A. ADMINISTRATIVE CORE: FACILITIES AND OTHER RESOURCES

**Frontiers Resources.** Frontiers has an impressive array of resources available to achieve its aims of engaging stakeholders, creating a sustainable translational research workforce and strengthening infrastructure to accelerate translational research. We draw on the considerable strengths of the University of Kansas Medical Center (Kansas City and Wichita campuses), the University of Missouri-Kansas City, Children’s Mercy Kansas City, and the Kansas City University of Medicine and Biosciences. In addition, we take advantage of a strong history of entrepreneurship investment in the Kansas City region (e.g., the Ewing Marion Kauffman Foundation, the UMKC Regnier Institute for Entrepreneurship and Innovation, the Kansas City Area Life Sciences Institute and the KU Innovation and Collaboration Center) to leverage drug, device, diagnostic, medical device and population health product development to achieve faster success. We have a plethora of community organizations, clinics, and providers across the region willing and excited to collaborate with Frontiers investigators, experts in entrepreneurship who will lead and train the next generation of successful business developers in the biomedical sciences and a growing cadre of team science-trained teams to work in emerging lifespan clinical and translational research. Please refer to the Overall Section of Facilities and Resources for a comprehensive description of Frontiers resources that are available to all Frontiers members.

Our Administrative Core is organized to provide central coordination for all Frontiers components and functions (see Figure FR-A.1.). Throughout the application, we have used our logo, a stylized compass, and component-specific color coding in all sections. This underscores the important interrelationships among and between components. For example, it provides an easy reference to how various trainings, resources and facilities are organized to provide seamless entrée for investigators and other partners. Another innovative strategy to improve accessibility of Frontiers resources is our Navigators who, under the direction of the Frontiers Administrative Director, are points of contact to work on behalf of investigators and community partners.

![Figure FR-A.1. Frontiers Components and Navigators](image-url)
**Administrative Core.** The Administrative Core of Frontiers: The Heartland Institute for Clinical and Translational Research is housed in the Fairway North building on the Fairway campus of KU Medical Center, just three miles from the main medical center campus. It occupies 3,430 square feet of space with six offices, five open workspaces, two collaborative spaces, and a conference room with video-conferencing capability (e.g., ZOOM, Go-to-Meeting).

Frontiers shares the building with several KUMC departments and offices that are central to the mission of the *Regulatory Knowledge and Support* component: Human Subjects Protection, Compliance, and the KUMC Research Institute’s Office of Sponsored Programs Administration, Clinical Research Administration, Office of Legal Services, and Financial Division. The building also houses the *Institute for Advancing Medical Innovation* (Frontiers optional module), and KU Innovation and Collaboration – an important contributor to Translational Workforce Development. Also on the Fairway campus, in a building across the street, are the *Participant Clinical Interaction’s Clinical and Translational Science Unit* and the Phase I trial operations of the KU Cancer Center.

These buildings are supported in part by a local county tax, Local citizens voted to that establish a 1/8th cent sales tax, in perpetuity, to generate ~$15M/year to support three areas of regional importance: clinical research; animal health and food safety; and business, engineering, science, and technology. The resulting *Johnson County Education and Research Triangle* (JCERT) – a visionary community and academic partnership – includes support for CTR and the Frontiers program.

**Frontiers Administrative Office.** The administrative team is responsible for day-to-day operations of Frontiers, and includes Drs. Brooks and Kimminau, the two associate directors, Kieran Pemberton, PhD, administrative director, a budget and finance specialist, an administrative assistant, and the communications coordinator (Figure FR-A.2). Frontiers office space will also be made for two new proposed navigators: the RTIU/TST Navigator and CE/ISP Navigator. Dr. Barohn will continue to meet twice weekly with the administrative team to provide rapid response to emerging issues and ensure all are informed regarding all Frontiers business. Dr. Pemberton provides the agenda for these meetings, with input from Drs. Barohn, Brooks, and Kimminau. These team meetings address fiscal, administrative, and communications issues, as well as coordination of Frontiers local and national activities with directors’ calendars. Agendas for the *Operations Group* and *SEAB* meetings are developed at these meetings. The frequency of these staff meetings provides for early identification of new opportunities and any concerns or problems within or between Frontiers components that need addressing.

**Frontiers Operations Group.** The *Operations Group* (Table FR-A.1), led by Dr. Barohn and facilitated by Dr. Kimminau is the primary decision-making body within Frontiers. It is made up of all of the Frontiers component and function leads. The *Operations Group* is responsible for managing intra- and inter-component issues, focusing on Frontiers’ operations regarding component use, interaction, and performance, and paying particular attention to evaluation reports and ideas for continuous improvement. Meetings are attended by the *Administrative Core* team (associate directors, administrative director, communications coordinator, and evaluation staff) to ensure efficient communication of new initiatives, challenges, and solutions. Dr. Pemberton also attends in his Lead Navigator captain’s role to ensure good communications with the Navigator team members across all components and functions. In Dr. Barohn’s absence, Dr. Brooks will chair the operations group and if both are absent, Dr. Kimminau will chair the operations group.

![Figure FR-A.2. Frontiers PI, R. Barohn and Associate Directors, W. Brooks and K. Kimminau.](image-url)
Frontiers Stakeholder Engagement Advisory Board (SEAB). The SEAB is the venue for Frontiers’ partners and affiliates, as well as community, family, patient and disease advocate stakeholders (see Table FR-A.2) to provide input into decision-making and participate in direction-setting for Frontiers. The SEAB has been actively involved in revising this application including attending our day-long retreat where each section was discussed and revisions suggested. The SEAB discusses needs and opportunities in our regional CTR community and in the CTSA network, and receives updates from each Frontiers component related to progress, challenges and opportunities. It functions as an active internal advisory board and ensures efficient inter- and intra-organizational communications. The Frontiers Administrative Core team attends SEAB meetings to answer questions, frame issues, and seek guidance. The Operations Group are optional attendees and will be required to be present if agenda items call for their participation.

Reflecting our commitment to strong integration of investigator, patient and community groups in the overall “thinking” of Frontiers, the SEAB is co-chaired by Thomas Curran, PhD, FRS, from our partner Children’s Mercy Kansas City, and Cheryl Jernigan, CPA, FACHE, our lead patient advocate. Dr. Curran directs the CMKC Research Institute. He came to Kansas City in early 2016.

<table>
<thead>
<tr>
<th>Component &amp; Function</th>
<th>Component &amp; (Function) Leader</th>
<th>Component Reporting line</th>
<th>Component &amp; Function Navigator</th>
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</thead>
<tbody>
<tr>
<td>OVERALL</td>
<td>Richard Barohn</td>
<td>Girod</td>
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</tr>
<tr>
<td>A. ADMINISTRATIVE CORE</td>
<td>William Brooks</td>
<td>Barohn</td>
<td>K. Pemberton</td>
</tr>
<tr>
<td>Organization, Governance, Collaboration and Communication</td>
<td>William Brooks</td>
<td>Barohn</td>
<td></td>
</tr>
<tr>
<td>Evaluation and Continuous Improvement</td>
<td>Kim Kimminau</td>
<td>Barohn</td>
<td>R. Liston</td>
</tr>
<tr>
<td>Quality and Efficiency</td>
<td>Kim Kimminau</td>
<td>Barohn</td>
<td></td>
</tr>
<tr>
<td>B. INFORMATICS</td>
<td>Russ Waitman</td>
<td>Brooks</td>
<td>T. McMahon</td>
</tr>
<tr>
<td>C. COMMUNITY AND COLLABORATION</td>
<td>Allen Greiner</td>
<td>Barohn</td>
<td>TBN</td>
</tr>
<tr>
<td>Community Engagement</td>
<td>Allen Greiner</td>
<td>Barohn</td>
<td>TBN</td>
</tr>
<tr>
<td>Collaboration and Multi-Disciplinary Team Science</td>
<td>William Brooks/ Kim Kimminau</td>
<td>Greiner</td>
<td>TBN</td>
</tr>
<tr>
<td>D. TRANSLATIONAL ENDEAVORS</td>
<td>John Spertus</td>
<td>Brooks</td>
<td>TBN-RTIU M. Hindle K. Pemberton A. Gialde</td>
</tr>
<tr>
<td>Translational Workforce Development (TWD)</td>
<td>John Spertus</td>
<td>Brooks</td>
<td></td>
</tr>
<tr>
<td>Pilot Translational and Clinical Studies Program (PTC)</td>
<td>Peter Smith</td>
<td>Brooks</td>
<td>K. Robertson</td>
</tr>
<tr>
<td>E. RESEARCH METHODS</td>
<td>Matthew Mayo</td>
<td>Brooks</td>
<td></td>
</tr>
<tr>
<td>Biostatistics, Epidemiology &amp; Research Design (BERD)</td>
<td>Matthew Mayo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regulatory Knowledge and Support (RKS)</td>
<td>Jamie Caldwell/ Karen Blackwell</td>
<td>Mayo</td>
<td>B. Murray</td>
</tr>
<tr>
<td>F. HUB RESEARCH CAPACITY</td>
<td>Sally Maliski</td>
<td>Barohn</td>
<td></td>
</tr>
<tr>
<td>Integrating Special Populations (ISP)</td>
<td>Sally Maliski/ Janette Berkle-Patton</td>
<td>Barohn</td>
<td>TBN</td>
</tr>
<tr>
<td>Participant and Clinical Interactions (PCI)</td>
<td>Jeffrey Burns/ Steven Leeder</td>
<td>Barohn</td>
<td>A. Lahner</td>
</tr>
<tr>
<td>G. NETWORK CAPACITY</td>
<td>Jeffrey Burns</td>
<td>Barohn</td>
<td>RTIU</td>
</tr>
<tr>
<td>Liaison to Trial Innovation Centers (LTICs)</td>
<td>Kieran Pemberton/ Karen Blackwell</td>
<td>Barohn</td>
<td>TBN</td>
</tr>
<tr>
<td>Liaison to Recruitment Innovation Centers (LRICs)</td>
<td>Patricia Kluding/ Jeffrey Burns</td>
<td>Barohn</td>
<td>TBN</td>
</tr>
<tr>
<td>H. OPTIONAL FUNCTION</td>
<td>Scott Weir/ Steven Leeder</td>
<td>Brooks</td>
<td>TBN</td>
</tr>
<tr>
<td>IAMI: Institute for Advancing Medical Innovations</td>
<td>Ed Ellerbeck/ John Spertus</td>
<td>Brooks</td>
<td>Beth Kerling</td>
</tr>
<tr>
<td>KL2 Institutional Career Development Core</td>
<td>Ed Ellerbeck/ John Spertus</td>
<td>Brooks</td>
<td>Beth Kerling</td>
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<tr>
<td>TL1 Training Core</td>
<td>WonChoi/ Steven Leeder</td>
<td>Brooks</td>
<td>Beth Kerling</td>
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</table>
bringing a wealth of experience, both as an investigator and as an administrator from his former position as co-PI of the University of Pennsylvania/Children’s Hospital of Philadelphia CTSA. Ms. Jernigan brings extensive local and national experience as a patient advocate. She is a 20-year breast cancer survivor and member of the Susan G. Komen Scientific Advisory Board. She also serves on a variety of national committees including the Clinical Trials Transformation Initiative Steering Committee and the Multi-Regional Clinical Trials Center Working Groups on Returning Clinical Trial Results to Patients and Returning Individual Results. We have had a long-standing relationship with Ms. Jernigan through her work as lead patient advocate for the newly initiated PIVOT project and for our PCORNet Greater Plains Collaborative.

Table FR-A.2 Frontiers Stakeholder Engagement Advisory Board

<table>
<thead>
<tr>
<th>NAME</th>
<th>AFFILIATION</th>
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</thead>
<tbody>
<tr>
<td>Cheryl Jernigan, CPA, FACHE, co-chair</td>
<td>Lead Patient Advocate, KU Cancer Center and Frontiers</td>
</tr>
<tr>
<td>Tom Curran, PhD, FRS, co-chair</td>
<td>Director, CMH Research Institute</td>
</tr>
<tr>
<td>Kelly Ranallo</td>
<td>Founder/President, Turner Syndrome Global Alliance; CMH Family Advisory Board</td>
</tr>
<tr>
<td>Sally Dwyer</td>
<td>Director of Programs/Services, The ALS Association Mid-America Chapter and Director, Midwest Neurology Alliance</td>
</tr>
<tr>
<td>John Carney</td>
<td>President and CEO, Center for Practical Bioethics</td>
</tr>
<tr>
<td>Craig Dietz, DO</td>
<td>Chief Medical Officer, KC Care Clinic</td>
</tr>
<tr>
<td>Ann Murguia</td>
<td>Elected Official, Commissioner Wyandotte County 3rd District</td>
</tr>
<tr>
<td>D. Charles Hunt, MPH</td>
<td>State Epidemiologist, Director Bureau of Epidemiology and Public Health Informatics, KDHE</td>
</tr>
<tr>
<td>Wayne Carter, DVM, PhD, DAVCIM</td>
<td>President and CEO, Kansas City Area Life Sciences Institute (KCALS)</td>
</tr>
<tr>
<td>Steven Kanter, MD</td>
<td>Dean, UMKC School of Medicine</td>
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<tr>
<th>NAME</th>
<th>AFFILIATION</th>
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<tbody>
<tr>
<td>Thomas Sack, PhD</td>
<td>President and CEO, MRIGlobal</td>
</tr>
<tr>
<td>Bob Page</td>
<td>President and CEO, University of Kansas Hospital (UKH)</td>
</tr>
<tr>
<td>Neeli Bendapudi, PhD</td>
<td>University of Kansas Provost and Executive Vice Chancellor, KU-Lawrence</td>
</tr>
<tr>
<td>David Chao, PhD</td>
<td>President and CEO, Stowers Institute for Medical Research and BioMed Valley Discoveries, Inc.</td>
</tr>
<tr>
<td>Robert White PhD</td>
<td>Dean, Kansas City University of Medicine and Biosciences</td>
</tr>
<tr>
<td>Robert Simari, MD</td>
<td>Executive Dean, KUMC School of Medicine</td>
</tr>
<tr>
<td>Abiodun Akinwuntan, PhD, MPH, MBA</td>
<td>Dean, KUMC School of Health Professions</td>
</tr>
<tr>
<td>K. James Kallail, PhD</td>
<td>Associate Dean for Research, KUMC School of Medicine—Wichita</td>
</tr>
<tr>
<td>Roy Jensen, MD</td>
<td>Director, KU Cancer Center</td>
</tr>
<tr>
<td>Dominique Pahud, MBA</td>
<td>Energizing Health</td>
</tr>
</tbody>
</table>

External Advisory Board (EAB). Frontiers’ EAB consists of outstanding, nationally-ranked clinical and/or translational investigators with considerable CTSA experience and expertise relevant to our specific focus areas (see Table FR-A.3). The EAB receives agendas and progress summaries prior to the meeting. Component leaders present updates, including successes and concerns, for advice and problem solving. The Frontiers evaluators also present on progress implementing Frontiers plans, reaching milestones, and areas needing attention. Following open and extensive discussion, the EAB meets with the Frontiers directors, the evaluator, and members of KUMC administration in closed session to provide

Table FR-A.3 External Advisory Board (EAB)

<table>
<thead>
<tr>
<th>NAME</th>
<th>AFFILIATION</th>
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</thead>
<tbody>
<tr>
<td>Julian Solway, MD</td>
<td>Director, Institute for Translational Medicine, University of Chicago</td>
</tr>
<tr>
<td>Bradley Evanoff, MD, MPH</td>
<td>Director, Institute for Clinical and Translational Sciences, Washington University in St. Louis</td>
</tr>
<tr>
<td>Gary Rosenthal, MD</td>
<td>Chair, Department of Internal Medicine, Wake Forest University</td>
</tr>
<tr>
<td>Nicole Boice</td>
<td>Founder and CEO, Global Genes</td>
</tr>
<tr>
<td>New appointee, TBN</td>
<td>Informatics specialist</td>
</tr>
<tr>
<td>New appointee, TBN</td>
<td>Integrating special populations specialist</td>
</tr>
</tbody>
</table>
immediate feedback and guidance. The EAB subsequently submits an extensive written report to the Frontiers director and our NCATS Program Officer.

The four regional Vice Chancellors from the University of Kansas Medical Center, University of Missouri- Kansas City, Kansas City University for Medicine and Bioscience and the University of Kansas (see Table FR-A.4) will comprise the new Regional Vice Chancellors for Research Council. They will convene regularly to ensure the presence and influence of Frontiers across all campuses.

**Children’s Mercy Kansas City (CMKC) Bridge Team.** We have created a CMKC-Frontiers Bridge Team because of the importance of CMKC to the Frontiers effort. Historically CMKC (formally known as Children’s Mercy Hospital (CMH)) is a University of Missouri affiliated institution (see Table FR-A.5). When Frontiers was created, Dr. Barohn brought CMKC into this process and created a number of new bridges between the two institutions across the state line. This ultimately led to the merge of the pediatric departments of CMKC and KUMC and the emergence of CMKC as a partner in the KC NCI Center and IAMI. In order to ensure good communication between Dr. Barohn and his Frontiers Administration Leadership Team and our CMKC Frontiers partners. We have established a CMKC-Frontiers Bridge team. This group consists of all CMKC faculty that have paid effort on the CTSA award and Drs Barohn, Brooks, and Kimminau. They will meet every other month.

<table>
<thead>
<tr>
<th>NAME/ CMKC</th>
<th>FRONTIERS ROLE</th>
<th>NAME/KUMC</th>
<th>FRONTIERS ROLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steven Leeder, PhD</td>
<td>TL1 Co-PI; IAMI Co-Director</td>
<td>Richard Barohn, MD</td>
<td>Frontiers, Principal Investigator and Director</td>
</tr>
<tr>
<td>Mark Clements, MD</td>
<td>Participant and Clinical Interactions-Hub Research Capacity Co-Director</td>
<td>William Brooks PhD</td>
<td>Frontiers, Associate Director-Administration</td>
</tr>
<tr>
<td>Sarah Soden, MD</td>
<td>Genomics Team Science Team Member- Community &amp; Collaboration</td>
<td>Kim Kimminau, PhD</td>
<td>Frontiers, Associate Director-Evaluation</td>
</tr>
<tr>
<td>Kathy Goggin, PhD</td>
<td>Frontiers Training Advisory Committee; Health Disparities &amp; Implementation Research - Research Navigator; ISP Workgroup Bridge Team-Hub Research Capacity - Co-Chair</td>
<td></td>
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</tr>
<tr>
<td>John Lantos, PhD</td>
<td>Ethics Team Science Team Member-Community &amp; Collaboration; Frontiers Training Advisory Committee; ISP Workgroup Bridge Team/Bio-Ethics-Hub Research Capacity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Susan Abdel-Rahman, MD</td>
<td>Frontiers Training Advisory Committee</td>
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</tbody>
</table>
B. INFORMATICS: FACILITIES AND OTHER RESOURCES

Frontiers Resources. Frontiers has an impressive array of resources available to achieve its aims of engaging stakeholders, creating a sustainable translational research workforce and strengthening infrastructure to accelerate translational research. We draw on the considerable strengths of the University of Kansas Medical Center (Kansas City and Wichita campuses), the University of Missouri-Kansas City, Children’s Mercy Kansas City, and the Kansas City University of Medicine and Biociences. In addition, we take advantage of a strong history of entrepreneurship investment in the Kansas City region (e.g., the Ewing Marion Kauffman Foundation, the UMKC Regnier Institute for Entrepreneurship and Innovation, the Kansas City Area Life Sciences Institute and the KU Innovation and Collaboration Center) to leverage drug, device, diagnostic, medical device and population health product development to achieve faster success. We have a plethora of community organizations, clinics, and providers across the region willing and excited to collaborate with Frontiers investigators, experts in entrepreneurship who will lead and train the next generation of successful business developers in the biomedical sciences and a growing cadre of team science-trained teams to work in emerging lifespan clinical and translational research. Please refer to the Overall Section of Facilities and Resources for a comprehensive description of Frontiers resources that are available to all Frontiers members.

University of Kansas Information Technology at the University of Kansas Medical Center, Information Resources (IR) provides researchers and faculty with critical technology infrastructure, as well as technical services and support. Recent technology improvements and relevant services include:

- KUMC has funded a $3.4M Network Infrastructure Upgrade, which brings 1-GB bandwidth to all desktops, as well as improves wireless coverage throughout the campus.
- To continue to address research needs for large amounts of reliable storage, KUMC recently funded a $2.5M Research and Employee File-Level Storage Expansion, providing long-term storage via expandable one-petabyte NAS with additional backend storage for backups.
- To further protect sensitive data and meet research obligations, KUMC has funded $2.4M for Information Security Architecture improvements.
- With our Acellion Secure File Transfer service, researchers can securely send and receive large files from colleagues at KUMC and/or external recipients.
- Proofpoint secure email is an encrypted messaging system that works seamlessly with the Medical Center’s existing email system. Secure email gateways encrypt email as it leaves the University’s private networks and heads out onto the Internet.
- The Barracuda Spam Firewall system has been expanded to further reduce SPAM e-mail messages, virus attachments, and phishing attacks aimed at compromising our researchers.
- KUMC SharePoint is a browser-based collaboration platform that includes document management, workflow management, and social networking.
- At KUMC, researchers can securely collaborate in real-time with both video (Polycom) and web (Adobe Connect) conferencing.
- Many IT policies and procedures are being reviewed and updated to ensure that our research mission is well protected and situated to remain competitive in the marketplace.
- Portable electronic device theft tracking and recovery options have been expanded to ensure that our research data is protected while at rest, while in transit, and if lost or stolen.

KUMC Continuing Education and Professional Development (CE/PD). CE/PD’s goal is to develop and deliver education that makes a positive difference in practice and patient outcomes. CE/PD provides continuing education directly related to the top practice concerns of Kansas’ primary care providers, and provides interprofessional education with a growing emphasis on team-based medicine. CE/PD is nationally accredited by the Accreditation Council for Continuing Medical Education and the American Nurses Credentialing Center. CE/PD is the largest provider of continuing medical education in Kansas. In FY 12,
CE/PD offered 81 courses, conferences or event series with an enrollment of 4,706. In addition, they supported 1,629 grand round sessions at KUMC, including broadcast via televideo of a number of sessions to metropolitan and rural sites across Kansas. Of note, CE/PD has accredited one of the most attended regional pediatric obesity conferences for the last decade, in addition to numerous grand rounds around obesity. CE has spearheaded two statewide initiatives that utilized training and performance improvement methodologies similar to the proposal in order to support adoption of national evidence-based guidelines in our rural and frontier communities. In particular, televideo technology supported team-based performance improvement activities and shared team learning because teams were geographically distributed across the states. One performance improvement initiative resulted in increased practice adoption of diabetes management practices and the second, while ongoing, is promising related to system-wide adoption of best practices in sepsis management.

**KUMC Department of Biostatistics.** The Department of Biostatistics occupies 6834 square feet of contiguous office space at the University of Kansas Medical Center located on the ground and 5th floors of the Robinson building as well as the 5th floor of the adjacent Wescoe building. This includes 20 lockable offices, two conference rooms and cubical spaces that can house up to twenty six staff/students. The Department of Biostatistics personnel consists of 13 biostatistics faculty members, 2 teaching associates, 4 research analysts, 4 information specialist personnel, 1 project manager, 2 administrators, and 1 administrative assistant.

**KUMC Division of Medical Informatics and Office of Enterprise Analytics.** The Division of Medical Informatics (MI) provides capabilities and expertise for clinical investigators and other health professionals in software engineering, data warehousing, data management and administration of clinical trial and electronic data capture systems. MI works with internal and external partners for consultation, training and access to tools enabling research data collection. MI tools and resources include:

- **HERON:** The Healthcare Enterprise Repository for Ontological Narration (HERON) is a method to integrate clinical and biomedical data for translational research. The MI team has distributed the open-source HERON framework to collaborators using the i2b2 (Informatics for Integrating Biology and the Bedside) software and have leveraged other open source environments to increase data transparency and reusability.

- **REDCap:** REDCap is used by more than 700 institutions in over 60 countries and has become a dominant tool for electronic data capture for research studies at most academic medical centers in the United States.

The Office of Enterprise Analytics (EA) provides business intelligence and other analytical support for planning and decision-making at the University of Kansas Medical Center (KUMC), and serves as the source for official data about the Medical Center.

EA manages and develops online reports within a QlikView environment, distributed to departments and upper management via a secure Access Point. Currently, EA offers reports on finance, payroll, commitments, and extramural research (summary and detail reports, research efforts), as well as reports designed for executives at the Medical Center (e.g. All Sources/All Spends). The EA staff possesses enhanced skills in data mining, analysis, and reporting, with backgrounds in academics, data management, finance and accounting, and application development.

Together, the Division of Medical Informatics and the Office of Enterprise Analytics occupy a total of 4,228 square feet on the third floor of the Student Center: Medical Informatics occupies 2,276 square feet; Enterprise Analytics occupies 1,055 square feet; and both departments share 897 square feet.

**KUMC Center for Health Informatics.** The University of Kansas Center for Health Informatics (KU-CHI) is an interprofessional center of excellence designed to advance health informatics through knowledge, integration, research and empowerment of faculty and students in the expanding field of biomedical science and information technology.
Continuing education, consultation and staff development workshops/seminars designed to advance healthcare informatics are sponsored or co-sponsored through the Center.

In collaboration with clinicians and clinical care agencies the Center supports the development and integration of clinical care tools for all aspects of patient care, including inpatient, outpatient, public health, home health and extended care.

Consultations services related to planning, implementation and evaluation of health Informatics solutions in academic and practice settings are available through the Center.

Research related to innovations in information systems development that improve the quality of healthcare via risk reduction, health enhancement or organizational efficiency are a primary focus.

KUSM-W Computer Resources. Computer resources are provided by the KUSM-W Office of Information Technology (IT). These resources are linked to the information technology department at KUMC in Kansas City. Thus, KUSM-W has full access to all institutional IT resources. Locally, the Office of Information Technology develops computer-based tools and provides IT education and support in the areas of data retrieval, storage, manipulation, composition, production, and distribution. They support mobile and remote technology including interactive television, smartphone applications, and audience response systems.

KU Information Technology (KU IT) at the Lawrence campus supports the academic and research missions of the University of Kansas by providing a broad range of technology services, tools and infrastructure that support research, learning, scholarship and creative endeavor. KU IT includes a 24/7 enterprise data center and knowledgeable staff with expertise in server and desktop support, application support, software development, IT security, networking, customer support and project management.

Collaboration and communications among KU researchers and colleagues at other institutions is paramount. KU IT has completed a number of projects in recent years to support research and facilitate collaboration on campus and around the world:

- Significantly expanded Wi-Fi on the Lawrence campus, including in core research buildings.
- Joined the eduroam global consortium, which allows KU researchers to use their KU credentials for logging in to Wi-Fi at eduroam partner institutions around the world, and allows visiting researchers from eduroam partners to access KU’s fast and secure Wi-Fi network.
- Upgraded older optical fiber backbone cabling to modern single-mode fiber in a number of buildings, allowing for gigabit connectivity and room for future expansion and growth.
- Upgraded bandwidth to multiple 10 Gb connections within and between research buildings, as well as from campus to the outside world.
- Completed a redundant optical fiber loop on KU’s West Campus to provide speed, bandwidth and capacity for growth to support discovery and innovation in up to 20 current or future buildings.
- Partnered with KU’s Information & Telecommunications Technology Center and the Office of Research to create the Center for Research Computing, which identifies and delivers cross-functional technology services and support to meet the needs of researchers.
- Provides high-performance, easily accessible file sharing and storage for KU research projects, research groups and service labs that need terabytes of secure, scalable data storage.
- KU has a dedicated team to provide workstation and other technology support to researchers. In addition, a Research Dashboard in KU’s portal provides 24/7 access to IT and other information needed for completing successful research grant applications. The dashboard includes a PI Proposal Checklist and links to other important resources.
**CMKC Center for Pediatric Genomic Medicine.** The Center for Pediatric Genomic Medicine at Children's Mercy Kansas City was formed in January 2011 under the direction of Stephen F. Kingsmore, MB, ChB, BAO, DSc, FRCPath. Dr. Kingsmore previously served as CEO of the National Center for Genome Resources in Santa Fe, NM. Over the next five years, plans call for the Center to grow to one of the largest pediatric genome centers in the US. All of the Center's operations will be CLIA and CAP-compliant. Procedures, workflows, and documentation is currently being developed to substantiate compliance. The Center moved into approximately 16,000 sq. ft. of space at the Crown Center office complex, which is immediately adjacent to the Hospital, in the fourth quarter of 2012, and now offers CLIA-approved next-generation sequencing diagnostic support (effective January, 2013).

Since December 2010, the Center has purchased more than $5 million of capital equipment. The software systems and workflows have been developed de novo at CMKC by personnel who previously worked with Dr. Kingsmore when he was at the National Center for Genome Resources, Santa Fe, NM. The capital equipment bundle was designed as CLIA-compliant service "modules", includes two Illumina HiSeq 2500s, an Illumina HiSeq 2000, two Illumina MiSeqs and a cBot, two custom-designed Caliper Sciclone G3 liquid handling robots (one for CLIA-compliant 96plex library preparation, incorporating Agencourt SPRI magnetic bead separation, the other for CLIA-compliant Agilent 96plex SureSelect target enrichment), a Bio-Rad CFX96 real-time PCR detection system (for library QC and enrichment QC), Caliper Lab Chip GX (for 96plex library QC), Covaris LE220 96-well plate DNA sonication system, Nanodrop S2000 spectrophotometer, four Bio-Rad MyCycler thermocyclers, five vortex mixers, seven minicentrifuges, two isotemperature dry baths, 1 digital water bath, one upright -80°C freezer, two -20°C freezers and two refrigerator-freezers, and compute resources.

The Center's computer resources are located within a dedicated data center with environmental controls, 15 tons of air conditioning, conditioned power, hospital emergency back-up power and 45kVa UPS capability. The compute resources comprise a 608-core Linux compute cluster with 6TB of DDR3 RAM and 20TB SATA hard drives (20 x 12-core Intel Xeon X5670, 8 x 16-core Intel Xeon E5-2660 and 12 x 20-core Intel Xeon E5-2660 ), redundant head nodes (12-core Intel Xeon X5670 with 48GB RAM and 500GB SATA drive), a pipeline server (12-core Intel Xeon X5670 with 96GB RAM and 1TB SATA hard drive), Isilon X400 storage system with 810TB usable capacity, SGI Infinite Storage Gateway disaster recovery and backup appliance with 160TB usable capacity, Spectra Logic T950 tape library with 2.4PB uncompressed usable capacity, redundant web servers (12-core Intel Xeon X5670 with 48GB RAM and 500GB SATA drive), and database server (12-core Intel Xeon X5670 with 96GB RAM and 16TB SATA drives) on which are deployed the LIMS, GATK, GSNAP, CASAVA, SSAGA, CMKC variant warehouse, RUNES and VIKING software systems. The data center is adjacent to the room housing the DNA sequencers, which also features environmental controls to maintain ambient temperature at 65 degrees C, conditioned power, hospital emergency back-up power and substantial UPS capability.

**CMKC High-throughput Research Genotyping and Sequencing Core.** The CMKC High-throughput Genotyping and Microarray Facility is directed by Shui Qing Ye, MD, PhD. Dr. Ye is the principal investigator in a NHLBI/NIH-funded R01 project and has more than 25 years of experience in biomedical research. Previously, he served as the Director of the Gene Expression Profiling Core in the Center of Translational Respiratory Medicine at Johns Hopkins University School of Medicine (2001 to 2005) and as the Director of the Molecular Resource Core in a NIH funded Program Project Grant on Lung Endothelial Pathobiology at the University of Chicago Pritzker School of Medicine (2005 to 2007). He recently edited a book entitled "Bioinformatics-A Practical Approach", which was published by CRC Press with highly positive reviews and covers most translational bioinformatics topics with 25 expert contributing authors from nine different world-class institutions of six different countries.

Major equipment in the facility includes an Illumina HiSeq 1500 next generation sequencing system; a 7th generation real-time PCR system, Viia™ 7 Real-Time System (Applied Biosystems), Experion™ System (BioRad) for assessment of RNA and DNA quantity and quality, Epoch Microplate Spectrophotometer (BioTek); an ECIS Z Theta electric cell-substrate impedance sensing (ECIS) instrument and its accessories (Applied BioPhysics) to automate tissue culture research by measuring the impedance of mammalian cells cultured on small electrodes; New Lab Alliance APLC system for the purification of recombinant proteins and cellular protein; TriStar LB 941 (Berthold Technologies) for absorbance, luminescence, and fluorescence detection,
Alphaimager (Alpha Innotech) for documenting DNA-, RNA- agarose and protein SDS-PAGE gel images and western blotting results; an Olympus IX 71 fluorescence microscope, Olympus CKX31 inverted and a Leica Dissecting Microscope as well as Sanger sequencing capabilities (Applied Biosystems 3130 sequencer).

These resources are located within a dedicated data center with environmental controls, conditioned power, and hospital emergency back-up power. There is one head node with six compute nodes installed in a dedicated rack with room for several more nodes. The compute resources comprise a 96-core cluster with 384GB of DDR3 RAM and 48TB SATA hard drives (6 x dual 8-core Intel Xeon E5-2670 “Sandy Bridge” 2.6GHz processors), Quantum SuperLoader3 2U 16 tape library for backups. Deployed on the cluster are the latest versions of GATK, CASAVA, Bowtie, TopHat, Cufflinks, R with CummeRbund, Python with NumPy and SciPy, BreakDancer, Plink, and Haploview software applications.

Additionally, i2b2 is available at CMKC (internally recognized as DORA) and UMKC now for investigators as noted in the Informatics section narrative.
C. COMMUNITY AND COLLABORATION: FACILITIES AND OTHER RESOURCES

**Frontiers Resources.** Frontiers has an impressive array of resources available to achieve its aims of engaging stakeholders, creating a sustainable translational research workforce and strengthening infrastructure to accelerate translational research. We draw on the considerable strengths of the University of Kansas Medical Center (Kansas City and Wichita campuses), the University of Missouri-Kansas City, Children’s Mercy Kansas City, and the Kansas City University of Medicine and Biosciences. In addition, we take advantage of a strong history of entrepreneurship investment in the Kansas City region (e.g., the Ewing Marion Kauffman Foundation, the UMKC Regnier Institute for Entrepreneurship and Innovation, the Kansas City Area Life Sciences Institute and the KU Innovation and Collaboration Center) to leverage drug, device, diagnostic, medical device and population health product development to achieve faster success. We have a plethora of community organizations, clinics, and providers across the region willing and excited to collaborate with Frontiers investigators, experts in entrepreneurship who will lead and train the next generation of successful business developers in the biomedical sciences and a growing cadre of team science-trained teams to work in emerging lifespan clinical and translational research. Please refer to the Overall Section of Facilities and Resources for a comprehensive description of Frontiers resources that are available to all Frontiers members.

**The Kansas Patients and Providers Engaged in Prevention Research (KPPEPR) Network.** The Kansas Patients and Providers Engaged in Prevention Research (KPPEPR) Network is a collaborative of patients and professionals from geographically diverse communities across Kansas. All KPPEPR Network members are primary care patients, providers, public health and/or agency professionals involved directly in health-related activity on a daily basis. The network is led by an Executive Director, Anthony Wellever, at the University of Kansas Medical Center (KUMC), where an additional group of senior research faculty (Drs. Allen Greiner, Kim Kimminau, Edward Ellerbeck, Christie Befort and Joseph LeMaster) provide support and technical assistance on all projects. The network is further supported by the Frontiers translational science program and it’s Community Partnership for Health initiative. Over the past 15 years, the KPPEPR Network has relied on collaborative involvement of over 60 primary care practices, thousands of patients and scores of public health and other health service agencies.

Prior projects have utilized patient and physician surveys, office assessments, direct observation of primary care, key informant interviews, and qualitative data collection methods. Nearly all of these projects have been initiated by academic researcher faculty at KUMC. The projects have resulted in a host of scientific publications and abstracts since Drs. Greiner and Ellerbeck became involved in 1999. The KPPEPR Network has been utilized to study the delivery of preventive services in physician’s offices, including colorectal cancer screening, counseling on diet and physical activity and smoking cessation counseling. In 2004 and 2005, KPPEPR practices participated in an NIH-funded study to examine the impact of disease management on smoking cessation in rural primary care practices. This study recruited 50 rural clinics, 63 health care providers, and 750 participants for a 2-year trial using motivational interviewing for smoking cessation (CA101963). Several NIH-funded intervention studies followed over of the next four years. In three other separate studies (HS14857, CA121016, HL87643) 68 rural clinics and 1,340 participants were recruited and delivered health related interventions via phone and telemedicine. Most recently, in 2015 KPPEPR became the primary network for a $10 million dollar PCORI funded intervention (Befort, PI) to study the comparative effectiveness of three practice change strategies for weight loss among rural primary care patients.

The KPPEPR Network has utilized several unique research methodologies over the years. These include home visit data collections by research assistants, hospital and primary care practice interventions and the involvement of medical students in research activities and intervention delivery. In 2014, KPPEPR leaders, began a network reorganization to systematically involve patients, and an interdisciplinary group of health care providers and public health professionals as network leaders and active participants. The intention of these changes is to begin conducting projects that are instigated at the behest of patients and providers, rather than as conceptualized by full time researchers. The reorganization should result in a shared decision-making process whereby all parties have an equal voice and are valued as contributors throughout the research process. By reorienting the network to more fully serve the needs of patients and “on the ground” service providers, KPPEPR is poised to make significant contributions to evolving health care reform and new research initiatives such as the Federal Patient Centered Outcomes Research Institute, which seek to answer health research questions with immediate application for improving patient oriented outcomes.
K-State Research and Extension. K-State Research and Extension is a statewide network of educators sharing unbiased, research-based information and expertise on issues important to Kansans. It has established local, state, regional, national, and international partnerships. It is dedicated to a safe, sustainable, competitive food and fiber system and to strong, healthy communities, families, and youth through integrated research, analysis and education. With more than 125 years of research and 100 years of extension, K-State Research and Extension has been improving the quality of life and standard of living for Kansans for a century. This integrated system connects the university to every county through locally based educators who serve as sources of objective information. In partnership with the Community Engagement function, researchers are working to collaborate with K-State Extension agents to increase enrollment in clinical trials, participation in community health initiatives and to encourage enrollment in Frontiers’ patient registry, “Pioneers.”

The American Academy of Family Physicians National Research Network (AAFP NRN) and MOSAIC Center of Excellence. The American Academy of Family Physicians National Research Network (AAFP NRN) and MOSAIC Center of Excellence was established in 1999 to conduct, support, promote, and advocate for primary care research in practice-based settings.

The AAFP NRN assists in realizing overall strategies for achieving improved primary care for the nation. These include: supporting initiatives in advancing the Patient Centered Medical Home, promoting an ongoing effort for practice change through improved use of technology, education and communication; assisting our members to achieve financial success through optimal practice management; involving family physicians in targeted public health activities; and increasing member and patient awareness of resources through educational programs.

Within the American Academy of Family Medicine National Research Network (based locally in Leawood, KS) we have 1 of 8 national centers of excellence in practice-based research (Kimminau, P30 HS21647) that provide access for Frontiers investigators to nine regional and three national PBRNs that include primary care, dental, pharmacy, and dietetics research networks.

The AAFP NRN is working to gain a broader perspective from the patients’ point of view as it relates to the focus of family medicine and family medicine research. This perspective will provide better insights into the concerns and needs of patients and further help us to understand and improve the patient/physician relationship. AAFP members work with the patient/family dynamic every day. Engaging patients in their own care is the foundation of what family medicine does. Including the patients’ view throughout our research processes is a key component if we are striving for improvements in health care and health outcomes. Getting their perspective throughout the various phases will provide us with insights into health concerns, important areas for research and benefits to the patient, and ultimately improved care.

Center for Excellence in Health Communication to Underserved Populations (CEHCUP). Health disparities constitute a major problem for the United States. More focused research, as well as advanced training for communicators (be they journalists, advertising or public relations practitioners) is needed. The William Allen White School of Journalism and Mass Communications has established the Center for Excellence in Health Communication to Underserved Populations on the KU-Lawrence campus to promote dedicated student training as well as collaborative research and service to the community to address health disparities in the state of Kansas and abroad.

CEHCUP has three major roles:

- Educate and train undergraduate and graduate students in journalism and strategic communication about health communication practices to underserved populations and CBPR-driven approaches.
- Function as a research hub to facilitate interdisciplinary, multidisciplinary and cross-disciplinary research into communication practices for health campaigns addressing underserved populations.
- Provide support, assistance and know-how for community-based organizations that want to engage in health promotion or disease prevention activities.

KUMC Office of Rural Health Education. KUMC Office of Rural Health Education partners with health care providers, Kansas employers, and stakeholders to increase access to quality health care for the people of rural and urban underserved Kansas. We do this by advancing the health care workforce through recruitment, retention, research and education. Let us help you find Kansas health care jobs, loan forgiveness and repayment options, temporary coverage for medical professionals, committed providers for your hospital or clinic, and more.
KCK Community Health Council. KCK Community Health Council (CHC) exists to improve health and health care for the people of Wyandotte County. We believe that residents have the ability, and an inherent right, to provide leadership in the shaping of physical spaces and public policies which impact their health. CHC’s responsibility is to ensure the collective experiences and expertise of Wyandotte County residents are represented in matters of health design and policy, as well as identify and maximize opportunities for collaboration, planning and implementation of effective community health improvement initiatives.

CHC is a non-profit, 501 (c) (3) community health collaborative of hospitals, safety net clinics, federally-qualified health clinics (FQHCs), mental health providers, public health departments, academic research institutions and health care funding organizations. CHC member institutions support the work of the organization on a pre-determined pledge that is renewed each fiscal year.

The University of Kansas Cancer Center has been selected for National Cancer Institute (NCI) designation. NCI designation enhances the long-standing relationship of the Cancer Center with the Midwest Cancer Alliance, providing opportunities to expand research and link discoveries made in the lab at the University of Kansas to the MCA network of hospitals and health care organizations and enhance the quality and delivery of cancer care at all levels. KPPEPR (Kansas Patients and Providers Engaged in Prevention Research) is a practice-based research network that is also part of the MCA.

All MCA-member medical professionals have access to second opinion and consultation services with multi-disciplinary cancer experts, conferences and other networking events, outreach programs, patient navigation support, communication materials, web resources, and continuing education programs. For the convenience of our affiliated medical professionals, the MCA provides many of these services at member locations, thanks to technology like Interactive Televideo (ITV).

Genesis Health Care Network, Garden City, Kansas (Finney County, KS). The Genesis Health Care Clinic Network is the operator of the largest rural primary care network serving Hispanics and refugees in Kansas. Serving over 9,500 patients annually through six clinics throughout southwest Kansas, with more than 90 percent of these individuals below the 200% poverty level and as the leading ambulatory “safety-net” care provider for these underserved individuals and families in the region, Genesis recognizes the importance of health care and social services for clients. The flagship Genesis clinic, in Garden City, rests in a region where 5 large counties now have majority minority populations. Meat packing, and feedlot growth over the past 30 years has led to an influx of Latinos and refugees from across the globe. The incredible diversity in the region has shaped Genesis. All programs -- dental and medical clinics, oral health screening and education, social services such as the food bank, clothing room, emergency assistance, citizenship classes, immunizations, early literacy, health education and outreach -- are designed to improve the lives and health status of individuals and families.

KUMC faculty began collaborative work with Genesis over 14 years ago. Dr. Kimminau, while Vice President of Research at the Kansas Health Institute in 2002, conducted the Minority Health Disparities in Kansas project and completed focus groups and health assessments at Genesis clinics. For over 12 years, we have placed medical students in the Genesis Garden City Clinic for a six week summer practice/research experience. We worked with Genesis to recruit smokers from the clinic for the NCI-funded KanQuit smoking cessation study (PI, Ellerbeck) in 2005-2007. We partnered with Genesis and other primary care clinics on the tablet computer delivered Healthy Living colorectal cancer screening program in 2007 (NCI, PI, Engelman). In 2009, we began working with Genesis to deliver state of the art telemedicine smoking cessation counseling services in the Connect to Quit study (NHLBI, PI, Richter). The past six years the Genesis network has been a subcontracted primary partner in the NCI-funded Community Networks Program Center to reduce cancer disparities (U54 CA154253, PI, Greiner). Through this we worked with Genesis to develop a Community Health Worker program that is now self-sustaining. We have new partnership funding from CMS to conduct health promotion across the region. We expect our research partnership with Genesis to continue and to allow work on vulnerable and understudied rural populations.

Institute for Community Engagement (ICE). ICE is the KUMC outreach and service delivery infrastructure that spans over 100 staff across five departments (Area Health Education Centers, Center for Telemedicine & Telehealth, Continuing Education, Rural Health, and Research & Scholarship). ICE coordinates outreach across the School of Medicine, School of Nursing, and School of Health Professions and there is a strong interprofessional focus across activities. Collectively, the Institute departments and its extensive internal and external partners provide needs-driven educational and clinical services that span the entire state and reach into each of Kansas’ 105 counties. The Institute’s mission is to "improve the health of Kansans through
communication, collaboration, and statewide partnerships." The mission spans enhancing student education, strengthening the health care workforce, researching to improve health, advancing health care access, and serving communities. The Institute works closely with KU Hospital to advance integration and health system models. ICE’s departments and partners work with and help CPH facilitate community engaged research from concept to proposal implementation, including site/practice recruitment and retention, training, as well as reporting findings back to communities.

**KU Center for Telehealth and Telemedicine (KUCTT).** Using the range of telehealth technologies, KUCTT provides Kansans access to the best available health care while providing Kansas’ health care professionals access to the best available health information and education. Kansas is the ideal state for telemedicine, with half of its population in two population centers and the other half located throughout 88 rural counties. From the very first consult in 1991 to present day, the KUCTT continues to expand its clinical services for children and across the lifespan. With more than 40,000 consults across 60 specialties from 1991 to present, KUCTT is a leader in the telemedicine field. The existing network connects some of the most clinically underserved communities, effectively enhancing Kansas’ quality of healthcare. Urban and rural telehealth partners include schools, area health education centers, hospitals, early intervention satellite sites, community health clinics, mental health facilities, and other venues. KUCTT is one of the most active outpatient telemedicine programs in the country, with over 4,000 clinical consults per year across secure room-based, PC-based, and mobile telemedicine platforms. KUCTT also oversees the federally funded Heartland Regional Telehealth Center, spanning telehealth services across Kansas, Missouri, and Oklahoma.

**Area Health Education Centers (AHECs).** The AHECs are academic-community partnerships that train health care providers at sites and in programs that are responsive to state and local needs around health topics. The AHECs enhance the quality and accessibility of health care services in Kansas through partnerships with communities, health care professionals and organizations, educational institutions and other interested individuals and agencies. The three offices are geographically distributed across the East (Pittsburg, KS office), West (Hays, KS office), and Northeast (Lawrence, KS office). Rural Kansas has a diverse underserved population, with high poverty in southeast rural areas, a population faced with economic challenges related to downturns in farming and oil in central and northwest Kansas, and a new immigrant population associated with meat packing and other industries in southwest Kansas. The AHECs have a strong local presence in each of these regions to meet needs unique to the area. AHECs link the resources of university health science centers with local planning, educational, research, and clinical resources. This network of health-related institutions provides multidisciplinary educational services to students, faculty and local practitioners, ultimately improving health care delivery in medically underserved areas. From 2009-2011, the AHECs completed 468 education/training initiatives with 1,980 sessions and processed 29,792 continuing education enrollments from every county in Kansas. The AHECs have leveraged their strong rural relationships to support recruitment and retention of rural practices in previous rural primary care research related to epilepsy, pediatric cancer, smoking cessation, and other topics.

**KUMC Continuing Education and Professional Development (CE/PD.).** CE/PD’s goal is to develop and deliver education that makes a positive difference in practice and patient outcomes. CE/PD provides continuing education directly related to the top practice concerns of Kansas’ primary care providers, and provides interprofessional education with a growing emphasis on team-based medicine. CE/PD is nationally accredited by the Accreditation Council for Continuing Medical Education and the American Nurses Credentialing Center. CE/PD is the largest provider of continuing medical education in Kansas. In FY 12, CE/PD offered 81 courses, conferences or event series with an enrollment of 4,706. In addition, they supported 1,629 grand round sessions at KUMC, including broadcast via televideo of a number of sessions to metropolitan and rural sites across Kansas. Of note, CE/PD has accredited one of the most attended regional pediatric obesity conferences for the last decade, in addition to numerous grand rounds around obesity. CE has spearheaded two statewide initiatives that utilized training and performance improvement methodologies similar to the proposal in order to support adoption of national evidence-based guidelines in our rural and frontier communities. In particular, televideo technology supported team-based performance improvement activities and shared team learning because teams were geographically distributed across the states. One performance improvement initiative resulted in increased practice adoption of diabetes management practices and the second, while ongoing, is promising related to system-wide adoption of best practices in sepsis management.

**Department of Family Medicine.** This growing department is housed within three separate areas of the KU Medical Center complex. The research division, under Dr. Greiner’s direction, occupies a 2400 square foot office suite within the KUMC Endowment Building. The Division has seven full time faculty investigators and
over twenty staff with experience in health disparities research and community outreach. The Department now ranks within the top ten family medicine departments in the U.S. in NIH funding. Two research division faculty members maintain clinical practices and each of the other five members is experienced in partnering with organizations and agencies to improve health. All research division staff have been hired with the intent of building a translational health disparities program studying prevention, social determinants, cancer and chronic diseases. These staff have expertise in health informatics, community based participatory research, minority participant recruitment, and biospecimen collection. The research division has been the primary home for the community engagement program within the KUMC Clinical and Translational Science Award, Frontiers, for over five years. The clinical portion of the Department of Family Medicine resides on the entire first floor of the recently completed medical office building. A large suite of faculty offices and educational program offices is housed separately in the Delp Building. This area also provides additional conference room and small classroom space for meetings and training sessions.

**Wyandotte County Safety-Net Clinic Coalition.** The Wyandotte County Safety-Net Clinic Coalition is a group of clinics serving low income individuals in Wyandotte County. The group has collaborated with multiple KUMC investigators on NIH funded projects over the last fifteen years. It includes two federally qualified community health center clinics run out of the Swope Health Services central location in Kansas City, Missouri. The clinics provide the vast majority of health care needs for the uninsured population of Kansas City, Kansas. This population segment is predominately minority with a rapidly growing Latino component. The coalition meets monthly and is currently working on collaborative programs to test the impact of community health workers on patient outcomes. The group has a shared patient database and referrals system. A number of local physicians and community leaders regularly attend coalition meetings and contribute to joint projects. The coalition works closely with the Wyandotte County Community Health Council. Swope Health Services has been extensively involved with coalition activities and has moved their largest Kansas City, KS clinic to a new location to facilitate expansion of services. Swope Parkway Health Center, Kansas City, Missouri is a federally qualified community health center with Pediatric, OB/GYN, General Medicine, Ophthalmology, Mental and Behavioral Health, and Community Outreach clinics. The Center also has a full service on-site pharmacy. Services are provided to patients with Medicare, Medicaid, and to the uninsured on a sliding scale fee schedule. Swope Central had 16,324 total visits and 7,138 unique patient visits in 2004. Swope Wyandotte Clinic, Kansas City, Kansas is a satellite office for Swope Central and serves as the primary federally qualified community health center in Kansas City, Kansas. The Clinic has recently moved into new office space and has expanded services. Services are provided to patients with Medicare, Medicaid, and to the uninsured on a sliding scale fee schedule. Swope Quindaro Clinic Kansas City, Kansas is a satellite office for Swope Central and serves a very low income section of the urban core in Kansas City, Kansas. Services are provided to patients with Medicare, Medicaid, and to the uninsured on a sliding scale fee schedule. Duchesne Clinic Kansas City, Kansas is a clinic operated by the Sisters of Charity of Leavenworth, a non-profit health care services organization that also runs several hospitals in the plains and western plains regions of the United States. The clinic only sees patients who have no insurance coverage. Southwest Boulevard Family Health Care Kansas City, Kansas is a full service primary care clinic. The clinic serves patients with Medicare, Medicaid, private insurance, and those with no insurance on a sliding scale fee schedule. The Wyandotte County – Kansas City, Kansas Unified Government Health Department operates Pediatrics, OB/GYN, Family Planning, Immunization, and STD clinics for those with Medicare, Medicaid, and the uninsured. Dr. Greiner serves as the health department’s medical officer.

**Kansas City CARE Clinic.** The KC CARE Clinic was formed in 1971 as a private 501(c)(3) organization to promote health and wellness by providing quality care, access, research, and education to the underserved and all people in our community. The clinic provides health care services in general medicine, HIV prevention and primary care, behavioral health, and dentistry with a full-time staff of 105 as well as over 1,200 volunteers. Full- and part-time staff includes two full-time physicians, six nurses, five nurse practitioners, 22 case managers, six behavioral health providers, seven community health workers, one dentist, one dental assistant, and seven prevention specialists. In 2014, 8,000 patients received primary care, mental and/or dental services at two clinic locations, both in underserved areas of the city. KC Care maintains relationships with many academic institutions in the area, allowing medical students from KUMC, KCU, UMKC, and other schools to gain experience in the clinic under professional supervision.

**Silver City Health Center.** Silver City Health Center offers affordable, high-quality primary care, in-depth clinical evaluation, and a range of program-specific health services to English and Spanish-speaking residents of Wyandotte and Johnson counties. The Center provides primary health care and health education resource
access to individuals without insurance, as well as to those with government or private health insurance coverage.

Located in the Argentine community of Kansas City, Kan., the center employs skilled health care professionals from the KU Schools of Health Professions, Medicine and Nursing.

**Haskell Indian Nations University.** Haskell Indian Nations University (HINU) is the premiere tribal university in the United States, offering quality education to Native American students. Haskell's student population averages about 1000 per semester, and all students are members of federally recognized tribes. Haskell's faculty and staff is predominantly native. Haskell offers Associate and Bachelor's degrees. Haskell’s historic campus is centrally located in Lawrence, KS in what is known as Kaw Valley. The mission of Haskell Indian Nations University is to build the leadership capacity of their students by serving as the leading institution of academic excellence, cultural and intellectual prominence, and holistic education to address the needs of Indigenous communities.

**Mid-America All Indian Center.** The Mid-America All-Indian Center serves as a cultural center and museum dedicated to educating people about and preserving the heritage of the American Indian.

**Heart of American Indian Center.** The mission of the Kansas City Indian Center is to encourage social, educational, and economic advancement of the American Indian community by promoting traditional and cultural values.

The Kansas City Indian Center (Heart of America Indian Center), a 501(c) (3) non-profit corporation, has been serving the Kansas City's American Indian population since 1971.

Today the Center remains dedicated to the following goals:
- provide health, welfare and cultural services to American Indian individuals and families of our community;
- promote fellowship among the American Indian people of all tribes living in the Kansas City Area;
- stimulate the natural integration of the American Indian into the community;
- encourage artistic and vocational pursuits by American Indian people; and
- preserve and foster traditional American Indian cultural values.

Services Available - Emergency Services for Low-Income American Indians, including Food Pantry and Holiday Baskets, emergency telephone calls to Reservation or Nation and referrals to additional services; and the Morningstar Substance Abuse Outpatient and Prevention Program.

**Mexican Consulate.** JUNTOS, Drs. Paula Cupertino and Allen Greiner collaborate with the Mexican Consulate and the *Ventanilla de Salud* program in Southwest Kansas. They provide health fairs, screening services and health assessments of individuals seeking services from the Consulate and thereby keep a high level of surveillance on this vulnerable population’s health status.

**ALS Mid-America Chapter.** Leading the fight to treat and cure ALS through global research and nationwide advocacy while also empowering people with Lou Gehrig’s Disease and their families to live fuller lives by providing them with compassionate care and support.

**Muscular Dystrophy Association.** The Muscular Dystrophy Association (MDA) is an American organization which combats muscular dystrophy and diseases of the nervous system and muscular system in general by funding research, providing medical and community services, and educating health professionals and the general public. The organization was founded in 1950 by a group of concerned parents of children with muscular dystrophy.

**Leukemia/Lymphoma Society.** The Leukemia & Lymphoma Society (LLS) is the world's largest voluntary health agency dedicated to blood cancer. The LLS mission: Cure leukemia, lymphoma, Hodgkin's disease and myeloma, and improve the quality of life of patients and their families. LLS funds lifesaving blood cancer research around the world and provides free information and support services.

**Community Living Opportunities.** Community Living Opportunities, Inc. (CLO) is a non-profit community organization that provides community living, day habilitation, in-home support and targeted case management services for over 300 people with developmental disabilities and employs more than 400 staff members. It was
formed in 1977 as an alternative to state institutions and became one of the pioneers in providing community-based services to people with developmental disabilities. Their services include targeted case management, residential services, which includes family-teaching and extended family-teaching homes, day services, behavioral consultation, children’s services, health care services, training and staff certification and organizational behavior management consulting. CLO operates seven group homes in Johnson County, Kansas (the metropolitan Kansas City area) and seven group homes in Douglas County, Kansas (Lawrence). CLO’s Early Childhood Autism Program (ECAP) provides in-home, intensive early intervention for 22 children with autism.

**Cottonwood, Inc.** Cottonwood Inc. is a not-for-profit community organization that provides services to people with developmental disabilities in Douglas and Jefferson County, Kansas. In their dual role as community service provider and the Community Developmental Disabilities Organization, Cottonwood is the single point of referral for people with developmental disabilities seeking services. Cottonwood provides services and support to people with developmental disabilities in their living and work environments in the community. Residential services encompass group living, supported living, semi-independent living, and recreation/leisure activities. Support Services include medical care, mental health care, advocacy, habilitative therapies, financial entitlements, transportation, employment, housing, recreation, and adult education. Employment services and work services assist people to obtain and maintain jobs in the Cottonwood Work Services Department and in the community. Cottonwood’s residential services include 48 living arrangements. Cottonwood promotes persons with developmental disabilities as qualified workers to employers, while offering incentives to employers for their cooperation in supported employment. Life enrichment services offer enhancement of job, social, cultural, and leisure skills. Transition services include helping the Lawrence School district provide for a smooth transition from school to adult living for students with disabilities. Cottonwood provides direct or indirect services to over 650 people, ranging in age from 18 to more than 60 years old. Finally, Cottonwood helps fund the Early Childhood Coordinating Council in Jefferson County for families with children in need of early intervention.

**Kansas Association for the Medically Underserved (KAMU)** is the primary care association for the state of Kansas, and consists of a network of 40 primary care and 13 dental clinics that provide health services to low-income and uninsured people throughout the state. KAMU serves as a connecting point for clinicians working in safety net clinics and participates in extensive workforce development programs. Recently, KUMC faculty assisted KAMU in designing a dental hub model for delivering dental care to counties and communities that either lack sufficient dentists and dental hygienists to meet their need or who have no dental providers at all. Funding to support the development of the dental hub represents a collaborative effort on the part of health philanthropies who wanted trusted, academic expertise from KUMC investigators during the design phase to ensure that the model would permit effective delivery of dental care services to those most in need.

**Communities Creating Opportunity.** Communities Creating Opportunity (CCO) is a longstanding organization in Kansas City that arose from the work of the Kansas City Organization Project (KCOP). KCOP began in 1977 with religious and community leaders to respond to the rapid racial transition and financial changes in the city’s Southeast neighborhoods. As black families moved into these communities in the mid-70s, white families moved out in droves. Subsequently, real estate values dropped, lending in the area froze, and insurance rates skyrocketed. Increases in poverty and crime rates followed. KCOP provided community residents with the organizational tools and leadership training to address these trends and enhance their communities. In 1984, KCOP became Kansas City Church Community Organization to reflect its congregation and neighborhood-based model of community organizing. While continuing in its tradition of faith-based community organizing, CCO adopted a new name in 2007, Communities Creating Opportunity, to include all religious traditions and other community partners. The well-recognized acronym, CCO, continues as the organization’s principal signature. Over the past ten years the group has been heavily involved in health equity work. The organization received funding to conduct “hotspot” mapping projects with Truman Medical Center and KUMC in an effort to identify unmet health care need. More recently CCO received funding from the Kansas Health Foundation to study how social factors influence health outcomes in Wyandotte County. KUMC researchers have worked with CCO leaders on data analysis and grant submissions for over five years.

**Mid-America Regional Coalition (MARC).** MARC is a regional nonprofit group of city and county governments that works to bridge governmental divides created by a state line and various city and county borders across metropolitan Kansas City. It is the metropolitan planning organization for the bistate Kansas City region. Directed by a Board of Directors made up of local elected officials, and serves nine counties and
119 cities. They provide a forum for the region to work together to advance social, economic and environmental progress. MARC is funded by federal, state and private grants, local contributions and earned income. A major portion of their budget is passed through to local governments and other agencies for programs and services. The organization developed a health policy agenda in 2009. Most recently MARC has become the home base of a regional community health worker collaborative initiative. This group meets monthly and works to support and help expand the activities of lay health workers through Kansas City. Various Frontiers researchers have worked with MARC to organize and build capacity for health improvement and bioscience in the region.

**El Centro.** El Centro began in 1976 with a small amount of funding from the Archdiocese of Kansas City in Kansas. Church leaders and a group of energetic and caring community members saw a need for an organization to address the needs and concerns of Kansas City, Kansas’ rapidly growing Latino population. With in-migration accelerating, El Centro de Servicios para Hispanos was born.

El Centro has grown from a single location to three locations in Kansas City, Kansas and Olathe, serving more than 12,000 individuals and families per year. Our programming has evolved from our first program for elders – the Senior Day Program – to include The Academy for Children – a dual-language Pre-K program, workshops on money-management and homeownership, health education and healthy living outreach through our Promotores de Salud (Health Promoters) volunteers, health navigation and intervention, and our policy and advocacy efforts for issues of special interest to our community. The organization launched a community health worker program in 2008 and has been a close partner of KUMC’s JUNTOS, Center for Advancing Latino Health. El Centro has also assisted in recruiting participants in research and has partnered with KUMC researchers in the Department of Family Medicine and with the Alzheimer’s Disease Center.

**Johnson County Department of Health and Environment.** Since 1943, the Johnson County Health Department has been the official public health agency for the County, with the Board of County Commissioners serving as the Board of Health. In March 2012, the Health Department merged with the Johnson County Environmental Department to become the Johnson County Department of Health and Environment (JCDHE). The Director is Lougene Marsh and the Deputy Director is James Joerke. JCDHE is comprised of six divisions: Business Operations, Childcare Licensing, Community Health, Environmental, Health Services, and Strategic Planning. There are approximately 150 department employees. In June 2014, JCDHE became the first accredited health department in Kansas.

Services include: immunizations, communicable disease surveillance, TB testing, refugee health testing, prenatal, WIC, reproductive health, STD screening, HIV testing, child care facilities’ licensure, health education classes, workshops & trainings, injury prevention activities (Safe Kids Johnson County), chronic disease risk reduction activities, community wellness activities. Programs include: Outreach Nurse, Public Health Emergency Program, Targeted Case Management, ‘Making a Difference’, Air Quality, Household Hazardous Waste, Solid Waste Management, On-site Sewage Treatment, Ozone Reduction and Pool Inspections.

Services are provided at three sites, 11875 S. Sunset and 11811 S. Sunset in Olathe and 6000 Lamar in Mission.

Dr. J. LeMaster, family physician at KUMC, serves as the medical director for JCDHE. His position facilitates research activities to engage residents seeking services to also participate in community based research. Most recently, researchers in family medicine conducted a comprehensive assessment of micro-food deserts in Johnson County to inform local policymakers, and the team collaborated with JCDHE’s WIC and immunization programs to interview residents about food insecurity, access and need.

**Johnson County Developmental Supports.** Johnson County Developmental Supports (JCDS) was established in 1972 as an agency of Johnson County (Kansas) government to provide community-based services for people with developmental disabilities. JCDS is headed by a seven-member governing board composed of parents, community advocates and professionals who are appointed by the Johnson County Board of County Commissioners. An executive director and a staff of 260 trained professionals lead daily operations. JCDS programs and services are partially funded on a contractual basis with the Kansas Department of Social and Rehabilitation Services. Additional funding sources include a county tax levy, state block grants, subcontract income, contracts with companies for workers, private grants and donations. JCDS provides office space, Internet access, and some clerical support for MRRC investigators working on site.

Today, as a Community Service Provider (CSP), JCDS directly serves nearly 500 people daily. Through a person-centered planning process and within available resources, services are shaped to fit individual needs,
preferences, goals, abilities and interests. Some examples of available services include Residential Supports (ranging from a few hours of support for those living independently to live-in, around-the-clock care), Day Supports (facility-based or community-based employment opportunities for paid work, or other activities including volunteer work), Alternative Supports (professional resources for nursing, occupational therapy and assistive technology), Behavior Supports (applied methods to maximize adaptive behavior) and Case Management.

In addition to being a service provider in Johnson County, JCDS has another, equally important role: that of Community Developmental Disabilities Organization (CDDO). As CDDO, JCDS provides a single point of contact and entry for all of Johnson County, Kansas and maintains a county-wide service needs list for those waiting for certain services. Johnson County Developmental Supports accomplishes its direct service mission by developing, linking, and monitoring services, supports, and resources for approximately 700 people. In addition, JCDS works with over 360 affiliates who are agencies and individual service providers to assist access to quality, cost-effective services.

**KUMC Center for Child Health and Development.** The Center for Child Health and Development provides diagnostic evaluation for Autism Spectrum Disorders using “gold standard” research tools. The current CCHD research database has over 6000 Intake records, over 4000 completed Patient Information Forms, over 1300 detailed psychological score measures and 1200 Developmental Pediatrics visits. With Russ Waitman, PhD, the CCHD is in the process of mapping the current database into the Electronic Medical Record (O2), which will result in further integration between the clinical research database and our EMR system and better access for researchers across Frontiers. With Dr. Waitman, the CCHD will continue to develop the database for researchers using the Harvard ontologies developed to provide researchers a concept-based approach to identifying behavioral features of importance and for correlating these with genotypic data.

**KUMC/CMKC Center for Children’s Healthy Lifestyles & Nutrition.** The Center for Children’s Healthy Lifestyles & Nutrition represents an extension of the committed collaboration in the area of pediatric obesity research between two neighboring institutions who serve the health needs of children across the bi-state region of Missouri and Kansas. Supported by a state-of-the-art facility, researchers at the University of Kansas Medical Center and Children’s Mercy Kansas City lead a wide range of childhood obesity treatment and prevention initiatives designed to benefit children, families and communities. The Center jointly houses clinical and research programs focused on activity and nutrition, as well as serving as home to a large community collaborative with over 400 members called Weighing In. This community collaborative helps tie (though our quarterly meetings) scientists to community members in working groups such as pregnancy and breastfeeding, early childhood, healthy schools. The Center is poised to serve as a leader for pediatric obesity research in the Midwest and as a centralized resource for community members, academic and business leaders who are interested in arresting the current rates of childhood obesity and moving forward to ensure the healthy lifestyles and nutrition of all children.

**KUMC Center on Aging.** KUMC’s Theo and Alfred M. Landon Center on Aging is located in a 52,000 square-foot complex adjacent to the KUMC campus. The facility supports clinical research related to aging. Research resources include cognitive testing laboratories and a human performance laboratory dedicated to advancing the understanding of motor function through interdisciplinary research and education. The primary focus of the human performance laboratory is the study of age related changes in mobility, which includes the study of healthy elderly as well as those with age related pathologies. Center activities are carried out in partnership with other academic units of KUMC, including the schools of Medicine, Allied Health, and Nursing and with affiliated institutions, such as area geriatric care centers, VA Medical Centers, the Wichita branch of the School of Medicine, the University of Kansas in Lawrence, state agencies, and service organizations. Research protocols undertaken at the Center by KUMC faculty address a variety of problems related to aging, ranging from social concerns to cellular biology. The Center on Aging also houses the outpatient clinics of the Department of Neurology. Their physicians treat many of the diseases affecting older adults, such as Parkinson’s Disease, Alzheimer’s Disease, and dementia, among other neurological conditions. This geographic and scientific proximity allows for many collaborations in research and clinical care.

**KUMC Kansas Intellectual and Developmental Disabilities Research Center.** The Kansas Intellectual and Developmental Disabilities Research Center (KIDDRC) has been funded by the National Institute of
Health and Human Development for the past 45 years. Our recent renewal application (now U54 HD090216) scored well (23) and was recommended for funding to the NICHD Advisory Council in August 2016. Throughout its history, the KIDDRC has played a major role in elucidating the causes, prevention and treatment of intellectual disabilities and related secondary conditions. The center brings together researchers from the KU-Lawrence and Kansas University Medical Center campuses, as well as from the Juniper Gardens Children’s Project at the Children’s Campus of Kansas City. For more than four decades, the KIDDRC has served as a model of interdisciplinary collaboration across campuses and disciplines. More than 80 percent of KIDDRC investigators collaborate with one another on funded projects, and half of these represent collaborations across the three Center sites. Many KIDDRC investigators collaborate with investigators at other IDDRCs at Vanderbilt, UNC-Chapel Hill, the University of Washington, the University of Wisconsin, Washington University in St. Louis, and Johns Hopkins University/ Kennedy Krieger Center. Core support services and facilities include: design and implementation of measurement tools for behavioral research; experimental design and analysis; bioinformatics; genomics expression analysis; histology and biological image acquisition and analysis; digital video acquisition and editing; and 3-D image manipulation and model output.

The KIDDRC will have 4 cores including - Clinical Translational Core (CTC), Preclinical Models Core (PMC), Clinical Outcomes/Biobehavioral Technology Core (CBC), and a Research Design and Analysis Core (RDAC).

CHILDRENS MERCY KANSAS CITY

CMKC/KUMC Pediatrics Department. The combined Department of Pediatrics across KUMC and Children’s Mercy Kansas City (CMKC) are highly focused on enhancing innovation, access, and quality in a measurable way through translational research. Both Departments offer annual Departmental Research Grants focused solely on translational research in children. These grants have led not only to larger externally funded studies, but also to innovations in the way we care for our pediatric patients. The IRB reciprocity and other tools that are already in place make it easy for the two sites to collaborate and recruit large groups of children for translational efforts (such as recent grants in Pediatric Diabetes R01 DK100779, and R21 HD081502 and in Pediatric Autism R21 HD076116). Both sites also participate in the PCORI CDRN effort, allowing for integration of our medical records for tools such as patient recruitment, subject size calculations, and engagement of relevant clinics and personnel in translational research efforts.

CMKC and KUMC also have several Centers focused on translational efforts. For example, the Center for Children’s Healthy Lifestyles & Nutrition jointly houses clinical and research programs focused on activity and nutrition, as well as serving as home to a large community collaborative with over 400 members called Weighing In. This community collaborative helps tie (though quarterly meetings) scientists to community members in working groups such as pregnancy and breastfeeding, early childhood and healthy schools. As part of a recent strategic planning process, CMKC has also founded a Division focused on Health Services and Outcomes Research, which capitalizes upon the strong clinical programs to strengthen translational research. A Director has been hired and efforts are underway focused on partnerships with inner city faith based organizations focused on health disparities (RC4 MD005738; R01 MH099981) and several health service innovations studies (R01 MH104086, R01 HD076673, R01 DK93592, R34MH107337, R34 MH108393) among others efforts. A world renowned genome center, the first of its kind with a pediatric focus, provides clinical genomic services while simultaneously conducting state-of-the-art genomic research, seeking to become a leader in pediatric genomic translational research (U19 HD077693). The Center for Child Health and Development provides diagnostic evaluation for Autism Spectrum Disorders using “gold standard” research tools. The current CCHD research database has over 6000 Intake records, over 4000 completed Patient Information Forms, over 1300 detailed psychological score measures and 1200 Developmental Pediatrics visits. With Russ Waitman, PhD, the CCHD is in the process of mapping the current database into the Electronic Medical Record (O2), which will result in further integration between the clinical research database and our EMR system and better access for researchers across Frontiers. With Dr. Waitman, the CCHD will continue to develop the database for researchers using the Harvard ontologies developed to provide researchers a concept-based approach to identifying behavioral features of importance and for correlating these with genotypic data.
The joint departments offer multidisciplinary training programs at all of their sites, focused not only on medical students and residents, but also on graduate students in psychology, exercise physiology, public health and related fields, as well as providing regular trainings to community members through talks, health fairs, and other community events.

**Mid America Heart Institute.** The Mid America Heart Institute is a vertically-integrated entity residing within Saint Luke’s Hospital, winner of the 2003 Malcolm Baldrige Award for Quality, and one of the 2 primary teaching facilities for the University of Missouri - Kansas City. In addition to its cutting-edge clinical services, MAHI created the Cardiovascular Research Center over 30 years ago to manage and analyze clinical data. A unique feature of MAHI is the commitment to translating findings into clinical practice. We have successfully pilot-tested and disseminated personalized consent forms and screening programs for depression and diabetes. The commitment of the health system to innovate and participate in research to further improve care means that our trainees will have extraordinary access to patients across a broad spectrum of disease and throughout a broad continuum of care. In Outcomes Research, the ‘laboratory’ refers to the data resources from which important clinical questions can be answered and the clinical environment in which novel interventions can be implemented and pilot tested. We hold an extraordinary array of unique databases in such areas as National Quality Databases, Multi-Center Outcomes Databases and Clinical Trial Databases which are used for clinical outcomes research. Importantly, each of these databases is actively used by investigators, enabling efficient use and extension of these data to support clinically important projects of our trainees. In addition, The Outcomes Research Center, Mid-America Heart Institute houses the Cardiovascular Outcomes T32 (NHLBI 5T32HL110837) and is one of the leading centers in cardiovascular outcomes research in the United States.

**UMKC LIFE AND HEALTH SCIENCES RESEARCH CENTERS AND INSTITUTES**

**UMKC Collaborative for Excellence in Behavioral Health Research and Practice (The Collaborative)** is located in the UMKC School of Nursing and Health Studies (SoNHS). The Collaborative is a group of professionals working to advance health and wellness by bringing behavioral health research to practice and by supporting people, organizations and systems through change processes. The Collaborative accomplishes this through a variety of projects in collaboration with local, state and federal partners. Members of the Collaborative lead or partner on a range of federally and locally funded projects, including the Centers for Disease Control and Prevention (CDC) funded Capacity Building Provider Network National Resource Center, which coordinates the CDC’s flagship program of 21 grantees that train health departments, community-based organizations and healthcare organizations to deliver high-impact HIV prevention strategies; the Substance Abuse and Mental Health Services Administration (SAMHSA) funded Addiction Technology Transfer Center (ATTC) National Office, which coordinates SAMHSA’s network of 14 ATTC centers that identify and promote evidence-based practices for addiction treatment, and helps to integrate addiction treatment into healthcare settings; the SAMHSA-funded Mid-America ATTC Regional Center, which serves Iowa, Kansas, Missouri, and Nebraska by developing and conducting online and in-person trainings and assists states and healthcare systems to implement evidence-based addiction treatments; and the SAMHSA funded UMKC SBIRT grant that provides health and behavioral health students and professionals with training to screen and intervene with patients who use alcohol and drugs.

**UMKC Center for Health Insights** (http://chi.umkc.edu/) The UMKC Center for Health Insights (CHI) provides biomedical researchers with investigators to accelerate their research. The CHI supports the UMKC REDCap research instance, Ingenuity for biological pathways analysis, the UMKC/Truman Medical Center i2b2 installation and the UMKC Insights High Performance Computing Platform, which includes a national de-identified data set derived from electronic health records. The CHI also innovates through our portable motion capture platform, our development of novel web resources to enhance information about patient context and initiatives related to the “Internet of Things”.

**UMKC Institute for Human Development** (http://www.ihd.umkc.edu/) The UMKC Institute for Human Development (IHD), a University Center for Excellence in Developmental Disabilities, is an Applied Research and Interdisciplinary Training Center for Human Services. IHD exemplifies the University’s goals by practicing engaged scholarship supporting research to practice so that people, agencies, and the community can benefit from the application of new knowledge and practices generated by the university.
IHD conducts and collaborates on a wide variety of applied research projects to develop, implement, and demonstrate as well as evaluate new ideas and promising practices that support healthy, inclusive communities. Through our interdisciplinary university training we infuse best practices into the curriculum of graduate and undergraduate students in a wide range of professional disciplines. Through community services and supports, IHD assists individuals, community and state agencies, and university faculty to build the capacity of their programs through needs assessments, technical assistance, grant development, demonstrations, and program evaluation. IHD is also a vital information link through the dissemination of products and the establishment of information resource centers. These resource centers become vital assets to the community as demonstrations of research to practice.

IHD focuses its work on seven broad priority need areas: health and wellness promotion; early childhood and youth; individual advocacy and family support; adult community living; aging and developmental disabilities; interdisciplinary university training; and policy, program development, and quality assurance. Every project at IHD falls into one of these categories. While the projects may change, the priority areas stay constant and serve to guide the larger vision of IHD.

IHD partners with university, community, state, and federal level organizations. IHD generates over $9 million in extramural funding through demonstration programs and leverages an estimated $20 million for other community agencies. 37% of IHD’s funding was from Federal sources, 39% from state, and 24% from local and university funds. In the past year, projects and initiatives continue to focus on youth, families, and adults with development disabilities, as well as underserved populations (i.e. low-income minority youth and urban Latino communities).

**UMKC KC FAITH Initiative.** The KC FAITH Initiative is a partnership between academic researchers at UMKC and Frontiers, the African American faith community, health service organizations and community organizations. The goal of this Initiative is to plan, develop, and implement, culturally and religiously tailored African American church-based multilevel health promotion programs and interventions to improve the health of the African American community. The strong relationships established as a result of KC FAITH have provided an opportunity for the KC FAITH community to gain access to research opportunities and clinical trials offered by Frontiers investigators, and vice versa. The KC FAITH Initiative Community Action Board has representatives from over 50 faith, health, community, and academic organizations. The Initiative is hosted at Calvary Community Outreach Network’s Calvary Community Wellness Center, our faith-based partner and co-convener of the KC FAITH Initiative. The Center includes 2 large offices (250 sq. ft and 300 sq. ft.) and large reception desk to accommodate 4 staff members. The Center also provides structured fitness opportunities and information to youth and families living and working in urban Kansas City. The 10,000 square foot warehouse located at 3002 Holmes Street has been converted into a state of the art fitness center to serve youth and families. The facility holds strength training equipment and free weights, aerobic equipment (treadmills, elliptical trainers, exercise bikes), fitness equipment for children (e.g., exercise bike with electronic game format, rock climbing wall, ropes, lighted exercise wall), aerobic floors, offices, a reception area, multiple bathrooms and showers, and meeting space. Health screenings, cooking classes, and fitness classes are among the many program offerings. The Wellness Center and church spaces are used for study meetings with the CAB, faith partners and other collaborating partners, and trainings with participating church leaders.

**Participating Churches:** Participating churches all have church sanctuaries, which will accommodate their church members during church services (e.g., Sunday services, midweek bible studies, special events) for delivery intervention components including sermons with DM/CVD content, responsive readings, and delivery of church bulletins/brochures by ushers. All of the churches also have fellowship halls, classrooms, multiple restrooms, and meeting space to accommodate DM/CVD education sessions (DPP and ADA workshop series), ministry group discussion, videos, and delivery of the program to community members using church outreach services. Most of the churches have audiovisual equipment (e.g., digital projectors, large media screens), membership management systems, and telephone messaging systems with varying levels of capabilities (phone, text, and/or email). All of the churches have fellowship hall space for exercise classes and kitchens for cooking classes.
The Center for Practical Bioethics is a nonprofit, free-standing and independent organization nationally recognized for its work in practical bioethics. For more than 30 years, the Center has helped patients and their families, healthcare professionals, policymakers and corporate leaders grapple with difficult issues in healthcare and research involving patients. The Center serves as an avenue by which members of the public may address ethical issues, participate in discussions and events surrounding bioethics, and understand policies and publications that address this topic. The Center features a dedicated Board of Directors and staff representing multiple disciplines and fields of expertise. In addition, individuals and organizations throughout the nation committed to advancing ethical practices and policies in health and healthcare support the Center.

**PAIN KC**: For the past three years, Frontiers staff has facilitated a community group of people living with chronic pain called PAINS KC. This group is a grassroots response to the IOM Report calling for action to address the widespread public health problem of chronic pain. The group meets in the Clinical Research Center facility monthly and includes patients, family members and caregivers.

**KANSAS CITY UNIVERSITY OF MEDICINE AND BIOSCIENCES**

**KCU Score 1 for Health.** The University has access to unique and diverse patient populations as a result of our affiliations with several area hospitals and clinics that provide our student rotations for third and fourth year medical student training. Score 1 for Health is another program located on the campus of KCU. This program has been providing free in-school health screening to children (K-5th) for more than fifteen years. Targeting elementary schools that enroll 50% or more of their students in the free lunch program, Score 1 screens approximately 14,000 students annually, and to date has screened over 100,000 students. KCU clinical faculty and medical students conduct these screenings, along with the Score 1 for Health registered nurses, allied health professionals and nursing students from schools in the Kansas City metro area. These screenings include height and weight assessments including calculation of BMI, hearing tests, blood pressure tests, dental checks and a head-to-toe physical assessment. An annual assessment of the student screening data is conducted and a corresponding report is produced.
D. TRANSLATIONAL ENDEAVORS

Frontiers Resources. Frontiers has an impressive array of resources available to achieve its aims of engaging stakeholders, creating a sustainable translational research workforce and strengthening infrastructure to accelerate translational research. We draw on the considerable strengths of the University of Kansas Medical Center (Kansas City and Wichita campuses), the University of Missouri-Kansas City, Children’s Mercy Kansas City, and the Kansas City University of Medicine and Biosciences. In addition, we take advantage of a strong history of entrepreneurship investment in the Kansas City region (e.g., the Ewing Marion Kauffman Foundation, the UMKC Regnier Institute for Entrepreneurship and Innovation, the Kansas City Area Life Sciences Institute and the KU Innovation and Collaboration Center) to leverage drug, device, diagnostic, medical device and population health product development to achieve faster success. We have a plethora of community organizations, clinics, and providers across the region willing and excited to collaborate with Frontiers investigators, experts in entrepreneurship who will lead and train the next generation of successful business developers in the biomedical sciences and a growing cadre of team science-trained teams to work in emerging lifespan clinical and translational research. Please refer to the the Overall Section of Facilities and Resources for a comprehensive description of Frontiers resources that are available to all Frontiers members.

TRANSLATIONAL WORKFORCE DEVELOPMENT (TWD)

John Spertus MD, MPH, FACC, FAHA, KL2 co-director, is well qualified for this responsibility and his effort on this KL2 program is closely aligned with many on-going training and mentorship activities supported by his current endowment. He is an internationally recognized authority in cardiovascular outcomes research, as demonstrated by his publications (>600), participation in numerous national committees (e.g. ACC, AHA, AMA, NQF and IOM) and his leadership roles in the AHA’s Council on Cardiovascular Quality and Outcomes Research (QCOR). He is the Deputy Editor for Circulation: Cardiovascular Quality and Outcomes and was awarded the AHA QCOR Lifetime Achievement Award in 2015, while also being named by Thomson Reuters as one of the most influential scientific minds of 2014 and 2015. He is principally known for his innovative methodological research, creating several of the leading patient-centered outcomes measures used to quantify the patients’ perspective of their health status, their symptoms, function, and quality of life. These include the Seattle Angina Questionnaire for coronary disease and the Kansas City Cardiomyopathy Questionnaire for heart failure, both of which have been translated into over 80 languages and are used throughout the world in clinical trials, quality improvement programs, clinical care, and outcomes research. He has been the principal author of the AHA/ACC Methodology for Creating Performance Measures, and the ACC’s Appropriate Use Criteria. He founded the Cardiovascular Outcomes Research Consortium: a collection of the leading outcomes research programs in the country and is involved in numerous translational research projects including T1 genetic and pharmacogenomic projects with basic scientists, T2 clinical trials, and T3 projects seeking to implement evidence-based decision aids into routine clinical care. Over the past 10 years, Dr. Spertus has mentored 15 junior faculty and 32 cardiology fellows as well as 3 medical students, 6 medical residents, and 3 PhDs. He has had continuous NIH support for the past 15 years and is currently PI of the Mid-America Heart Institute’s Cardiovascular Outcomes Research Training Program (T32 HL110837). Dr. Spertus’ research experiences that span the spectrum of translational research, his success in mentoring, his experience with entrepreneurship, and his extensive connections with researchers from other CTSAs make him an invaluable co-director for this KL2 program.

Frontiers Training Center Advisory Committee

The Frontiers Training Center Advisory Committee will meet quarterly to oversee the smooth operation of all of the Frontiers training programs, including this KL2. Members of this committee (Table RF-D.1) will be responsible for assisting the KL2 co-directors in selecting and recruiting program participants, identifying mentors, monitoring trainee and scholar progress, and providing feedback on the overall direction of the KL2 program. Several members of this committee overlap with other Frontiers advisory committees (i.e., Goggin & Maliski for integrating special populations; Brooks for administration and team science; Greiner for patient and community engagement) to ensure excellent communication throughout our CTSA cores.
**Table FR-D.1: Frontiers Training Center Advisory Committee**

<table>
<thead>
<tr>
<th>Name</th>
<th>Frontiers Role</th>
<th>Position/Institution</th>
<th>Research Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Spertus, MD, MPH</td>
<td>FTC Committee chair, Co-director KL2</td>
<td>Endowed Chair, Metabolic &amp; Vascular Disease Research/Mid-America Heart Institute (UMKC)</td>
<td>Health outcome assessment; Using information technology to guide medical decision-making based on risk-prediction models</td>
</tr>
<tr>
<td>Steven Leeder, PhD</td>
<td>Co-director TL1</td>
<td>Endowed Chair and Director, Division of Clinical Pharmacology &amp; Therapeutic Innovation (CMKC)</td>
<td>Pharmacogenetic and pharmacogenomic strategies to characterize the observed variability in drug disposition and response in children.</td>
</tr>
<tr>
<td>Ed Ellerbeck, MD, MPH</td>
<td>Director KL2</td>
<td>Chair, Preventive Medicine and Public Health (KUMC)</td>
<td>Quality improvement in clinical care; Reducing health disparities in clinical care</td>
</tr>
<tr>
<td>Won Choi, PhD, MPH</td>
<td>TL1 Co-director, MS-CR director</td>
<td>Professor, Preventive Medicine and Public Health (KUMC)</td>
<td>Smoking cessation and prevention among underserved populations</td>
</tr>
<tr>
<td>Allen Greiner, MD, PhD</td>
<td>Community Engagement Director</td>
<td>Professor, Family Medicine (KUMC)</td>
<td>Implementation research to enhance colorectal cancer screening in primary care; Founder of the KPPEPR practice-based research network.</td>
</tr>
<tr>
<td>Dianne Durham, PhD</td>
<td>Faculty Development &amp; Mentor training</td>
<td>Associate Dean for Faculty Affairs and Faculty Development (KUMC)</td>
<td>Effects of altered auditory and vestibular experience on the central nervous system</td>
</tr>
<tr>
<td>Greg Unruh, MD</td>
<td>Coordinator – Post-doctoral fellowships</td>
<td>Associate Dean for Graduate Medical Education (KUMC)</td>
<td>Anesthesia; Post-graduate education and training</td>
</tr>
<tr>
<td>John Colombo, PhD</td>
<td>Child Development Research</td>
<td>Professor, Department of Psychology; Director, Schiefelbusch Institute for Life Span Studies (KU-L)</td>
<td>Developmental cognitive neuroscience of attention and learning; Typical and atypical development of cognitive and intellectual function</td>
</tr>
<tr>
<td>Kathy Goggin, PhD</td>
<td>Research Cluster Expert</td>
<td>Ernest L. Glasscock Endowed Chair in Pediatric Education and Research (CMKC)</td>
<td>Medication adherence; Psychosocial predictors of health behavior change to improve health outcomes and reduce health disparities</td>
</tr>
<tr>
<td>Michael Wolfe, PhD</td>
<td>Research Integrity Officer</td>
<td>Associate Professor and Research Integrity Officer (KUMC)</td>
<td>Ensures research integrity on all projects. Provides guidance on changing policy</td>
</tr>
<tr>
<td>Richard Barohn, MD</td>
<td>Frontiers PI</td>
<td>Distinguished Professor and Chair, Neurology; Vice Chancellor for Research (KUMC)</td>
<td>Clinical trials for novel and repurposed treatment of rare neuromuscular diseases</td>
</tr>
<tr>
<td>Sally Maliski, PhD, RN, FAAN</td>
<td>Integrating Special Populations/Patient Engagement</td>
<td>Dean, School of Nursing; Associate Director for Health Disparities KU Cancer Center (KUMC)</td>
<td>Health disparities research; Patient engagement; Quality of life for prostate cancer treatment</td>
</tr>
<tr>
<td>Scott Weir, Pharm D, PhD</td>
<td>Entrepreneurship</td>
<td>Director, Institute for Advancing Medical Innovation, Professor, Pharmacology, Toxicology and Therapeutics (KUMC &amp; KU-L)</td>
<td>Clinical pharmacology, pharmacokinetics, biopharmaceutics; Developing innovative approaches to lead optimization and early drug development</td>
</tr>
<tr>
<td>Tracie Collins, MD, MPH</td>
<td>Rural Medicine</td>
<td>Chair, Preventive Medicine and Public Health (KUMC-W)</td>
<td>Health disparities, behavioral intervention trials with peripheral artery disease and diabetes mellitus</td>
</tr>
<tr>
<td>William Brooks, PhD</td>
<td>Team Science</td>
<td>Professor, Neurology; Director, Hoglund Brain Imaging Center (KUMC)</td>
<td>Provides integration between the T and K programs and the U program Community &amp; Collaboration component (Team Science function)</td>
</tr>
</tbody>
</table>

**RESOURCES AVAILABLE FOR TRAINEES**

- **Center for Bioethics.** The Center for Bioethics provides training, facilitates community collaboration, and aims to stimulate the field of research ethics. Directed by John Lantos, the bioethics center hosts webinars with nationally renowned speakers, offers a Pediatrics Bioethics Certificate Program and a fellowship program in Pediatric ethics and genomics. The Center provides consultations with trainees and investigators regarding the ethical implications of their research at every stage from design to reporting of results.

- **Center for the Study of Dental and Musculoskeletal Tissues, UMKC-CEMT.** The UMKC CEMT is a multidisciplinary and interdisciplinary center that includes investigators from the Schools of Dentistry, Medicine, Nursing, and Computing and Engineering to focus on dental and musculoskeletal health. This UMKC Center of Excellence integrates all investigators, whether basic or clinical, into powerful translational teams to prevent and treat diseases of mineralized tissue which includes teeth, cartilage, bone, and muscle. This goal aligns with the NIH roadmap initiative and focuses on mineralized tissue research with regards to obesity, cancer, osteoporosis, bone trauma, aging, metabolic bone disease, and diseases of oral tissue. Not only can findings be applied to biomaterials and composite research, medical devices, diagnostics, and clinical imaging, but also be expanded to veterinary practice and diagnostics and treatment of animal dental and bone disease.
There are four major objectives for this center:

- Develop a world-class basic science research program in mineralized tissues.
- Create an outcomes science platform and clinical trial networks.
- Provide education for graduate students and clinicians.
- Establish an infrastructure to develop biotechnology and technology transfer.

Partnerships have been forged with the School of Medicine, School of Nursing, School of Computer and Engineering, and the School of Dentistry. This Center brings together and facilitates collaboration not only among faculty from several of UMKC’s life and health sciences schools but also their Kansas City clinical partners. UMKC’s health professions schools are located on Hospital Hill, adjacent to several of the region’s top clinical care facilities. Primary clinical partners include Truman Medical Center, Children’s Mercy Kansas City, and Saint Luke’s Hospital. Together, with the UMKC School of Medicine (SOM) and School of Nursing (SON), they offer a unique patient base that provide rich information for research and clinical applications into diseases of mineralized tissue. Researchers in the School of Nursing provide experience in implementation of clinical findings to practice and assessment of the impact of changes in clinical practice on health outcomes.

Bioengineers at the School of Computing and Engineering (SCE) have generated significant numbers of patents and devices in biometrics and the school is developing a program in biomedical engineering that integrates with the health professional schools. The UMKC School of Dentistry is the only dental school in either Missouri or Kansas. The Bone Biology and Biomaterials/Bioengineering research programs are recognized nationally and internationally and have researchers with long histories of competitive federal support for their work. Investigators in Bone Biology include molecular biologists, engineers, protein chemists, and geneticists with expertise in the area of the genomics, proteomics, and transgenics in the study of mineralized tissue. The Biomaterials program includes investigators with international reputations in biomaterials for the repair and regeneration of tissues. http://cemt.umkc.edu/default.shtml

**The Outcomes Research Center, Mid-America Heart Institute** houses the Cardiovascular Outcomes T32 (NHLBI 5T32HL110837) and is one of the leading centers in cardiovascular outcomes research in the United States. Many of the current methods used nationally for quantifying and analyzing patient–centered health status outcomes were designed by faculty in this Center. Members of this group have developed new techniques for performance measurement and have applied methods of cost-effectiveness and decision analysis to novel cardiovascular technologies. The Outcomes Research Center has a strong record of interdisciplinary collaboration between cardiologists, nephrologists, internists, nurses, economists, psychologists, and pharmacists from both UMKC and KU. This Center provides critical support to training efforts in interdisciplinary outcomes research and precision medicine.

The cardiovascular research program not only mentors and collaborates with researchers throughout Frontiers, other CTSAs and internationally (China’s National Center for Cardiovascular Disease, Australia and Europe), but it has a strong commitment to training the next generation of translational scientists. In particular, our T32 in Cardiovascular Quality and Outcomes Research has become a leading training center for young investigators interested in the terminal phase of translational research. Beyond our own accomplished faculty, we create collaborations for our trainees with leading outcomes researchers at Yale (Harlan Krumholz), Duke (Eric Peterson, Lesley Curry, Adrian Hernandez), and the Universities of Colorado (John Rumsfeld, Fred Masoudi, Larry Allen) and Michigan (Brahmajee Nallamothu, Rodney Hayward). Trainees are able to exploit existing data from >30 clinical trials and registries led by MAHI/UMKC faculty and the national registries of the AHA and ACC (for which MAHI/UMKC is one of 3 analytic centers, along with Yale and Duke, for the ACC NCDR registries). In addition, our trainees are able to participate in the newly-established Saint Luke’s Center for Healthcare Innovation, which support novel interventions to achieve the triple aim of healthcare. These resources thus support access to the latest analytic approaches (supported by 12 biostatisticians at MAHI alone), deep experience in the increasingly important analysis and interpretation of patient-reported outcomes measure and in the challenges and evaluation of implementation research. One hundred percent of our trainees have remained in academia, either as clinical trainees or as Assistant Professors with a research emphasis.

**PILOT TRANSLATIONAL AND CLINICAL STUDIES (PTC)**

Office space is available for PTC Director Smith, consisting of 180 square feet in Hemenway Life Sciences Innovation Center and containing all required office equipment and supplies. This space is adjacent to ample meeting and conference rooms and easily accommodates group sessions associated with review process. A
full-time senior administrative assistant is available to Smith to set up any necessary meetings or events and provide project assistance. Additionally, the PTC is supported by a Frontiers Pilot Navigator in the KUMC RI, Kelly Robertson who is responsible for logistical support for the application submission and review process, for the Voting Panel meetings, and for the Stakeholder’s Council meeting, and for communicating with all applicants, reviewers, voters and stakeholders. A data analyst assists with developing and maintaining our REDCap-derived database of reviewers’ and applicants’ key words and areas of expertise.

**TRAINING**

**KU Libraries.** The University of Kansas Library system is ranked as one of the top 50 libraries by the Association of Research Libraries with more than 4.4 million print volumes at their seven locations and more than 1.6 million visits every year. Included in the library system are the A. R. Dykes Health Sciences Library, Logan Clendening History of Medicine Library and Museum and the George J. Farha Medical Library on the campus in Wichita, Kansas. KU has been a leader in the open access movement and was a founding member of the Coalition of Open Access Policy Institutions. Our libraries offer student friendly spaces with areas for group study and quiet zones. Trained librarians teach students, faculty, and researcher how to take advantage of library resources, including on-line reference management resources. Instruction is provided to groups and individuals on use of PubMed, EndNote, and other electronic and software resources critical to the support of CTR.

Our libraries offer a vast collection of print monographs and journal volumes, as well as extensive online monographs and ~19,000 online journals. Generalized scientific resources include online access to Science Citation Index, Medline, the Cumulative Index to Nursing and Allied Health Literature, PsycInfo, and the International Pharmaceutical Abstracts. The journal collection currently includes online access to packages of titles available from such publishers as: American Chemical Society, Blackwell-Synergy, Kluwer, Wiley Interscience, Lippincott-Williams-and-Wilkins, Proquest Nursing Journals, BioOne, Science Direct, Marcel Dekker, and Nature Publishing Group.

**KUMC Teaching & Learning Technologies.** An enterprising and effective academic technology component is essential to CTSA educational programs. The KUMC Teaching & Learning Technologies (TLT) department works collaboratively with the schools (Medicine, Nursing, and Health Professions) and with campus support units to provide KUMC faculty, staff, students, and community with leadership and support for integration of new and existing instructional technology into KUMC learning environments—both in the classroom and at a distance. TLT provides support to students and faculty at three different campuses, as well as supporting online students accessing the curriculum remotely. TLT staff includes six masters-prepared Instructional Technologists to provide pedagogical support and instructional design. Three TLT Instructional Technologists are trained Quality Matters evaluators, who provide professional development training to faculty in the design of online courses. Five staff members have degrees in Communications with an emphasis in television and video production, and have expertise in all aspects of media production, from pre-production planning to shooting and editing to distribution. TLT is a recognized leader in using technology to enrich and transform the teaching and learning experience.

New and emerging technologies are continually evaluated and pilot tested with interested faculty. Current projects include: Virtual Worlds/Second Life, SCALE-UP Classrooms/Steelcase, Wearable Technology/Google Glass, Augmented Reality/Aurasma Studio, and Multitouch Interfaces/Planar Monitors. TLT services eight core services/technologies include: Online Learning/Blackboard and Quality Matters, Classroom Scheduling and Support/25Live, Video Conferencing/Polycom, Electronic Testing/ExamSoft, Compliance Training/NetDimensions, Webconferencing/Adobe Connect, Online Surveys/EvaluationKIT, and Video Production/Tricaster and Final Cut Pro.

TLT is committed to continuous and just-in-time professional development for Frontiers educators. Frequent demonstrations of new technologies and pedagogical strategies are offered (including “Brown Bag Lunch” sessions, Special Interest Groups, and department meetings). TLT staff have presented at regional, national, and international conferences related to technology and pedagogy, and have been published in academic and practical journals. TLT produces a newsletter that is available online and archived for reference, as well as a blog with regular posts about technology issues relevant to the faculty.
In addition to campus-wide support, TLT also works closely with faculty in their collaboration efforts with outside agencies. The School of Nursing Registered Nurse-to-Bachelor of Science program has a shared curriculum pilot with the KCK Community College. Additionally, the Kansas Advanced Practice Collaboration (KAPC) is a partnership between KUMC, Fort Hays State University, and Pittsburg State University. The Great Plains Interactive Distance Education Alliance (Great Plains IDEA) is a consortium of eight universities that provides an online Master of Science in Dietetics and Nutrition degree. The American Indian Health Research and Education Alliance (AIHREA) works closely with the Partnership for Rural and American Indian Research Engagement and Education (PRAIREE), which has projects at Kansas State University, the University of Nebraska, the University of South Dakota, and the Mayo Clinic. TLT provides support services to these and many more regional and national partnership projects.

Online courses/distance learning. KUMC has extensive experience and capability in facilitating online and distance learning as an option for students. The Registered Nurse-to-Bachelor of Science in Nursing Program provides registered nurses a flexible format to complete their bachelor's degrees and expand their career options. It is entirely online and accessible 24 hours a day. The Nurse-Midwife Advanced Practice Major features both on-campus components and synchronous learning by meeting as a group, online, with audio/computer interface each week for three hours. KUMC is also a member of the Great Plains Interactive Distance Education Alliance (IDEA) partnership of 20 public university members providing access to educational opportunities by collaboratively developing and delivering high-quality, online academic programs. Through Great Plains IDEA, KUMC offers an online masters in dietetics. Several certificate programs are also offered online, including the Research Clinical Trial Coordinator and Clinical Research Management certificates.

Lectures Courses and Classes for Clinical and Translational Research

Clinical Trials Educational Lecture Series. The Clinical Trials Educational Lecture Series (CTELS) is organized and offered by the KUMC Research Institute as an educational opportunity for those involved in clinical and translational research trials. Previous topics have included “Overview of the Frontiers Clinical and Translational Science Unit (CTSU)” and “New Options for Participant Recruitment: PioneersResearch.org”. Videos of previous lectures are available from 2012 onward. http://www.kumc.edu/kumcri/clinical-research-administration/education-opportunities/ctels.html.

The Frontiers Training Center (FTC), the access point for Frontiers investigators to share research training, ideas, and programs with other CTSA hubs. Frontiers has created superb training programs for the CTR workforce, and these will be expanded and enhanced. Going forward, we will develop a Frontiers Training Gateway on our website that will be the central site for posting all CTR training opportunities and provide a calendar of events. Beth Kerling, an experienced trainer and project director, will be the full-time FTC navigator and help investigators and staff learn about training opportunities in the FTC, TL1 and KL2 programs. Coordination will be further facilitated by Dr. Spertus’ joint leadership roles in Translational Workforce Development and the KL2 program. Table FR-D. 2 displays the training coordinated by the Frontiers Training Center. Training is color-coded to match each component’s designation, and the table includes the audience and frequency each training or course is offered.
Table FR-D.2: The Frontiers Training Center (FTC) coordinates/offers training housed in Frontiers components/functions:

<table>
<thead>
<tr>
<th>Training</th>
<th>Audience</th>
<th>Frequency</th>
<th>Component/Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introduction to Clinical Research</strong> – provides basic overview</td>
<td>Novice researchers</td>
<td>annual</td>
<td>TE/TWD</td>
</tr>
<tr>
<td><strong>Outcomes Research Seminar Series</strong> – Frontiers programs to discuss</td>
<td>All</td>
<td>as needed</td>
<td>TE/TWD</td>
</tr>
<tr>
<td>outcome research projects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Precision Medicine</strong> – workshops/consultations on integrating</td>
<td>All</td>
<td>as needed</td>
<td>TE/TWD</td>
</tr>
<tr>
<td>multivariate risk models (ePRISM) in clinical care to provide</td>
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<tr>
<td>personalized recommendations at the point of care</td>
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<tr>
<td><strong>Early Career Development Programs, including a Health</strong></td>
<td>High School, under-represented students,</td>
<td>annual</td>
<td>TE/TWD</td>
</tr>
<tr>
<td><strong>Careers Pathways Program; Teacher and Students for</strong></td>
<td>financially disadvantaged and rural</td>
<td></td>
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<tr>
<td><strong>Community-oriented Research and Education</strong> (R25 OD020214) serving</td>
<td>communities</td>
<td></td>
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<tr>
<td>Wyandotte County, KS; <strong>Missouri Project Lead the Way</strong>, large STEM</td>
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<tr>
<td>education network for K-12 students who come to our annual Frontiers</td>
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<tr>
<td>Research Day</td>
<td></td>
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<tr>
<td><strong>Frontiers Scholar Program</strong></td>
<td>Fellows/junior faculty</td>
<td>annually</td>
<td>TE/TWD</td>
</tr>
<tr>
<td><strong>Implementation Research Training (see below)</strong></td>
<td>All</td>
<td>annually</td>
<td>TE/TWD</td>
</tr>
<tr>
<td><strong>Entrepreneurship Training Program (see below)</strong></td>
<td>All</td>
<td>annually</td>
<td>TE/TWD</td>
</tr>
<tr>
<td><strong>Basic Training in Human Subjects Protection Program</strong></td>
<td>All</td>
<td>every 3 yr</td>
<td>Research</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Methods/RKS</td>
</tr>
<tr>
<td><strong>Good Clinical Practice/GCP training</strong> – per new NCATS guidelines</td>
<td>Investigators; coordinators</td>
<td>every 3 yr</td>
<td>Research</td>
</tr>
<tr>
<td>(2017)</td>
<td></td>
<td></td>
<td>Methods/RKS</td>
</tr>
<tr>
<td><strong>GCP for Social &amp; Behavioral Researchers</strong> (2017)</td>
<td>Investigators; coordinators</td>
<td>every 3 yrs</td>
<td>Research</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Methods/RKS</td>
</tr>
<tr>
<td><strong>Responsible Conduct of Research Training</strong> (2017)</td>
<td>All</td>
<td>every 4 yrs</td>
<td>Research</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Methods/RKS</td>
</tr>
<tr>
<td><strong>Introduction to Biostatistics for Clinical &amp; Translational</strong></td>
<td>All</td>
<td>annual</td>
<td>Research</td>
</tr>
<tr>
<td><strong>Researchers</strong> offered each July also available world-wide on-line via</td>
<td></td>
<td></td>
<td>Methods/BERD</td>
</tr>
<tr>
<td><strong>YouTube; Advanced Statistical Applications Certificate</strong> (available to</td>
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<tr>
<td>other CTSAs on-line)</td>
<td></td>
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</tr>
<tr>
<td><strong>Clinical Trials Education Lecture and Workshop Series (CTELS)</strong> on</td>
<td>All, target research coordinators</td>
<td>monthly</td>
<td>Research</td>
</tr>
<tr>
<td>topics such as adverse event reporting, IRB updates, recruitment</td>
<td></td>
<td></td>
<td>Methods/RKS</td>
</tr>
<tr>
<td>registries, and research billing, all sessions recorded &amp; posted</td>
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<tr>
<td>online</td>
<td></td>
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</tr>
<tr>
<td><strong>Research Coordination ‘Onboarding’ Training Program</strong></td>
<td>New coordinators</td>
<td>as needed</td>
<td>Research</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Methods/RKS</td>
</tr>
<tr>
<td><strong>Research Coordinators Certificate Training Program</strong></td>
<td>Coordinators &gt; 2 yrs experience</td>
<td>annual</td>
<td>Research</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Methods/RKS</td>
</tr>
<tr>
<td><strong>Research &amp; Discovery Grand Rounds</strong> provide training on topics</td>
<td>All</td>
<td>monthly</td>
<td>Research</td>
</tr>
<tr>
<td>related to CTR (e.g., ClinicalTrials.gov data reporting, new</td>
<td></td>
<td></td>
<td>Methods/RKS</td>
</tr>
<tr>
<td>pathways for dissemination, &amp; patient/community involvement</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
DR. BAROHN, as Vice Chancellor for Research for KUMC, recently set a goal that all CTR investigators and coordinators must complete Good Clinical Practice (GCP) training by 2017. Through the VCR Council (Administration Core), he is working with the Frontiers VCRs to make this required at all institutions. We are initiating (2017) required Responsible Conduct of Research (RCR) training for all research personnel (not just for those on NIH training grants). This training will include CITI modules on RCR and required in-person sessions every four years. The information below was sent to all faculty to alert them to the new requirements for Responsible Conduct of Research (RCR) Training and Good Clinical Practice (GCP) Training.

**Responsible Conduct of Research (RCR) Training**

**New RCR Training Requirements**

**All faculty and staff engaged in research** (for this purpose defined as all investigators and other research personnel, regardless of title or position, who are involved in the design, conduct or reporting of research, regardless of funding) will be required to complete RCR training. The new Responsible Conduct of Research (RCR) training requirements are as follows:

- Complete the designated RCR modules in CITI by January 1, 2017 and once every four years after that; and
- Attend or view two live seminars or conferences on RCR every four years.

For those who have previously completed the CITI RCR training, you will not need to repeat the CITI training prior to January 1, 2017, unless it has been 4 years since the prior training.
How to access the RCR modules in CITI:

Below are the instructions on how to access the RCR modules in CITI. There is also a PDF with more in-depth explanation of how to create a new CITI-program account and add the RCR modules. The modules should be taken in the order they are listed. Information necessary to understand part of one module may have been covered in previous modules and may be repeated in others for emphasis.

1. Go to www.citiprogram.org
2. Click “Log in through my institution/Log in via SSO” (on the right side of the screen).
3. Click University of Kansas Medical Center.
4. Log in with your KUMC username and password.
5. Click on “University of Kansas Medical Center Courses”.
6. If you have not previously loaded the Responsible Conduct of Research) course, scroll down and click “Add a Course or Update Learner Groups”.
7. Scroll to Question 5 and select “Responsible Conduct of Research”, and then “submit”.
8. On the next screen, click on “Responsible Conduct of Research.”
9. Complete the following courses:
   - Introduction to RCR
   - Plagiarism
   - Authorship
   - Collaborative Research
   - Data Management
   - Mentoring
   - Peer Review
   - Research Misconduct

Live seminars/conferences

- Research & Discovery Grand Rounds (R&D GR) will be part of the new RCR training requirement. We plan to provide live RCR-related presentations on campus periodically throughout the year which you can attend in person or via ITV. Please see the schedule of upcoming R&D GR conferences here (calendar as a PDF).
- We will also take advantage of current educational events such as CTELS, departmental grand rounds and other conferences and include them as RCR seminars, when applicable.
- If you attended the Dr. Neaves session on May 5, 2016, you know how beneficial these opportunities can be. Plus, your attendance counts towards your requirement of two in-person seminars over four years. If you weren’t able to attend, you can watch the presentation Dr. Neaves delivered by logging into your TLC account, clicking on the Catalog tab > University Folder > Research Institute > Enforcing and Defending Responsible Conduct of Research video. It will automatically log your attendance in the system.

What is Responsible Conduct of Research (RCR)?

NIH defines the Responsible Conduct of Research or RCR as “the practice of scientific investigation with integrity. It involves the awareness and application of established professional norms and ethical principles in the performance of all activities related to scientific research.”
Why is this new training required?

RCR addresses, among other things, topics such as research integrity, conflict of interest (personal, professional, and financial), data management, responsible authorship and publication (plagiarism), peer review, mentorship and training, and misconduct in research. For this reason, RCR is an important aspect of the University and Health System’s commitment to upholding the highest standards for research integrity and the protection of human subjects.

If you have any questions about either of these programs, please e-mail Mary Hindle, Research Institute Education and Training Manager, at mhindle2@kumc.edu.

Good Clinical Practice (GCP) Training

New GCP Training Requirements

Starting in January, KUMC will now require GCP training for all investigators and clinical research coordinators engaged in the execution of a clinical trial. This includes principal investigators, co-investigators, and study coordinators formally listed as members of the study team (most commonly, on the basis of the IRB application).

The new GCP training requirement is as follows:

• Complete the designated GCP modules in CITI by January 1, 2017 and once every three years after that;

Because this GCP training is required by certain sponsors, and has already been a requirement in certain areas of KUMC, some individuals involved in clinical research at KUMC have already taken this training. If you have already taken the GCP training you will not need to retake the training until the three year expiration.

How to Access the GCP modules in CITI

Below are the instructions on how to access the GCP modules in CITI. There is also a PDF with more in-depth explanation of how to create a new CITI-program account and add the GCP modules. The modules should be taken in the order they are listed. Information necessary to understand part of one module may have been covered in previous modules and may be repeated in others for emphasis.

2. Click "Log in through my institution/Log in via SSO" (on the right side of the screen).
3. Click University of Kansas Medical Center.
4. Log in with your KUMC username and password.
5. Click on "University of Kansas Medical Center Courses".
6. If you have not previously loaded the Good Clinical Practice (FDA Focus) course, scroll down and click "Add a Course or Update Learner Groups".
7. Scroll to Question 4 and select "Good Clinical Practice (FDA Focus)", and then "submit".
8. On the next screen, click on GCP for Clinical Trials with Investigational Drugs and Medical Devices (U.S. FDA Focus).
9. Complete the Integrity Assurance Statement and complete the following modules in order:
The CITI Good Clinical Practice Course for Clinical Trials Involving Drugs and Devices
Informed Consent in Clinical Trials of Drugs, Biologics, and Devices
Overview of New Drug Development
Overview of ICH GCP
ICH – Comparison Between ICH GCP E6 and U.S. FDA Regulations
Conducting Investigator- Initiated Studies According to FDA Regulations and GCP
Investigator Obligations in FDA-Regulated Research
Managing Investigational Agents According to GCP Requirements
Overview of U.S. FDA Regulations for Medical Devices
Detecting and Evaluating Adverse Events
Reporting Serious Adverse Events
Audits and Inspections of Clinical Trials
Monitoring of Clinical Trials by Industry Sponsors
Completing the CITI GCP Course

What is Good Clinical Practice (GCP)?

"Good Clinical Practice" or GCP is defined by FDA guidance as an international ethical and scientific quality standard for designing, conducting, recording, and reporting trials that involve the participation of human subjects. Compliance with GCP standards provides public assurance that rights, safety, and well-being of trial subjects are protected. ICH GCP guidance provides a unified standard to facilitate acceptance of clinical data by regulatory authorities.

Why is this new training required?

Adherence to the principles of good clinical practices is universally recognized as a critical requirement to the conduct of research involving human subjects. GCP guidance provides a unified standard to facilitate acceptance of clinical data by regulatory authorities. The Food and Drug Administration's (FDA's) regulations for the conduct of clinical trials address both GCP and human subjects protections. Recently, the National Center for Advancing Translational Sciences (NCATS), a division of the National Institutes of Health (NIH), has recommended that GCP training be completed by investigators and research coordinators involved with clinical trials. To learn more, view the Good Clinical Practice (GCP) Training document from the NIH National Center for Advancing Translational Sciences.

What is a clinical trial?

The NIH definition of “clinical trial” is as follows: A research study in which one or more human subjects are prospectively assigned to one or more interventions (which may include placebo or other control) to evaluate the effects of those interventions on health-related biomedical or behavioral outcomes.

If you have a question about whether you need to take this training, e-mail Mary Hindle, Research Institute Education and Training Manager, at mhindle2@kumc.edu.
Introduction to Clinical Research. The course provides a basic and broad overview to clinical research. Students gain an understanding of how to develop clinical research questions including protocol design and the factors that should be considered in initiating a clinical research study. This includes biostatistical considerations, recruitment of study participants, regulatory issues, data management, and defining measures and instruments. Students gain knowledge of how to define clinical research among the various institutional entities involved with clinical research at The University of Kansas Medical Center such as the Research Institute (RI), Clinical and Translational Science Unit, (CTSU) and the Human Subjects Committee (HSC). Other components of the course focus on critical appraisal of research studies, how to present research data, and how to apply for funding.

The target audience for the course is broad and includes faculty involved in the Frontiers Clinical Research Curriculum Program, students pursuing a masters in clinical research, clinical fellows in the school of medicine, doctoral students (medical and graduate, MD/PhD, MD/MPH, etc.), post-doctoral fellows, medical residents, and faculty at KUMC and KU-Lawrence.

Lecture topics include:

- Putting it all together: How I got my research off the ground at KUMC
- Developing Clinical Research Questions
- Open Discussion of Projects: Focus on Background, Literature Review (PubMed), Research Question and Hypothesis
- Measures, Study Organization, Statistical Considerations, Analysis Plan & Data Management
- Submitting to IRB / Responding to Provisos
- General Ethical Considerations
- Institutional Review Board / Mock IRB
- Study Design
- Vulnerable and Protected Populations
- Effective Data Presentations: Platforms and Posters
- Critically Appraising Research: A Consumer’s Perspective
- Manuscript Development and Reporting Guidelines
- Mock Review Panel

Below is the syllabus for 2016-2017 academic year.

INTRODUCTION TO CLINICAL RESEARCH
Fall Semester, 2016
(1 credit hour)

Hearing and Speech (AUD 805) MD/PhD Students (GSMC 803) Nursing (NRS 803) Graduate Preventive Medicine (PRVM 803)

Time: 5:00 p.m. - 6:30 p.m., Thursday

Place: Fairway Auditorium, CRC Building 4350 Shawnee Mission Parkway, Fairway, KS 66205

Course Coordinator: Eric Vidoni, P.T., Ph.D.
KU Alzheimer’s Disease Center, Education & Outreach Director (913) 588-5312; email: evidoni@kumc.edu.
Course Description:
The course will provide a basic and broad overview to clinical research. The student will gain an understanding of how to develop clinical research questions including protocol design and the factors that should be considered in initiating a clinical research study. This will include biostatistical considerations, the recruitment of study participants, regulatory issues, and data management, and defining measures and instruments. Students will gain knowledge of how to define clinical research among the various institutional entities involved with clinical research at The University of Kansas Medical Center such as the Research Institute (RI), Clinical and Translational Science Unit, (CTSU) and the Human Subjects Committee (HSC). Additionally, one component of the course will focus on critical appraisal of research studies, and how to present research data.

The target audience for the course is broad and includes faculty involved in the Frontiers Clinical Research Curriculum Program, students pursuing a masters in clinical research, clinical fellows in the school of medicine, doctoral students (medical and graduate, MD/PhD, MD/MPH, etc.), post-doctoral fellows, medical residents, and faculty at KUMC and KU-Lawrence.

It is required that you have a research idea before enrolling. Students will find more benefit from course content and exercises if it can be directly applied to their own research idea.

Prerequisites: Permission from the instructors

Course Objective:
Upon completion of the course students will be able to:

- Describe the process of identifying a clinical research idea
- Discuss principles of clinical research study design and protocol development
- Describe ethical and regulatory issues in conducting research involving human subjects
- Discuss biostatistical significance including data management and defining measures and instruments
- Describe how to present research data

Course Format:
Lecture and discussion. the course is composed of lectures and discussion (1 to 1 ½ hours each) over a period of one semester.

Clinical Research Project:
Each student will be expected to prepare a clinical research study approval application for their Institutional Review Board. The project is due as noted on the class schedule at the end of this syllabus but students are encouraged to complete sections of the project as they relate to weekly lectures. Prepare a PDF version of the application (all files necessary for the type of application you are submitting) and email it to evidoni@kumc.edu by the deadline. Instructions for the project can be found here.

Grading Policy:
Pass or Fail grade will be assigned to each student enrolled for credit at the completion of the course. The student’s evaluation is based on the student's performance. A determination of failed performance is at the discretion of the course instructor but in general includes but is not limited to: missing or being late to class, non-professional behavior or not completing assignments.

Students will be evaluated on their attendance and participation in the course and upon submission of a PDF version of their clinical research project that demonstrates a working knowledge of study design issues (outcome measures, data management, biostatistical considerations) as well as ethical and regulatory issues.

Students seeking credit for the MSCR or CCTR programs must enroll for credit. Students not enrolled for credit may request a certificate of course completion. Students not enrolled for credit must attend 75% of classes and complete the Clinical Research Project for a certificate of course completion.
Students with Special Needs:
Learning assistance, academic performance enhancement, and psychological services at KUMC are free, confidential, and available at Student Counseling & Educational Support Services by calling 913-588-6580 or visiting G116 Student Center. Any student in this course who needs an accommodation because of a disability in order to complete the course requirements should contact the instructor or the Equal Opportunity / Disability Specialist (913) 588-7813, TDD (913) 588-7963 as soon as possible.

Resources:
In addition to lecture materials and handouts, students may find the following online resources useful.

CTSA Central Education and Training resources
Additional resources are available at several different Clinical and Translational Science Award (CTSA) sites across the country, and the CTSA Central website maintains a repository of selected training resources available at those institutions. https://www.ctsacentral.org/consortium/education-and-training.

CTSpedia

Introduction to the Principles and Practice of Clinical Research
A NIH sponsored course on design of clinical trials. There are several useful videos in this series, primarily regarding design. https://ippcr.nihtraining.com/archive.php?year=2014.

Introduction to Biostatistics for Clinical and Translational Researchers.
Sponsored by the KUMC Department of Biostatistics in affiliation with the University of Kansas Cancer Center and Frontiers (FR-D.1). This free, short four lecture course is comprised of selected topics in biostatistics relevant to clinical and translational research. No knowledge of statistics is assumed and all are welcome to attend. Topics include, designing experiments, descriptive statistics, estimation, hypothesis testing, one- and two-sample tests ANOVA, linear regression, and survival analysis. This course was recorded and made available online at http://www.kumc.edu/school-of-medicine/department-of-biostatistics/events-and-lectures/introduction-to-biostatistics-for-clinical-and-translational-researchers/introduction-to-biostatistics-for-clinical-and-translational-researchers-x22407.ml.html

HERON Fishing Trip – Frontiers Biomedical Informatics offers a comprehensive day-long training workshop to discover and explore HERON, the Healthcare Enterprise Repository for Ontological Narration (powered by i2b2). HERON is an integrated data repository at KUMC that harvests electronic medical records, billing systems, registries, and national databases. HERON searches over 725 million facts on 1.9 million patients and can be used by KUMC faculty as well as students, staff, and collaborators sponsored by a KUMC faculty member. The annual HERON Fishing Trip discusses and demonstrates the data types, advanced search capabilities, analysis tools, and data delivery available through HERON. The workshop has been very successful, with annual attendance of over 50 people each year it has been offered. Past attendees have included representatives from the University of Wisconsin, University of Washington, Cornell University, University of Cincinnati, Johns Hopkins, Oregon Health Sciences University, University of Cincinnati, Keystone IT, University of Missouri, Marshfield Clinic, Cornell University, and many others.
Informatics Training Sessions – Frontiers Biomedical Informatics has developed multiple training avenues to support a diverse group of REDCap and HERON users include researchers, study coordinators, hospital administrators, residents, fellows, and students in both clinical and basic sciences. Varying types of assistance are available to those who require or want additional support, including

- Group presentations and training
- One-on-one meetings with study teams and key personnel
- Bi-monthly lunch and learn sessions where users can drop in with specific questions or to obtain a general overview of the system

These options have served 406 attendees over three years.

ENTREPRENEURSHIP RESOURCES

University of Kansas Innovation & Collaboration (KUIC) In line with the University of Kansas need to lead innovation and entrepreneurial engagement activities on campus under Bold Aspirations, KUIC is an institution wide unit that includes various functions related to corporate assets - technology transfer, faculty startup formation, and corporate partnerships. Accordingly, it brings together The KU Center for Technology Commercialization (KUCTC), Office of Corporate Partnerships as well as technology transfer and faculty startup resources under a separate 501(c)3 umbrella. KUIC is led by the Associate Vice Chancellor of Innovation and Entrepreneurship with the goal of being positioned to be more efficient and more flexible in pursuing agreements with industry partners.

Partners in fulfilling KU’s mission through the economic engagement ecosystem at KU are the School of Business and the BTBC. The School of Business houses the KU Center for Entrepreneurship, which was created to develop an entrepreneurial mindset among KU students and faculty. Specifically, the center works to develop the knowledge and clinical capabilities necessary to create and grow products and services that add social and economic value to society. To accomplish this objective, the Center for Entrepreneurship focuses on education, research and outreach programs to provide experiential learning opportunities. In education courses, concentrations and certificates are offered for both business students and non-business students. In research, the Center for Entrepreneurship supports all other KU centers and schools by providing an entrepreneurial application for their research grant efforts. In outreach programs, activities provide excellent experiential learning opportunities for student teams while also providing regional organizations with venture plans and consulting solutions to address their challenges.

These programs are funded from a grant provided by the Economic Development Administration of U.S. Department of Commerce establishing a University Center at KU with matching funds being provided by KU alumni. KU is one of only 40 universities in the country to receive this type of grant. This grant also provides financial support to other programs in the School of Business, including Jayhawk Consulting (www.jayhawckconsulting.org), RedTire (www.redtire.org), the Morris New Venture Business Plan Competition, the Certificate of Entrepreneurship for undergraduate and graduate non-business students (http://entr.ku.edu/certificate), and the KU Entrepreneurship Club.

The Regnier Institute for Entrepreneurship & Innovation (IEI) The Regnier Institute for Entrepreneurship and Innovation, housed in the Henry W. Bloch School of Management at the University of Missouri-Kansas City (UMKC), conducts a wide range of cross-campus entrepreneurship and innovation commercialization programs. These include an array of courses, including interdisciplinary courses, degree programs and emphasis areas, venture startup programs, and business idea and business planning competitions. In addition to the commitment of several Bloch School faculty members to these endeavors the IEI’s cross-campus mission and reach are well reflected in its having a Senior Fellow from the UMKC School of Law faculty, and additional Fellows from the faculty of the UMKC School of Medicine, School of Computing & Engineering, and Conservatory of Music and Dance. In addition, the IEI has well over 100 mentors, from a wide variety of industries and professions, involved in many of its activities, and particularly its E-Scholars venture launch program. Moreover, and especially through its interdisciplinary Entrepreneurship & New Venture Creation course, the IEI has connected with bio-medical innovation projects from universities and other research organizations including, among others, KU and Children’s Mercy Hospital.
**Whiteboard 2 Boardroom Program (W2B)** Led by the University of Missouri – Kansas City Innovation Center, a National Science Foundation Partnership for Innovation grant created the Whiteboard 2 Boardroom program (W2B) as a partnership between four regional schools – University of Missouri-Kansas City, University of Kansas, Johnson County Community College and William Jewell College. It has since expanded to include twenty-two (22) academic institutions, corporations and hospitals in the Missouri/Kansas bi-state region. W2B is a team effort that includes research partners that provide new technologies, technology transfer offices that collect technologies from research partners and help with initial assessment and IP issues, entrepreneurs with a depth of expertise and experience in different technical domains that utilize a variety of business models, W2B staff members that serve as “match-makers”, and service providers such as the UMKC Small Business and Technology Development Center and other KCSourceLink Resource Partners that assist with business connections to facilitate startup development.

KCSourceLink connects a network of more than 240 business building programs across the 18-county Kansas City region. Entrepreneurs can call a hotline, access the website, or enter any of the Resource Partners to find the resources that they need to succeed.

With an emphasis on students and faculty and technology entrepreneurs, the program supports a wide variety of community-based entrepreneurs across all industries. Entrepreneurs of all ages and diverse backgrounds and circumstances access the services. W2B provides services to the regional entrepreneurial community, including but not limited to identification of CEO talent and mentors for new companies, access to innovations developed at regional academic institutions and research organizations, establishment of strategic partnerships, and identification of sources of capital.

**Kauffman Foundation** Established in the mid-1960s by the late entrepreneur and philanthropist Ewing Marion Kauffman, the Kauffman Foundation is based in Kansas City, Mo., and is among the largest private foundations in the United States with an asset base of approximately $2 billion. The Kauffman Foundation provides educational resources for U.S. entrepreneurs, works to accelerate metro-area entrepreneurship hubs, and supports organizations that assist entrepreneurs. The Foundation also works to advance entrepreneurship by providing research-based knowledge to entrepreneurs, policymakers and others. Examples of programs and initiatives are: **Kauffman FastTrac** - Courses to help entrepreneurs start and grow their businesses. More than 350,000 people worldwide have taken a course since 1993; **1 Million Cups** - Free, weekly program to educate, engage and connect local entrepreneurs on a grassroots level. Founded in April 2012, 1 Million Cups has quickly grown to nearly 75 startup communities across the country; **Kauffman Founders School** - Online education program that enables entrepreneurs to learn anywhere, anytime. Leading experts present rich content that founders can immediately apply to their businesses; **Global Entrepreneurship Week** - Held each November, Global Entrepreneurship Week is the world’s largest celebration of the innovators and job creators who launch startups that bring ideas to life, drive economic growth and expand human welfare.

**The Bioscience & Technology Business Center at the University of Kansas Medical Center** The Bioscience and Technology Business Center (BTBC) was a unique creation in 2006 by the City of Lawrence (City), Douglas County (County), the University of Kansas (KU) and the Lawrence Chamber of Commerce (Chamber). Its missions are to create, grow, recruit, and retain bioscience and technology companies from within the region and spun out from the University and build a sustainable economic development infrastructure and tax base for the region.

Beyond the unique BTBC stakeholder structure and strategic partnerships, the BTBC has developed a dynamic and successful environment for innovation and entrepreneurship, and an engine for creating and accelerating high-tech and bioscience businesses. These successes have been accomplished through:

- Startups based on research and technology from KU and the KU Medical Center;
- State-of-the-art BTBC facilities with advanced amenities such as gigabit fiber internet;
- BTBC resources including business services and the expansive BTBC network;
- Competitive incentive packages to worthy companies starting new business operations; and
- Strong coordination with KUIC in accessing KUMC academic and technology resources for BTBCMC companies.
BTBC will continue to build and leverage its assets and other resources to further development of its footprint at KUMC and KUMC’s relationships and value to the region’s economy.

**Digital Sandbox KC** provides proof-of-concept resources to support early-stage commercialization processes including access to technology, business and market experts and funding for early stage market validation, prototyping and beta testing services.

**Frontier Entrepreneurship Roundtable**

This Roundtable (co-chaired by M. Meyers and J. Nagel; see table below) was established one year ago, to bring together entrepreneurship leaders involved in biomedical research from the region. The Roundtable meets quarterly in the Frontiers conference room to discuss entrepreneurship training resources for biomedical CTR scientists in the region.

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<thead>
<tr>
<th>FR-D.3. Members of the Entrepreneurship Roundtable</th>
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<tr>
<td><strong>Name, Frontiers Role, Position, Community/Institution</strong></td>
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<tr>
<td><strong>Co-chair:</strong> Maria Meyers, Vice Provost of Economic Development, Executive Director, UMKC Innovation Center</td>
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<tr>
<td><strong>Co-chair:</strong> Julie Nagel, KU Associate Vice Chancellor for Innovation and Entrepreneurship and President of the KU Innovation &amp; Collaboration Center (KUIC)</td>
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<tr>
<td>John Spertus, Director, Frontiers Translational Endeavors Component</td>
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<td>Scott Weir Director, Institute for Advancing Medical Innovations, KUMC</td>
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<td>Richard Barohn, Frontiers Director, Entrepreneurship facilitator</td>
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<td>Jeffery Joyce, Vice President for Research, KCUMB</td>
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<td>James Baxendale, Director WhiteBoard2 Boardroom, UMKC</td>
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<tr>
<td>Anthony Luppino, Professor: Interdisciplinary Education in Law and Entrepreneurship, UMKC School of Law</td>
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<td>Julie Burkhart, Director Community Engagement, KU</td>
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<td>Steven Soper, Foundation Distinguished Professor, Department of Chemistry, KU</td>
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<td>Tammy Flores, Senior Program Analyst in Research &amp; Policy, Kauffman Foundation</td>
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<td>Dominique Pahud, Founder and CEO of Energizing Health</td>
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<td>Tom Field, Associate Vice Chancellor, Organizational Improvement, KUMC</td>
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<td>LaVerne Epp, Executive Chairman - BTBC Bioscience &amp; Technology Business Center (BTBC)</td>
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<td>Anurag Patel, Manager of Strategic Development, Digital Innovation, KUMC</td>
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<tr>
<td>Wally Meyer, Director Center for Entrepreneurship, KU</td>
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E. RESEARCH METHODS: FACILITIES AND OTHER RESOURCES

Frontiers Resources. Frontiers has an impressive array of resources available to achieve its aims of engaging stakeholders, creating a sustainable translational research workforce and strengthening infrastructure to accelerate translational research. We draw on the considerable strengths of the University of Kansas Medical Center (Kansas City and Wichita campuses), the University of Missouri-Kansas City, Children’s Mercy Kansas City, and the Kansas City University of Medicine and Biosciences. In addition, we take advantage of a strong history of entrepreneurship investment in the Kansas City region (e.g., the Ewing Marion Kauffman Foundation, the UMKC Regnier Institute for Entrepreneurship and Innovation, the Kansas City Area Life Sciences Institute and the KU Innovation and Collaboration Center) to leverage drug, device, diagnostic, medical device and population health product development to achieve faster success. We have a plethora of community organizations, clinics, and providers across the region willing and excited to collaborate with Frontiers investigators, experts in entrepreneurship who will lead and train the next generation of successful business developers in the biomedical sciences and a growing cadre of team science-trained teams to work in emerging lifespan clinical and translational research. Please refer to the Overall Section of Facilities and Resources for a comprehensive description of Frontiers resources that are available to all Frontiers members.

KUMC Biostatistics, Epidemiology, and Research Design (BERD)

KUMC Department of Biostatistics The Department of Biostatistics occupies 6834 square feet of contiguous office space at the University of Kansas Medical Center located on the ground and 5th floors of the Robinson building as well as the 5th floor of the adjacent Wescoe building. This includes twenty 26 lockable offices, two conference rooms and cubical spaces that can house up to twenty six staff/students. The Department of Biostatistics personnel consists of 13 biostatistics faculty members, 2 teaching associates, 4 research analysts, 4 information specialist personnel, 1 project manager, 2 administrators and 1 administrative assistant.

KUMC BERD Computer Resources

Hardware. Shared high speed workstation with dual Xeon 3.40 GHz processor, 8 GB of SDRAM, over 500GB of high speed storage, digital tape backup, and a DVD read/write drive. 34 HP Intel Core i5 CPU @ 3.40 GHz processor, 16 GB of SDRAM, over 800GB of high speed storage; 4 HP Intel Core i7 CPU @ 3.60 GHz processor with 32 GB of SDRAM along with 1 TB hard drive.

Networking/Internet and Servers HP PowerEdge 4600 file server with a 3.6GHz Xeon CPU, 8GB of DDR SDRAM, six 18GB SCSI Hard Drives in a RAID 5 configuration, 200GB digital tape backup system. Internet Explorer 11; Microsoft Outlook email; Internet 2 access through KUMC’s LAN. The Department also has 14 windows 2008 R2 virtual servers - with dual Xeon processors, 8 GB SDRAM and over 240 GB of storage area; 5 windows 2012 R2 virtual servers - with dual Xeon processors, 16 GB SDRAM and over 320 GB of storage area; 1 SUSE Linux server Quad core processor, 8 GB SDRAM. A HP PowerVault tape backup is also located in the server room along with a cooling system to maintain optimal conditions for optimal server performance. Tape backups are performed daily on modified data and full tape backups are performed weekly and stored off-site for 9 weeks.


KUMC Velos eResearch Velos eResearch supports patient recruitment, patient scheduling, study monitoring, project planning, study design, protocol compliance, budget, invoicing, milestone management, data safety monitoring, adverse event reporting, system integration and study execution.

Velos was designed from the ground up to support both study administration and clinical data management. This type of design is fundamental to Velos’ customer service abilities to solve customers’ research, information and coordination challenges. Key features are:

STUDY ADMINISTRATION

- Protocol management
- Patient scheduling
- Regulatory reporting
Adverse event management and reporting
- Budgeting, milestones, invoice, and payments/receipts processing
- Management of research organizations, personnel, and collaborators

**CLINICAL DATA MANAGEMENT**
- Patient profiling
- Longitudinal, patient-level information collection and analysis
- Study-specific data collection and analysis
- Workflow configuration
- Integration with internal and third party information systems

Some other notable strengths of Velos eResearch are:
- An advanced, carefully considered commercially available clinical research information system.
- Velos was designed to provide off-the-shelf support for all of study administration, clinical data management, adverse event reporting, and integration with internal and third party cancer center systems through one integrally-designed system.
- The ability to add, modify, and apply study- and customer-specific data dictionaries with minimal technical involvement.
- HL7 compliance. Velos has dozens of working laboratory, medical record, and device interfaces that are already in production.
- Compliance with industry standards (such as CFR11) and a commitment to supporting standards that foster higher collaboration. Velos is active in and supportive of government initiatives intended to foster greater collaboration among researchers (example FDA funded studies).
- Patient-level of study-level system architecture. Most research systems were primarily designed for research sponsors and focus on the needs of single studies. The system architecture to support research sites well is quite different and must consider both patient- and study-level views and also integrate the two.
- Advanced technology and security features to support multi-institutional, cooperative trials, community-based research and patient self-reporting, in a single environment.
- Through these capabilities, Velos helps effect a paradigm shift from the current sponsor-centric clinical research information model to one that is investigator-centric. In doing so, Velos believes it can help its customers, and the research community in general, unleash tremendous improvements in research productivity, collaboration, and, ultimately, patient care.

**Regulatory Knowledge and Support (RKS)**

**KUMC Research Institute** Established in 1992, the KUMC Research Institute (RI) serves as the recipient of all grants and contracts to and with KUMC and assists with the research activities of KUMC faculty. Frontiers' Regulatory Knowledge Support is housed within the RI, a private, not-for-profit 501(c)(3) corporation. The RI fosters individual partnerships between KUMC researchers and the private sector, enhances revenue to researchers and the University through the transfer of research discoveries and other information to the private sector, and facilitates a cooperative and profitable interaction between KUMC and corporations throughout Kansas, the greater Kansas City Metropolitan area, domestically and internationally. The Research Institute employs more than 50 staff members. Research Institute divisions are: Sponsored Programs Administration; Clinical Research Administration unit; Office of Legal Services; and Financial Services.

**RI Sponsored Programs Administration (SPA)** The primary responsibility of SPA is to facilitate the research-related activities of all Schools within KUMC and to serve as a resource for the research faculty during all aspects of their research. SPA assists faculty and staff in acquiring extramural support in research, education and service projects and is responsible for post award administration of contracts and grants awarded to KUMC to ensure that these projects are conducted in compliance with federal and state regulations, university policies and commitments specified in grants, contracts and other agreements with external sponsors.
RI Clinical Research Administration (CRA) Clinical Research Administration is the central liaison between the funding agency, Institutional Review Board and principal investigators at KUMC. The CRA markets KUMC to potential research sponsors, receives and manages protocol initiation, and provides ongoing administrative support to ensure timely and cost-effective completion of clinical trials.

Clinical Research Administration services include:

Pre-Initiation

- Attend, if requested by study staff, site evaluation visits to answer institutional questions on study processing and activation time
- Serve as centralized contact between sponsors and the study staff for all clinical trial, regulatory, administrative, and budget and contract work at the University of Kansas Medical Center
- Provide protocol development support for investigators
- Prepare consent form for investigator’s review
- Secure Human Subjects Committee approval of protocol and consent form
- File regulatory documents required by FDA and sponsor
- Prepare and negotiate trial budgets
- Request pricing for hospital and clinical services
- Review and negotiate clinical trial and data use agreements
- Notify investigator and sponsor of final HSC approval
- Prepare and submit initial IND documents, amendment and annual progress reports for IND

Post-Initiation

- Secure HSC approval of protocol revisions and revised consent forms
- Obtain HSC approval for print or media advertising
- Process internal adverse events and IND safety reports for HSC submission and approval
- Provide status reports of each investigator’s trials as requested
- Submit reports to HSC for annual re-certification of trials
- Coordinate ongoing communication between sponsor and investigator
- Revise and negotiate budget and clinical trial agreements

Study Closure

- Process study closure for trial termination
- Complete reconciliation documents for trial account closure

Quality Improvement for Clinical Research

- In conjunction with the Office of Compliance, conduct quality improvement visits [QIV]

Education Opportunities

- Host and organize Clinical Trial Education Lecture (CTEL) series on a monthly basis
- Provide training workshops (CTEC) for investigators and study coordinators
- Meet with physicians and study coordinators to review Research Institute services
- Provide new study coordinator/research nurse orientation
- Facilitate coordinator certification, networking and educational opportunities
**RI Office of Legal Affairs.** The University of Kansas Medical Center Research Institute Inc., encourages relationships with the corporate sector and has participated in a wide variety of written agreements related to pre-clinical and clinical research. The Office of Legal Affairs will either review the contract provided by the company or initiate a contract based on the standard Research Institute Clinical Trials Agreement. The Research Institute negotiates master agreements with companies who place multiple clinical trials at the Research Institute. The Office of Legal Affairs provides rapid turn around and negotiation on all agreements with industry sponsored clinical trials given priority in negotiation.

Office of Legal Affairs services include reviewing and negotiating:

- Clinical Trial Agreements
- Confidential Disclosure Agreements
- Fee-for-Service Agreements
- Grant Agreements (Federal and Privately Funded)
- License Agreements
- Material Transfer Agreements
- Sponsored Research Agreements
- Subcontract Agreements

**RI Financial Services Division.** The Division of Financial Services serves as the depository and administrator for funds received. The Division of Financial Services works directly with principal investigators to insure that the management of funds from granting agencies are made available with minimum loss of time and effort. The goal is to conduct research at the lowest overhead cost possible with the maximum flexibility to the principal investigator. The accounting records of the Research Institute are audited annually by an external audit firm.

**KU Innovation & Collaboration.** The University of Kansas Innovation and Collaboration (KUIC) is a 501(c) (3) with a thirteen-member Board chaired by the Provost and Executive Chancellor of the University of Kansas with the purpose of partnering with corporations and bringing KU innovation to the marketplace. Serving both the Lawrence and Medical Center campuses. KU has a strong tradition of effective technology transfer built on research in such fields as drug development and delivery; education and human development; biosciences, biofuels and bioengineering; information technologies and informatics; and remote sensing.

**Frontiers Research Gateway.** The Frontiers Research Gateway is a web-based resource to provide all Frontiers investigators with helpful tips and information to enable them to conduct their research. The webpages provide information ranging from generating research ideas to seeking extra-mural funding to executing research projects. Divided into four sections – Study Development, Study Initiation, Conducting a Study, and Study Close-Out – the Gateway walks investigators though the overall research process and breaks down that process with detailed steps. Those steps are supplemented with specific information on how Frontiers can help. The Research Gateway was developed by the Frontiers Administration team in 2013 with input from investigators who shared their experiences in navigating the research process and with the Frontiers website team. The webpages of the Gateway contain many useful links that researchers frequently need and find useful. ([www.frontiersresearch.org/frontiers/research-gateway](http://www.frontiersresearch.org/frontiers/research-gateway))

**Frontiers IRB Reciprocity** In 2013, Frontiers partner institutions, including University of Kansas Medical Center, University of Missouri–Kansas City, Children’s Mercy Kansas City, and University of Medicine and Biosciences entered into an IRB reciprocity agreement. Typically a research project involving partners from these institutions will only need one IRB review. Detailed instructions on how to initiate an IRB application with reciprocity are found on the Frontiers website ([http://frontiersresearch.org/frontiers/IRB-reciprocity](http://frontiersresearch.org/frontiers/IRB-reciprocity)).

We have gained considerable experience by creating and participating in IRB consortia that positions the Frontiers program to deliver efficient implementation for regional and national multi-center trials. Frontiers institutions developed and implemented regional IRB reciprocal processes across all our affiliated institutions.
early in the third year of our initial CTSA funding. When our PCORnet GPC was funded we leveraged this regional experience to establish reliance agreements at 12 GPC sites. Our experience with using single IRB models includes central IRBs, deferred reciprocal models, and shared review models. We are members of IRBShare, and most recently we were invited to participate in the pilot phase of the NCATS IRB Reliance Initiative (NIRI). Efficiencies gained through single IRB models like IRB reciprocity are further enhanced and complemented by our experiences with streamlined approaches for master agreements and budgets (e.g., NeuroNEXT, StrokeNet, Neonatal Research Network), our PCORnet CDRN sub-awards, and multiple master agreements with external sponsors. We have a great deal of experience both leading multicenter trials involving CTSA hubs and other sites and being a part of such trials led by others.

**KUMC Human Research Protection Program.** KUMC has a comprehensive Human Research Protection Program (HRPP) that ensures the rights, safety and welfare of all subjects recruited or enrolled in research projects, regardless of funding source. The program supports weekly IRB meetings on the Kansas City Campus and monthly meetings on the Wichita campus. AAHRPP accreditation has been maintained since 2007. The program oversees the institutional review process and coordinates ancillary reviews with radiation safety, biosafety, HIPAA, conflicts of interest, and data security. To support efficient review, the IRB application identifies not only key elements necessary for IRB review but also captures information that supports the ancillary reviews. Streamlining of the above compliance functions occurs through cross-membership on the various committees and a parallel review process.

**KUMC Electronic IRB submissions.** Since 2013, all proposals to the KUMC IRB are submitted through our electronic IRB system (eIRB) using Huron’s Click IRB7. Our eIRB automates all aspects of submission, routing, review and approval for the entire lifecycle of the project. The system supports compliance by serving as the repository for all IRB-approved documents and by tracking human subjects training and current conflict of interest disclosures. For research conducted under a central IRB or other reliance mechanism, eIRB delivers a truncated application process that allows investigators to register their study and upload the approval of the reviewing IRB.

**KU Health System and Research Institute Steering Committee and Sub-Committees.** In an effort to improve communications and processes across the KU Health System and the Research Enterprise, a collaborative group has been created to improve clinical and translational research that occurs in the KU Hospital setting. This process was started by Dr. Barohn after he became Vice Chancellor for Research. He asked Dr. Ator, the KU Hospital Chief Information Officer to co-chair the steering committee. The steering committee and workgroups are composed of members from KUMC, KU Hospital, and KU Physicians, Inc. A number of workgroups meet regularly and report to the steering committee chaired by Drs. Barohn and Ator. Drs. Barohn and Ator then report final recommendations to the Executive Vice Chancellor, Dr. Girod, and the Hospital CEO, Mr. Page for endorsement.

**Full Steering Committee**

- Greg Ator (Steering Committee co-chair)
- Rick Barohn (Steering Committee co-chair)
- Debra Brogden (Committee Support)
- Karen Blackwell
- Marge Bott
- Jamie Caldwell
- Chad Cannon
- Carol Cleek
- Mazen Dimachkie
- Ed Ellerbeck
- Peter Griffith
- Chris Hansen
- Lisa Hoebelheinrich

Joseph McGuirk
Tamara McMahon
Seamus Murphy
Andrea Nicol
Dinesh Pal Mudaranthakam
Jeff Reene
Michael Rippee
David Robbins
Marilyn Rymer
Steve Simpson
Peter Smith
Jim Vacek
Russ Waitman and/or Tamara McMahon
Research Revenue Cycle / Research Clinical System Operations (Inpatient/Outpatient Research)
The purpose of this subcommittee is to improve efficiencies in patient billing and invoicing by determining whether it was research versus routine or standard of care.

Workgroup Support: Shawn Fapp
Jamie Caldwell (co-chair)  Chris Mackay
Colette Lasack (co-chair)  Dinesh Pal Mudaranthakam
Greg Ator  Seamus Murphy
Angie Ballew  Caroline Murray
Ethan Carter  Ted Noravong
Carol Cleek  Marilyn Rymer
Kelly Daniels  Debra Seyfried
Rolina Everett  Reta Studnicka
Dhanunjaya Lakkireddy  Peter Tadros
Barbara MacArthur  Sue Welborn

Personnel & Access to O2 / Consent Form/Patient Identification
Workgroup Support: Kelly Robertson  Theresa Jackson
Peter Griffith (co-chair)  Bart Lindsley
Greg Ator (co-chair)  Joe McGuirk
Hobs Apell  Seamus Murphy
Sandra Bergquist-Beringer  Caroline Murray
Marge Bott  Dinesh Pal Mudaranthakam
Jamie Caldwell  Trish Palmer
Melinda Clark  David Robbins
Carol Cleek  Debra Seyfried
Mazen Dimachkie (co-chair)  Bob Spaniol
Rolina Everett  Reta Studnicka
Susie Farkas  Karen Tevault
Ensley Fleming (ECG)  Sue Thomas
Laura Herbelin  Sue Welborn
Angella Herrman  Steve Williamson (co-chair)
Brad House II  Jennifer Wilson

Recruiting Subjects via the Electronic Medical Record (EMR) The purpose of this subcommittee is to determine the best method of identifying study participants using the electronic medical record.

Workgroup Support: Debra Brogden  Matt Mayo
Tamara McMahon (co-chair)  Joe McGuirk
Dinesh pal Mudaranthakam (co-chair)  Kieran Pemberton
Frontiers Affiliate Regulatory Committee
Comprised of regulatory representatives and officials from Frontiers partners and affiliates, this consortium-wide group was established to address regulatory hurdles affecting Frontiers research. The Committee divided into smaller groups to address specific issues: IRB Reciprocity Subcommittee, RB Forms Subcommittee, Conflict of Interest Subcommittee, and Training Subcommittee. These groups held numerous meetings over many months, resulting in Frontiers-wide regulatory efficiencies, including IRB reciprocity among KUMC, KU-Wichita, Children’s Mercy, Truman Medical Centers, University of Missouri-Kansas City, and St. Luke’s Health System.

UMKC Office of Research Services (http://ors.umkc.edu/home) The Office of Research Services provides faculty with pre-award services including proposal and budget development support, application concept review, non-technical and technical review, and application submission support. The Office also provides assistance in finding relevant sponsors for research through an institutional subscription to PIVOT as well as through other more individualized activities and efforts. Once an award is received the post-award staff members assist researchers in setting up spending accounts and provide the back-end support necessary for budget management, compliance with University, federal, and other sponsor requirements as well as timely and accurate reporting. The Office also works seamlessly and in collaboration with the Office of Research Compliance and the Office of Technology Commercialization (http://ors.umkc.edu/otc)

UMKC Office of Research Compliance ensures that researchers and their proposed research are in compliance with governmental regulations and university requirements. The Office coordinates our efforts to comply with Animal Care and Use (IACUC), human subject research (Institutional Review Board), Laboratory and Biosafety (Institutional Biosafety Committee), Radiation Safety regulations, and HIPAA accountability and training. Specifically, the UMKC Research Compliance Office provides the following services: helps researchers navigate complex federal and state compliance regulations; reviews and manages conflicts of interest to ensure the researcher’s personal interests do not influence their primary obligations to science, university, colleagues, students, and sponsors; ensures humane care and use of all animals in research and teaching; oversees research protection as it relates to human participants, recombinant DNA, and bio-hazardous material; provides oversight to research investigators and serve as liaisons to the review boards and committees; coordinates the radiation safety program; and, offers education and training to faculty and staff.

KU-Lawrence Human Subjects Committee Human Subjects Committee - Lawrence Campus (HSC-L) protects those who volunteer to be participants in research studies. HSC-L’s primary mission is to protect research participants’ rights and privacy. In addition, it protects investigators from legal and ethical missteps and safeguards them from the repercussions of such missteps.

Children’s Mercy Kansas City Office of Research Integrity Children’s Mercy has a Federalwide Assurance (FWA) with the Department of Health and Human Services, in which we assure Federal officials that any research project, whether it is a chart review or administration of investigational drugs, is conducted in accordance with Federal regulations. The Office of Research Integrity assists investigators in every step of the research process. The CMKC Institutional Review Board (IRB) is a completely electronic process through MARS, Mercy’s Automated Research System. Researchers use the MARS system to gain access and submit IRB submissions for review. Submissions are entered, routed, reviewed and finalized electronically. This tool improves efficiency for the IRB review and investigators.

KCU Office of Research and Sponsored Programs The Office of Research and Sponsored Programs (ORSP) provides pre- and post-award support for research grants as well as compliance oversight by the KCU Manager of Research Compliance who is charged with promoting and supporting ethical research at KCU. The ORSP provides a fully functioning Institutional Review Board (IRB) and an Institutional Animal Care
and Use Committee (IACUC). Members of these committees must complete mandatory CITI training. The ORSP is also responsible for the Conflict of Interest program which assures and monitors investigator compliance with institutional policy on financial conflict of interest.
F. HUB RESEARCH CAPACITY: FACILITIES AND OTHER RESOURCES

**Frontiers Resources.** Frontiers has an impressive array of resources available to achieve its aims of engaging stakeholders, creating a sustainable translational research workforce and strengthening infrastructure to accelerate translational research. We draw on the considerable strengths of the University of Kansas Medical Center (Kansas City and Wichita campuses), the University of Missouri-Kansas City, Children’s Mercy Kansas City, and the Kansas City University of Medicine and Biosciences. In addition, we take advantage of a strong history of entrepreneurship investment in the Kansas City region (e.g., the Ewing Marion Kauffman Foundation, the UMKC Regnier Institute for Entrepreneurship and Innovation, the Kansas City Area Life Sciences Institute and the KU Innovation and Collaboration Center) to leverage drug, device, diagnostic, medical device and population health product development to achieve faster success. We have a plethora of community organizations, clinics, and providers across the region willing and excited to collaborate with Frontiers investigators, experts in entrepreneurship who will lead and train the next generation of successful business developers in the biomedical sciences and a growing cadre of team science-trained teams to work in emerging lifespan clinical and translational research. Please refer to the Overall Section of Facilities and Resources for a comprehensive description of Frontiers resources that are available to all Frontiers members.

**COMMUNITY RESOURCES FOR ENGAGEMENT AND RECRUITMENT OF SPECIAL POPULATIONS**

The Kansas Patients and Providers Engaged in Prevention Research (KPPEPR) Network. The Kansas Patients and Providers Engaged in Prevention Research (KPPEPR) Network is a collaborative of patients and professionals from geographically diverse communities across Kansas. All KPPEPR Network members are primary care patients, providers, public health and/or agency professionals involved directly in health-related activity on a daily basis. The network is led by an Executive Director, Anthony Wellever, at the University of Kansas Medical Center (KUMC), where an additional group of senior research faculty (Drs. Allen Greiner, Kim Kimminau, Edward Ellerbeck, Christie Befort and Joseph LeMaster) provide support and technical assistance on all projects. The network is further supported by the Frontiers translational science program and its Community Partnership for Health initiative. Over the past 15 years, the KPPEPR Network has relied on collaborative involvement of over 60 primary care practices, thousands of patients and scores of public health and other health service agencies.

Prior projects have utilized patient and physician surveys, office assessments, direct observation of primary care, key informant interviews, and qualitative data collection methods. Nearly all of these projects have been initiated by academic researcher faculty at KUMC. The projects have resulted in a host of scientific publications and abstracts since Drs. Greiner and Ellerbeck became involved in 1999. The KPPEPR Network has been utilized to study the delivery of preventive services in physician’s offices, including colorectal cancer screening, counseling on diet and physical activity and smoking cessation counseling. In 2004 and 2005, KPPEPR practices participated in a NIH-funded study to examine the impact of disease management on smoking cessation in rural primary care practices. This study recruited 50 rural clinics, 63 health care providers, and 750 participants for a 2-year trial using motivational interviewing for smoking cessation (CA101963). Several NIH and HRSA funded intervention studies followed over of the next four years. In 3 other separate studies (HS14857, CA121016, HL87643) 68 rural clinics and 1,340 participants were recruited and delivered health related interventions via phone and telemedicine. Most recently, in 2015 KPPEPR became the primary network for a $10 million dollar PCORI funded intervention (Befort, PI) to study the comparative effectiveness of 3 practice change strategies for weight loss among rural primary care patients.

The KPPEPR Network has utilized several unique research methodologies over the years. These include home visit data collections by research assistants, hospital and primary care practice interventions and the involvement of medical students in research activities and intervention delivery. In 2014, KPPEPR leaders, began a network reorganization to systematically involve patients, and an interdisciplinary group of health care providers and public health professionals as network leaders and active participants. The intention of these changes is to begin conducting projects that are instigated at the behest of patients and providers, rather than as conceptualized by full time researchers. The reorganization should result in a shared decision-making process whereby all parties have an equal voice and are valued as contributors throughout the research process. By reorienting the network to more fully serve the needs of patients and “on the ground” service providers, KPPEPR is poised to make significant contributions to evolving health care reform and new research initiatives such as the Federal Patient Centered Outcomes Research Institute, which seek to answer health research questions with immediate application for improving patient oriented outcomes.
K-State Research and Extension. K-State Research and Extension is a statewide network of educators sharing unbiased, research-based information and expertise on issues important to Kansas. It has established local, state, regional, national, and international partnerships. It is dedicated to a safe, sustainable, competitive food and fiber system and to strong, healthy communities, families, and youth through integrated research, analysis and education. With more than 125 years of research and 100 years of extension, K-State Research and Extension has been improving the quality of life and standard of living for Kansans for a century. This integrated system connects the university to every county through locally based educators who serve as sources of objective information. In partnership with the Community Engagement function, researchers are working to collaborate with K-State Extension agents to increase enrollment in clinical trials, participation in community health initiatives and to encourage enrollment in Frontiers’ patient registry, “Pioneers.”

The American Academy of Family Physicians National Research Network (AAFP NRN) and MOSAIC Center of Excellence. The American Academy of Family Physicians National Research Network (AAFP NRN) and MOSAIC Center of Excellence was established in 1999 to conduct, support, promote, and advocate for primary care research in practice-based settings.

The AAFP NRN assists in realizing overall strategies for achieving improved primary care for the nation. These include: supporting initiatives in advancing the Patient Centered Medical Home, promoting an ongoing effort for practice change through improved use of technology, education and communication; assisting our members to achieve financial success through optimal practice management; involving family physicians in targeted public health activities; and increasing member and patient awareness of resources through educational programs.

Within the American Academy of Family Medicine National Research Network (based locally in Leawood, KS) we have 1 of 8 national centers of excellence in practice-based research (Kimminau, P30 HS21647) that provide access for Frontiers investigators to 9 regional and 3 national PBRNs that include primary care, dental, pharmacy, and dieticets research networks.

The AAFP NRN is working to gain a broader perspective from the patients’ point of view as it relates to the focus of family medicine and family medicine research. This perspective will provide better insights into the concerns and needs of patients and further help us to understand and improve the patient/physician relationship. AAFP members work with the patient/family dynamic every day. Engaging patients in their own care is the foundation of what family medicine does. Including the patients’ view throughout our research processes is a key component if we are striving for improvements in health care and health outcomes. Getting their perspective throughout the various phases will provide us with insights into health concerns, important areas for research and benefits to the patient, and ultimately improved care.

Center for Excellence in Health Communication to Underserved Populations (CEHCUP). Health disparities constitute a major problem for the United States. More focused research, as well as advanced training for communicators (be them journalists, advertising or public relations practitioners) is needed. The William Allen White School of Journalism and Mass Communications has established the Center for Excellence in Health Communication to Underserved Populations on the KU-Lawrence campus to promote dedicated student training as well as collaborative research and service to the community to address health disparities in the state of Kansas and abroad.

CEHCUP has three major roles:

- Educate and train undergraduate and graduate students in journalism and strategic communication about health communication practices to underserved populations and CBPR-driven approaches.
- Function as a research hub to facilitate interdisciplinary, multidisciplinary and cross-disciplinary research into communication practices for health campaigns addressing underserved populations.
- Provide support, assistance and know-how for community-based organizations that want to engage in health promotion or disease prevention activities.

KUMC Office of Rural Health Education. KUMC Office of Rural Health Education partners with health care providers, Kansas employers, and stakeholders to increase access to quality health care for the people of rural and urban underserved Kansas. We do this by advancing the health care workforce through recruitment, retention, research and education. Let us help you find Kansas health care jobs, loan forgiveness and repayment options, temporary coverage for medical professionals, committed providers for your hospital or clinic, and more.
KCK Community Health Council. KCK Community Health Council (CHC) exists to improve health and health care for the people of Wyandotte County. We believe that residents have the ability, and an inherent right, to provide leadership in the shaping of physical spaces and public policies which impact their health. CHC’s responsibility is to ensure the collective experiences and expertise of Wyandotte County residents are represented in matters of health design and policy, as well as identify and maximize opportunities for collaboration, planning and implementation of effective community health improvement initiatives.

CHC is a non-profit, 501 (c) 3 community health collaborative of hospitals, safety net clinics, federally-qualified health clinics (FQHCs), mental health providers, public health departments, academic research institutions and health care funding organizations. CHC member institutions support the work of the organization on a pre-determined pledge that is renewed each fiscal year.

The University of Kansas Cancer Center has been selected for National Cancer Institute (NCI) designation. NCI designation enhances the long-standing relationship of the Cancer Center with the Midwest Cancer Alliance, providing opportunities to expand research and link discoveries made in the lab at the University of Kansas to the MCA network of hospitals and health care organizations and enhance the quality and delivery of cancer care at all levels. KPPEPR (Kansas Patients and Providers Engaged in Prevention Research) is a practice-based research network that is also part of the MCA.

All MCA-member medical professionals have access to second opinion and consultation services with multidisciplinary cancer experts, conferences and other networking events, outreach programs, patient navigation support, communication materials, web resources, and continuing education programs. For the convenience of our affiliated medical professionals, the MCA provides many of these services at member locations, thanks to technology like Interactive Televideo (ITV).

Genesis Health Care Network, Garden City, Kansas (Finney County, KS). The Genesis Health Care Clinic Network is the operator of the largest rural primary care network serving Hispanics and refugees in Kansas. Serving over 9,500 patients annually through six clinics throughout southwest Kansas, with more than 90 percent of these individuals below the 200% poverty level and as the leading ambulatory “safety-net” care provider for these underserved individuals and families in the region, Genesis recognizes the importance of health care and social services for clients. The flagship Genesis clinic, in Garden City, rests in a region where 5 large counties now have majority minority populations. Meat packing, and feedlot growth over the past 30 years has led to an influx of Latinos and refugees from across the globe. The incredible diversity in the region has shaped Genesis. All programs -- dental and medical clinics, oral health screening and education, social services such as the food bank, clothing room, emergency assistance, and citizenship classes, immunizations, early literacy, health education and outreach -- are designed to improve the lives and health status of individuals and families.

KUMC faculty began collaborative work with Genesis over 14 years ago. Dr. Kimminau, while Vice President of Research at the Kansas Health Institute in 2002, conducted the Minority Health Disparities in Kansas project and completed focus groups and health assessments at Genesis clinics. For over 12 years, we have placed medical students in the Genesis Garden City Clinic for a six week summer practice/research experience. We worked with Genesis to recruit smokers from the clinic for the NCI-funded KanQuit smoking cessation study (PI, Ellerbeck) in 2005-2007. We partnered with Genesis and other primary care clinics on the tablet computer delivered Healthy Living colorectal cancer screening program in 2007 (NCI, PI, Engelman). In 2009, we began working with Genesis to deliver state of the art telemedicine smoking cessation counseling services in the Connect to Quit study (NHLBI, PI, Richter). The past six years the Genesis network has been a subcontracted primary partner in the NCI-funded Community Networks Program Center to reduce cancer disparities (U54 CA154253, PI, Greiner). Through this we worked with Genesis to develop a Community Health Worker program that is now self-sustaining. We have new partnership funding from CMS to conduct health promotion across the region. We expect our research partnership with Genesis to continue and to allow work on vulnerable and understudied rural populations.

Institute for Community Engagement (ICE). ICE is the KUMC outreach and service delivery infrastructure that spans over 100 staff across five departments (Area Health Education Centers, Center for Telemedicine & Telehealth, Continuing Education, Rural Health, and Research & Scholarship). ICE coordinates outreach across the School of Medicine, School of Nursing, and School of Health Professions and there is a strong interprofessional focus across activities. Collectively, the Institute departments and its extensive internal and external partners provide needs-driven educational and clinical services that span the entire state and reach into each of Kansas’ 105 counties. The Institute’s mission is to "improve the health of Kansans through
communication, collaboration, and statewide partnerships." The mission spans enhancing student education, strengthening the health care workforce, researching to improve health, advancing health care access, and serving communities. The Institute works closely with KU Hospital to advance integration and health system models. ICE’s departments and partners work with and help CPH facilitate community engaged research from concept to proposal implementation, including site/practice recruitment and retention, training, as well as reporting findings back to communities.

**KU Center for Telehealth and Telemedicine (KUCTT).** Using the range of telehealth technologies, KUCTT provides Kansans access to the best available health care while providing Kansas’ health care professionals access to the best available health information and education. Kansas is the ideal state for telemedicine, with half of its population in two population centers and the other half located throughout 88 rural counties. From the very first consult in 1991 to present day, the KUCTT continues to expand its clinical services for children and across the lifespan. With more than 40,000 consults across 60 specialties from 1991 to present, KUCTT is a leader in the telemedicine field. The existing network connects some of the most clinically underserved communities, effectively enhancing Kansas’ quality of healthcare. Urban and rural telehealth partners include schools, area health education centers, hospitals, early intervention satellite sites, community health clinics, mental health facilities, and other venues. KUCTT is one of the most active outpatient telemedicine programs in the country, with over 4,000 clinical consults per year across secure room-based, PC-based, and mobile telemedicine platforms. KUCTT also oversees the federally funded Heartland Regional Telehealth Center, spanning telehealth services across Kansas, Missouri, and Oklahoma.

**Area Health Education Centers (AHECs).** The AHECs are academic-community partnerships that train health care providers at sites and in programs that are responsive to state and local needs around health topics. The AHECs enhance the quality and accessibility of health care services in Kansas through partnerships with communities, health care professionals and organizations, educational institutions and other interested individuals and agencies. The three offices are geographically distributed across the East (Pittsburg, KS office), West (Hays, KS office), and Northeast (Lawrence, KS office). Rural Kansas has a diverse underserved population, with high poverty in southeast rural areas, a population faced with economic challenges related to downturns in farming and oil in central and northwest Kansas, and a new immigrant population associated with meat packing and other industries in southwest Kansas. The AHECs have a strong local presence in each of these regions to meet needs unique to the area. AHECs link the resources of university health science centers with local planning, educational, research, and clinical resources. This network of health-related institutions provides multidisciplinary educational services to students, faculty and local practitioners, ultimately improving health care delivery in medically underserved areas. From 2009-2011, the AHECs completed 468 education/training initiatives with 1,980 sessions and processed 29,792 continuing education enrollments from every county in Kansas. The AHECs have leveraged their strong rural relationships to support recruitment and retention of rural practices in previous rural primary care research related to epilepsy, pediatric cancer, smoking cessation, and other topics.

**KUMC Continuing Education and Professional Development (CE/PD.)** CE/PD’s goal is to develop and deliver education that makes a positive difference in practice and patient outcomes. CE/PD provides continuing education directly related to the top practice concerns of Kansas’ primary care providers, and provides interprofessional education with a growing emphasis on team-based medicine. CE/PD is nationally accredited by the Accreditation Council for Continuing Medical Education and the American Nurses Credentialing Center. CE/PD is the largest provider of continuing medical education in Kansas. In FY 12, CE/PD offered 81 courses, conferences or event series with an enrollment of 4,706. In addition, they supported 1,629 grand round sessions at KUMC, including broadcast via televideo of a number of sessions to metropolitan and rural sites across Kansas. Of note, CE/PD has accredited one of the most attended regional pediatric obesity conferences for the last decade, in addition to numerous grand rounds around obesity. CE has spearheaded two statewide initiatives that utilized training and performance improvement methodologies similar to the proposal in order to support adoption of national evidence-based guidelines in our rural and frontier communities. In particular, televideo technology supported team-based performance improvement activities and shared team learning because teams were geographically distributed across the states. One performance improvement initiative resulted in increased practice adoption of diabetes management practices and the second, while ongoing, is promising related to system-wide adoption of best practices in sepsis management.

**Department of Family Medicine.** This growing department is housed within three separate areas of the KU Medical Center complex. The research division, under Dr. Greiner’s direction, occupies a 2400 square foot office suite within the KUMC Endowment Building. The Division has seven full time faculty investigators and
over twenty staff with experience in health disparities research and community outreach. The Department now ranks within the top ten family medicine departments in the U.S. in NIH funding. Two research division faculty members maintain clinical practices and each of the other five members is experienced in partnering with organizations and agencies to improve health. All research division staff have been hired with the intent of building a translational health disparities program studying prevention, social determinants, cancer and chronic diseases. These staff have expertise in health informatics, community based participatory research, minority participant recruitment, and biospecimen collection. The research division has been the primary home for the community engagement program within the KUMC Clinical and Translational Science Award, Frontiers, for over five years. The clinical portion of the Department of Family Medicine resides on the entire first floor of the recently completed medical office building. A large suite of faculty offices and educational program offices is housed separately in the Delp Building. This area also provides additional conference room and small classroom space for meetings and training sessions.

**Wyandotte County Safety-Net Clinic Coalition.** The Wyandotte County Safety-Net Clinic Coalition is a group of clinics serving low income individuals in Wyandotte County. The group has collaborated with multiple KUMC investigators on NIH funded projects over the last fifteen years. It includes two federally qualified community health center clinics run out of the Swope Health Services central location in Kansas City, Missouri. The clinics provide the vast majority of health care needs for the uninsured population of Kansas City, Kansas. This population segment is predominately minority with a rapidly growing Latino component. The coalition meets monthly and is currently working on collaborative programs to test the impact of community health workers on patient outcomes. The group has a shared patient database and referrals system. A number of local physicians and community leaders regularly attend coalition meetings and contribute to joint projects. The coalition works closely with the Wyandotte County Community Health Council. Swope Health Services has been extensively involved with coalition activities and has moved their largest Kansas City, KS clinic to a new location to facilitate expansion of services. Swope Parkway Health Center, Kansas City, Missouri is a federally qualified community health center with Pediatric, OB/GYN, General Medicine, Ophthalmology, Mental and Behavioral Health, and Community Outreach clinics. The Center also has a full service on-site pharmacy. Services are provided to patients with Medicare, Medicaid, and to the uninsured on a sliding scale fee schedule. Swope Central had 16,324 total visits and 7,138 unique patient visits in 2004. Swope Wyandotte Clinic, Kansas City, Kansas is a satellite office for Swope Central and serves as the primary federally qualified community health center in Kansas City, Kansas. The Clinic has recently moved into new office space and has expanded services. Services are provided to patients with Medicare, Medicaid, and to the uninsured on a sliding scale fee schedule. Swope Quindaro Clinic Kansas City, Kansas is a satellite office for Swope Central and serves a very low income section of the urban core in Kansas City, Kansas. Services are provided to patients with Medicare, Medicaid, and to the uninsured on a sliding scale fee schedule. Duchesne Clinic Kansas City, Kansas is a clinic operated by the Sisters of Charity of Leavenworth, a non-profit health care services organization that also runs several hospitals in the plains and western plains regions of the United States. The clinic only sees patients who have no insurance coverage. Southwest Boulevard Family Health Care Kansas City, Kansas is a full service primary care clinic. The clinic serves patients with Medicare, Medicaid, private insurance, and those with no insurance on a sliding scale fee schedule. The Wyandotte County – Kansas City, Kansas Unified Government Health Department operates Pediatrics, OB/GYN, Family Planning, Immunization, and STD clinics for those with Medicare, Medicaid, and the uninsured. Dr. Greiner serves as the health department’s medical officer.

**Kansas City CARE Clinic.** The KC CARE Clinic was formed in 1971 as a private 501(c)(3) organization to promote health and wellness by providing quality care, access, research, and education to the underserved and all people in our community. The clinic provides health care services in general medicine, HIV prevention and primary care, behavioral health, and dentistry with a full-time staff of 105 as well as over 1,200 volunteers. Full- and part-time staff includes two full-time physicians, six nurses, five nurse practitioners, 22 case managers, six behavioral health providers, seven community health workers, one dentist, one dental assistant, and seven prevention specialists. In 2014, 8,000 patients received primary care, mental and/or dental services at two clinic locations, both in underserved areas of the city. KC Care maintains relationships with many academic institutions in the area, allowing medical students from KUMC, KCU, UMKC, and other schools to gain experience in the clinic under professional supervision.

**Silver City Health Center.** Silver City Health Center offers affordable, high-quality primary care, in-depth clinical evaluation, and a range of program-specific health services to English and Spanish-speaking residents of Wyandotte and Johnson counties. The Center provides primary health care and health education resource
access to individuals without insurance, as well as to those with government or private health insurance coverage.

Located in the Argentine community of Kansas City, Kan., the center employs skilled health care professionals from the KU Schools of Health Professions, Medicine and Nursing.

**Haskell Indian Nations University.** Haskell Indian Nations University (HINU) is the premiere tribal university in the United States, offering quality education to Native American students. Haskell’s student population averages about 1000 per semester, and all students are members of federally recognized tribes. Haskell’s faculty and staff is predominantly native. Haskell offers Associate and Bachelor’s degrees. Haskell’s historic campus is centrally located in Lawrence, KS in what is known as Kaw Valley. The mission of Haskell Indian Nations University is to build the leadership capacity of their students by serving as the leading institution of academic excellence, cultural and intellectual prominence, and holistic education to address the needs of Indigenous communities.

**Mid-America All Indian Center.** The Mid-America All-Indian Center serves as a cultural center and museum dedicated to educating people about and preserving the heritage of the American Indian.

**Heart of American Indian Center.** The mission of the Kansas City Indian Center is to encourage social, educational, and economic advancement of the American Indian community by promoting traditional and cultural values.

The Kansas City Indian Center (Heart of America Indian Center), a 501(c) (3) non-profit corporation, has been serving the Kansas City’s American Indian population since 1971.

Today the Center remains dedicated to the following goals:
- provide health, welfare and cultural services to American Indian individuals and families of our community;
- promote fellowship among the American Indian people of all tribes living in the Kansas City Area;
- stimulate the natural integration of the American Indian into the community;
- encourage artistic and vocational pursuits by American Indian people; and
- preserve and foster traditional American Indian cultural values.

Services Available - Emergency Services for Low-Income American Indians, including Food Pantry and Holiday Baskets, emergency telephone calls to Reservation or Nation and referrals to additional services; and the Morningstar Substance Abuse Outpatient and Prevention Program.

**Mexican Consulate.** JUNTOS, Drs. Paula Cupertino and Allen Greiner collaborate with the Mexican Consulate and the Ventanilla de Salud program in Southwest Kansas. They provide health fairs, screening services and health assessments of individuals seeking services from the Consulate and thereby keep a high level of surveillance on this vulnerable population’s health status.

**ALS Mid-America Chapter.** Leading the fight to treat and cure ALS through global research and nationwide advocacy while also empowering people with Lou Gehrig’s Disease and their families to live fuller lives by providing them with compassionate care and support.

**Muscular Dystrophy Association.** The Muscular Dystrophy Association (MDA) is an American organization which combats muscular dystrophy and diseases of the nervous system and muscular system in general by funding research, providing medical and community services, and educating health professionals and the general public. The organization was founded in 1950 by a group of concerned parents of children with muscular dystrophy.

**Leukemia/Lymphoma Society.** The Leukemia & Lymphoma Society (LLS) is the world’s largest voluntary health agency dedicated to blood cancer. The LLS mission: Cure leukemia, lymphoma, Hodgkin's disease and myeloma, and improve the quality of life of patients and their families. LLS funds lifesaving blood cancer research around the world and provides free information and support services.

**Community Living Opportunities.** Community Living Opportunities, Inc. (CLO) is a non-profit community organization that provides community living, day habilitation, in-home support and targeted case management services for over 300 people with developmental disabilities and employs more than 400 staff members. It was
formed in 1977 as an alternative to state institutions and became one of the pioneers in providing community-based services to people with developmental disabilities. Their services include targeted case management, residential services, which includes family-teaching and extended family-teaching homes, day services, behavioral consultation, children’s services, health care services, training and staff certification and organizational behavior management consulting. CLO operates seven group homes in Johnson County, Kansas (the metropolitan Kansas City area) and seven group homes in Douglas County, Kansas (Lawrence). CLO’s Early Childhood Autism Program (ECAP) provides in-home, intensive early intervention for 22 children with autism.

Cottonwood, Inc. Cottonwood Inc. is a not-for-profit community organization that provides services to people with developmental disabilities in Douglas and Jefferson County, Kansas. In their dual role as community service provider and the Community Developmental Disabilities Organization, Cottonwood is the single point of referral for people with developmental disabilities seeking services. Cottonwood provides services and support to people with developmental disabilities in their living and work environments in the community. Residential services encompass group living, supported living, semi-independent living, and recreation/leisure activities. Support Services include medical care, mental health care, advocacy, habilitative therapies, financial entitlements, transportation, employment, housing, recreation, and adult education. Employment services and work services assist people to obtain and maintain jobs in the Cottonwood Work Services Department and in the community. Cottonwood’s residential services include 48 living arrangements. Cottonwood promotes persons with developmental disabilities as qualified workers to employers, while offering incentives to employers for their cooperation in supported employment. Life enrichment services offer enhancement of job, social, cultural, and leisure skills. Transition services include helping the Lawrence School district provide for a smooth transition from school to adult living for students with disabilities. Cottonwood provides direct or indirect services to over 650 people, ranging in age from 18 to more than 60 years old. Finally, Cottonwood helps fund the Early Childhood Coordinating Council in Jefferson County for families with children in need of early intervention.

Kansas Association for the Medically Underserved (KAMU) is the primary care association for the state of Kansas, and consists of a network of 40 primary care and 13 dental clinics that provide health services to low-income and uninsured people throughout the state. KAMU serves as a connecting point for clinicians working in safety net clinics and participates in extensive workforce development programs. Recently, KUMC faculty assisted KAMU in designing a dental hub model for delivering dental care to counties and communities that either lack sufficient dentists and dental hygienists to meet their need or who have no dental providers at all. Funding to support the development of the dental hub represents a collaborative effort on the part of health philanthropies who wanted trusted, academic expertise from KUMC investigators during the design phase to ensure that the model would permit effective delivery of dental care services to those most in need.

Communities Creating Opportunity. Communities Creating Opportunity (CCO) is a longstanding organization in Kansas City that arose from the work of the Kansas City Organization Project (KCOP). KCOP began in 1977 with religious and community leaders to respond to the rapid racial transition and financial changes in the city’s Southeast neighborhoods. As black families moved into these communities in the mid-70s, white families moved out in droves. Subsequently, real estate values dropped, lending in the area froze, and insurance rates skyrocketed. Increases in poverty and crime rates followed. KCOP provided community residents with the organizational tools and leadership training to address these trends and enhance their communities. In 1984, KCOP became Kansas City Church Community Organization to reflect its congregation and neighborhood-based model of community organizing. While continuing in its tradition of faith-based community organizing, CCO adopted a new name in 2007, Communities Creating Opportunity, to include all religious traditions and other community partners. The well-recognized acronym, CCO, continues as the organization’s principal signature. Over the past ten years the group has been heavily involved in health equity work. The organization received funding to conduct “hotspot” mapping projects with Truman Medical Center and KUMC in an effort to identify unmet health care need. More recently CCO received funding from the Kansas Health Foundation to study how social factors influence health outcomes in Wyandotte County. KUMC researchers have worked with CCO leaders on data analysis and grant submissions for over five years.

Mid-America Regional Coalition (MARC). MARC is a regional nonprofit group of city and county governments that works to bridge governmental divides created by a state line and various city and county borders across metropolitan Kansas City. It is the metropolitan planning organization for the bistate Kansas City region. Directed by a Board of Directors made up of local elected officials, and serves nine counties and
119 cities. They provide a forum for the region to work together to advance social, economic and environmental progress. MARC is funded by federal, state and private grants, local contributions and earned income. A major portion of their budget is passed through to local governments and other agencies for programs and services. The organization developed a health policy agenda in 2009. Most recently MARC has become the home base of a regional community health worker collaborative initiative. This group meets monthly and works to support and help expand the activities of lay health workers through Kansas City. Various Frontiers researchers have worked with MARC to organize and build capacity for health improvement and bioscience in the region.

**El Centro.** *El Centro* began in 1976 with a small amount of funding from the Archdiocese of Kansas City in Kansas. Church leaders and a group of energetic and caring community members saw a need for an organization to address the needs and concerns of Kansas City, Kansas' rapidly growing Latino population. With in-migration accelerating, *El Centro de Servicios para Hispanos* was born.

El Centro has grown from a single location to three locations in Kansas City, Kansas and Olathe, serving more than 12,000 individuals and families per year. Our programming has evolved from our first program for elders – the Senior Day Program – to include The Academy for Children – a dual-language Pre-K program, workshops on money-management and homeownership, health education and healthy living outreach through our *Promotores de Salud* (Health Promoters) volunteers, health navigation and intervention, and our policy and advocacy efforts for issues of special interest to our community. The organization launched a community health worker program in 2008 and has been a close partner of KUMC’s JUNTOS, Center for Advancing Latino Health. *El Centro* has also assisted in recruiting participants in research and has partnered with KUMC researchers in the Department of Family Medicine and with the Alzheimer’s Disease Center.

**Johnson County Department of Health and Environment.** Since 1943, the Johnson County Health Department has been the official public health agency for the County, with the Board of County Commissioners serving as the Board of Health. In March 2012, the Health Department merged with the Johnson County Environmental Department to become the Johnson County Department of Health and Environment (JCDHE). The Director is Lougene Marsh and the Deputy Director is James Joerke. JCDHE is comprised of six divisions: Business Operations, Childcare Licensing, Community Health, Environmental, Health Services, and Strategic Planning. There are approximately 150 department employees. In June 2014, JCDHE became the first accredited health department in Kansas.

Services include: immunizations, communicable disease surveillance, TB testing, refugee health testing, prenatal, WIC, reproductive health, STD screening, HIV testing, child care facilities’ licensure, health education classes, workshops & trainings, injury prevention activities (Safe Kids Johnson County), chronic disease risk reduction activities, community wellness activities. Programs include: Outreach Nurse, Public Health Emergency Program, Targeted Case Management, ‘Making a Difference’, Air Quality, Household Hazardous Waste, Solid Waste Management, On-site Sewage Treatmen, Ozone Reduction and Pool Inspections. Services are provided at three sites, 11875 S. Sunset and 11811 S. Sunset in Olathe and 6000 Lamar in Mission.

Dr. J. LeMaster, family physician at KUMC, serves as the medical director for JCDHE. His position facilitates research activities to engage residents seeking services to also participate in community based research. Most recently, researchers in family medicine conducted a comprehensive assessment of micro-food deserts in Johnson County to inform local policymakers, and the team collaborated with JCDHE’s WIC and immunization programs to interview residents about food insecurity, access and need.

**Johnson County Developmental Supports.** Johnson County Developmental Supports (JCDS) was established in 1972 as an agency of Johnson County (Kansas) government to provide community-based services for people with developmental disabilities. JCDS is headed by a seven-member governing board composed of parents, community advocates and professionals who are appointed by the Johnson County Board of County Commissioners. An executive director and a staff of 260 trained professionals lead daily operations. JCDS programs and services are partially funded on a contractual basis with the Kansas Department of Social and Rehabilitation Services. Additional funding sources include a county tax levy, state block grants, subcontract income, contracts with companies for workers, private grants and donations. JCDS provides office space, Internet access, and some clerical support for MRRRC investigators working on site. Today, as a Community Service Provider (CSP), JCDS directly serves nearly 500 people daily. Through a person-centered planning process and within available resources, services are shaped to fit individual needs, preferences, goals, abilities and interests. Some examples of available services include Residential Supports
(ranging from a few hours of support for those living independently to live-in, around-the-clock care), Day Supports (facility-based or community-based employment opportunities for paid work, or other activities including volunteer work), Alternative Supports (professional resources for nursing, occupational therapy and assistive technology), Behavior Supports (applied methods to maximize adaptive behavior) and Case Management.

In addition to being a service provider in Johnson County, JCDS has another, equally important role: that of Community Developmental Disabilities Organization (CDDO). As CDDO, JCDS provides a single point of contact and entry for all of Johnson County, Kansas and maintains a county-wide service needs list for those waiting for certain services. Johnson County Developmental Supports accomplishes its direct service mission by developing, linking, and monitoring services, supports, and resources for approximately 700 people. In addition, JCDS works with over 360 affiliates who are agencies and individual service providers to assist access to quality, cost-effective services.

**PCI RESOURCES**

**KU Clinical Research Center.** Designed unlike any other research facility in the country, the 82,400-square-foot building, which was donated by the Hall Family Foundation, has been remodeled with state-of-the-art features and a more efficient use of space, resources and manpower to best accommodate patients and researchers:

- Easily accessible outpatient exam and treatment rooms, office space and specimen collection laboratories
- A pavilion for gatherings and community events
- Clinical research functions combined into one location (Figure FR-F.1)

The Clinical Research Center is home to the Clinical and Translational Science Unit (see next) and the NIA-designated Alzheimer’s Disease Center.

**Clinical and Translational Science Unit (CTSU).** The Clinical and Translational Science Unit (CTSU) provides state-of-the-art space for researchers to see patients who are enrolled in clinical trials. The CTSU is staffed by experienced registered nurses and medical assistants who provide routine care, complex protocol procedures and help record research data in study flow sheets. The space features an exercise physiology laboratory and a commercial-quality metabolic kitchen. The CTSU does this through:

1) **Physical infrastructure** and resources to support all aspects of research from patient involvement to complex multidisciplinary, multi-institutional collaborations.
2) **A team-based environment** with established methods and processes to stimulate collaborative research and support increasingly complex trials.
3) Training opportunities for the translational science workforce in an integrated, continuous-learning environment.

The CTSU currently supports 137 approved protocols: 86 investigator-initiated and 51 industry-sponsored studies. In 2015 we had 4887 participant visits to the CTSU (non-unique), up 140% over our first year in 2011 (n=2055) and a 60% increase over the 2014 (n=3061 participants). We attribute this recent growth (Figure FR-F.2) to the increasing user-base as investigators have adapted to our new location in the Clinical Research Center. Currently, the CTSU’s 137 protocols are directed by 68 different PIs from 27 different KUMC departments and centers. Additionally, we support PIs from various campuses in the region including the University of Missouri-Kansas City (Dr. Lundgren), KU-Wichita (Drs. Collins and Redmond in Preventive Medicine), KU-Lawrence (Dr. Storkel, Life Span Institute) and a local physician (Dietz) with the Kansas City CARE Clinic. Our increasing user base from regional institutions underscores our usefulness to a broad and varied research base and the unifying, collaborative mission of the CTSU as a site for team science.

CTSU Infrastructure: The CTSU (25,000 ft²) is housed on the third floor of the KU Clinical Research Center. The Clinical Research Center is a unique regional resource supported by the Johnson County Education and Research Triangle (JCERT) initiative, a 1/8th cent sales tax passed in 2008 to create economic stimulus through new facilities for clinical research, animal health, engineering, business, science and technology. This new, 75,000 ft² facility is located near the KU campus with easy access for all HICTR network institution investigators and research participants.

- **Clinic Space:** The CTSU contains 17 clinic rooms, 2 cognitive testing rooms, and open workspaces for up to 5 visiting study coordinators (Figure FR-F.3).
- **Infusion Center:** The CTSU's infusion center has 11 infusion bays supported by two nursing stations and activity in the center has steadily grown. We have supported seven phase 1 first-in-human studies (Pompe’s disease, Fabry’s, myotonic dystrophy, multiple sclerosis, and pancreatitis). The center also supports research infusions (480 infusions in 2015) and intensive and complex metabolic research assessments such as hyperinsulinemic-euglycemic clamps (n=70).
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- **Bionutrition Unit:** The CTSU’s bionutrition unit includes an 830 ft² metabolic kitchen and a 600 ft² demonstration kitchen. The kitchen is fully equipped to provide meals required by study protocols, including regular, therapeutic, modified, and calculated and weighed research meals.
- **Exercise Physiology Laboratory:** The CTSU’s dedicated Exercise Physiology Lab contains two metabolic carts (ParvoMedics TrueOne 2400), treadmills, bicycle ergometer, and electrocardiogram. The CTSU has a Dual Energy X-ray Absorptiometry (iDEXA, GE Healthcare) for detailed body composition assessments. The exercise physiology laboratory is currently supporting 17 studies and in 2015 conducted 84 treadmill tests and 179 DEXA scans.
- **Clinical Laboratories:** The CTSU has a sample processing lab that contains a glucose analyzer (YSI STAT Plus), refrigerated centrifuge (Heraeus Labofuge 400 R), and a three –80 degree freezers (Thermo Electron Forma). The Clinical Research Center also has a state-of-the-art Bioanalytical Lab equipped with two Waters UPLC-Xevo TQ-S LC-MS/MS systems.
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- **Research Nursing Team:** The CTSU team is composed of an administrative director, nurse manager, 6 research nurses and a medical assistant. This flexible team provides staffing for any needed assessments, phlebotomy, complex procedures, overnight stays, and processing of lab samples.

- **Research Coordinators:** The CTSU maintains a pool of research coordinators who can conduct all aspects of research coordination. The pool is currently composed of 2 full time coordinators and 2 part time coordinators (CTSU research nurses “flex” between the research nursing team and coordination, as needed). The coordinators have supported a total of 48 trials (28 different PIs) since 2011 and are currently supporting 20 trials (from 14 different PIs).

- **“CTSU without Walls” Program:** The CTSU offers a CTSU without Walls program to increase access to CTSU resources by supporting research outside the structured unit. Deployable research nurses are available to assist investigators with 1) drawing blood; 2) performing IV infusions; 3) collecting and processing specimens; 4) administering study drugs; 5) monitoring for adverse events; and 6) performing other protocol procedures such as oral glucose tolerance tests.

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**PCI Clinical Research Satellites.** The CTSU maintains 3 satellite spaces on the main KUMC campus. This enables participants or researchers who need basic support offsite to conduct research visits and access to some of the resources of the CTSU.

- **Swope Health Services Satellite:** The PCI program also has a site at the Swope Health Center in Kansas City, MO, a safety-net clinic that enhances access to a largely minority, underserved research population. Swope is a patient-centered medical home that provides primary health care and behavioral health services in Kansas City. Swope Health Services mission is to improve the health and wellness of the community by delivering accessible, quality, comprehensive patient care. Today, Swope Health Services provides care for more than 40,000 patients in western Missouri and eastern Kansas. The PCI program has dedicated research space at Swope that includes 2215 sq ft of space that includes 10 offices and 3 workstations. The space enhances access to the patient population served at Swope and provides the space to accommodate over 2400 research assessments annually. Currently, there are three smoking cessation projects including two R01 funded projects led by Drs. Nollen (DA031815) and Cox (DA035796) and a PCORI-funded project (AD-1310-08709) led by Dr. Nollen. Additionally, the satellite presence created opportunities for the KU AD Center to participate in an NIA funded multi-site trial of aspirin in reducing clinical events in older adults.

- **Delp Satellite (KUMC Main Campus):** The Delp satellite is located on the main KUMC campus and consists of 250 sq ft of dedicated research space. This basic unit is outfitted with a calibrated centrifuge, lab collection supplies, desk top computer, exam table, crash cart, scale, stadiometer, and vitals machine. Utilization averages 28 subjects per month.

- **Hoglund Brain Imaging Satellite:** The Hoglund satellite space is located at the Hoglund Brain Imaging Center to support clinical research procedures such as phlebotomy, clinical assessments, and cognitive testing that may accompany brain scanning protocols. The space is 150 sq ft and outfitted with centrifuge, exam table, and phlebotomy supplies. Utilization averages 28 subjects per month.
G. NETWORK CAPACITY: FACILITIES AND OTHER RESOURCES

**Frontiers Resources.** Frontiers has an impressive array of resources available to achieve its aims of engaging stakeholders, creating a sustainable translational research workforce and strengthening infrastructure to accelerate translational research. We draw on the considerable strengths of the University of Kansas Medical Center (Kansas City and Wichita campuses), the University of Missouri-Kansas City, Children’s Mercy Kansas City, and the Kansas City University of Medicine and Biosciences. In addition, we take advantage of a strong history of entrepreneurship investment in the Kansas City region (e.g., the Ewing Marion Kauffman Foundation, the UMKC Regnier Institute for Entrepreneurship and Innovation, the Kansas City Area Life Sciences Institute and the KU Innovation and Collaboration Center) to leverage drug, device, diagnostic, medical device and population health product development to achieve faster success. We have a plethora of community organizations, clinics, and providers across the region willing and excited to collaborate with Frontiers investigators, experts in entrepreneurship who will lead and train the next generation of successful business developers in the biomedical sciences and a growing cadre of team science-trained teams to work in emerging lifespan clinical and translational research. Please refer to the Overall Section of Facilities and Resources for a comprehensive description of Frontiers resources that are available to all Frontiers members.

**TRIAL INNOVATION CENTER (TIC)**

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**KUMC NeuroNEXT:** The Network for Excellence in Neuroscience Clinical Trials, or NeuroNEXT, was created to conduct studies of treatments for neurological diseases through partnerships with academia, private foundations, and industry. The network is designed to expand the NINDS capability to test promising new therapies, increase the efficiency of clinical trials before embarking on larger studies, and respond quickly as new opportunities arise to test promising treatments for people with neurological disorders.

The NeuroNEXT program aims to:

- Provide a standardized and accessible infrastructure to facilitate rapid development and implementation of protocols in neurological disorders.
- Support scientifically sound, possibly biomarker-informed, exploratory clinical trials that provide data for clear go/no-go decisions.
- Energize and mobilize federal, industry, foundations and patient advocacy partners by leveraging existing relationships between NINDS and NeuroNEXT to organize high impact exploratory clinical trials for neurological disorders.
- Expand the pool of experienced clinical investigators and research staff to lead multicenter clinical research trials.

University of Kansas Medical Center (KUMC) is one of the 25 sites that comprise the NeuroNEXT program through our grant, U10 NS077356. Investigators on the KU Lawrence campus, KUMC campus and at Children's Mercy Kansas City (CMKC) collaborate frequently through meetings with potential investigators at these sites and with neurologists in the greater Kansas City area to brainstorm potential proposal ideas.

**Regulatory Knowledge and Support (RKS)**

**RI Clinical Research Administration (CRA)** Clinical Research Administration is the central liaison between the funding agency, Institutional Review Board and principal investigators at KUMC. The CRA markets KUMC to potential research sponsors, receives and manages protocol initiation, and provides ongoing administrative support to ensure timely and cost-effective completion of clinical trials. Total staff: 16. Dedicated to clinical and translational research: 16.

Clinical Research Administration services include:

**Pre-Initiation**

- Attend, if requested by study staff, site evaluation visits to answer institutional questions on study processing and activation time
- Serve as centralized contact between sponsors and the study staff for all clinical trial, regulatory, administrative, and budget and contract work at the University of Kansas Medical Center
- Provide protocol development support for investigators
- Prepare consent form for investigator's review
- Secure Human Subjects Committee approval of protocol and consent form
- File regulatory documents required by FDA and sponsor
- Prepare and negotiate trial budgets
- Request pricing for hospital and clinical services
Review and negotiate clinical trial and data use agreements
Notify investigator and sponsor of final HSC approval
Prepare and submit initial IND documents, amendment and annual progress reports for IND

Post-Initiation
- Secure HSC approval of protocol revisions and revised consent forms
- Obtain HSC approval for print or media advertising
- Process internal adverse events and IND safety reports for HSC submission and approval
- Provide status reports of each investigator's trials as requested
- Submit reports to HSC for annual re-certification of trials
- Coordinate ongoing communication between sponsor and investigator
- Revise and negotiate budget and clinical trial agreements

Study Closure
- Process study closure for trial termination
- Complete reconciliation documents for trial account closure

Quality Improvement for Clinical Research
- In conjunction with the Office of Compliance, conduct quality improvement visits [QIV]

Education Opportunities
- Host and organize Clinical Trial Education Lecture (CTEL) series on a monthly basis
- Provide training workshops (CTEC) for investigators and study coordinators
- Meet with physicians and study coordinators to review Research Institute services
- Provide new study coordinator/research nurse orientation
- Facilitate coordinator certification, networking and educational opportunities

**Frontiers Research Gateway.** The Frontiers Research Gateway is a web-based resource to provide all Frontiers investigators with helpful tips and information to enable them to conduct their research. The webpages provide information ranging from generating research ideas to seeking extra-mural funding to executing research projects. Divided into four sections – Study Development, Study Initiation, Conducting a Study, and Study Close-Out – the Gateway walks investigators though the overall research process and breaks down that process with detailed steps. Those steps are supplemented with specific information on how Frontiers can help. The Research Gateway was developed by the Frontiers Administration team in 2013 with input from investigators who shared their experiences in navigating the research process and with the Frontiers website team. The webpages of the Gateway contain many useful links that researchers frequently need and find useful. (www.frontiersresearch.org/frontiers/research-gateway)

**Frontiers IRB Reciprocity.** In 2013, Frontiers partner institutions, including University of Kansas Medical Center, University of Missouri–Kansas City, Children’s Mercy Kansas City, and University of Medicine and Biosciences entered into an IRB reciprocity agreement. Typically a research project involving partners from these institutions will only need one IRB review. Detailed instructions on how to initiate an IRB application with reciprocity are found on the Frontiers website (http://frontiersresearch.org/frontiers/IRB-reciprocity).

We have gained considerable experience by creating and participating in IRB consortia that positions the Frontiers program to deliver efficient implementation for regional and national multi-center trials. Frontiers institutions developed and implemented regional IRB reciprocal processes across all our affiliated institutions early in the third year of our initial CTSA funding. When our PCORnet GPC was funded we leveraged this regional experience to establish reliance agreements at 12 GPC sites. Our experience with using single IRB models includes central IRBs, deferred reciprocal models, and shared review models. Because of our expertise in single IRB review, we were invited into pilot phases of the NCATS IRB Reliance Initiative (NIRI) which has now evolved into the global SMART IRB reliance agreement that is being implemented across all CTSA hubs. Efficiencies gained through single IRB models like IRB reciprocity are further enhanced and complemented by our experiences with streamlined approaches for master agreements and budgets (e.g., NeuroNEXT, StrokeNet, Neonatal Research Network), our PCORnet CDRN sub-awards, and multiple master...
agreements with external sponsors. We have a great deal of experience both leading multicenter trials involving CTSA hubs and other sites and being a part of such trials led by others.

**Frontiers Affiliate Regulatory Committee** Comprised of regulatory representatives and officials from Frontiers partners and affiliates, this consortium-wide group was established to address regulatory hurdles affecting Frontiers research. The Committee divided into smaller groups to address specific issues: IRB Reciprocity Subcommittee, RB Forms Subcommittee, Conflict of Interest Subcommittee, and Training Subcommittee. These groups held numerous meetings over many months, resulting in Frontiers-wide regulatory efficiencies, including IRB reciprocity among KUMC, KU-Wichita, Children's Mercy, Truman Medical Centers, University of Missouri-Kansas City, and St. Luke's Health System.

**KUMC Electronic IRB submissions.** Since 2013, all proposals to the KUMC IRB are submitted through our electronic IRB system (eIRB) using Huron's Click IRB7. Our eIRB automates all aspects of submission, routing, review and approval for the entire lifecycle of the project. The system supports compliance by serving as the repository for all IRB-approved documents and by tracking human subjects training and current conflict of interest disclosures. For research conducted under a central IRB or other reliance mechanism, eIRB delivers a truncated application process that allows investigators to register their study and upload the approval of the reviewing IRB.

**KU Health System and Research Institute Steering Committee and Sub-Committees.** In an effort to improve communications and processes across the KU Health System and the Research Enterprise, a collaborative group has been created to improve clinical and translational research that occurs in the KU Hospital setting. This process was started by Dr. Barohn after he became Vice Chancellor for Research. He asked Dr. Ator, the KU Hospital Chief Information Officer to co-chair the steering committee. The steering committee and workgroups are composed of members from KUMC, KU Hospital, and KU Physicians, Inc. A number of workgroups meet regularly and report to the steering committee chaired by Drs. Barohn and Ator. Drs. Barohn and Ator then report final recommendations to the Executive Vice chancellor, Dr. Girod, and the Hospital CEO, Mr. Page for endorsement.

**KUMC Division of Medical Informatics and Office of Enterprise Analytics**

**Informatics Training Sessions** – Frontiers Informatics has developed multiple training avenues to support a diverse group of REDCap and HERON users including researchers, study coordinators, hospital administrators, residents, fellows, and students in both clinical and basic sciences. Varying types of assistance are available to those who require or want additional support, including:
- Group presentations and training
- One-on-one meetings with study teams and key personnel
- Bi-monthly lunch and learn sessions where users can drop in with specific questions or to obtain a general overview of the system

These learning options have served 406 attendees over three years.

**KUMC Velos eResearch** Velos eResearch supports patient recruitment, patient scheduling, study monitoring, project planning, study design, protocol compliance, budget, invoicing, milestone management, data safety monitoring, adverse event reporting, system integration and study execution. Velos was designed from the ground up to support study administration and clinical data management. This design is fundamental to Velos’ customer service abilities to solve customers’ research, information and coordination challenges. Key features are:

**STUDY ADMINISTRATION**
- Protocol management
- Patient scheduling
- Regulatory reporting
- Adverse event management and reporting
- Budgeting, milestones, invoice, and payment/receipts processing
- Management of research organizations, personnel, and collaborators
CLINICAL DATA MANAGEMENT

- Patient profiling
- Longitudinal, patient-level information collection and analysis
- Study-specific data collection and analysis
- Workflow configuration
- Integration with internal and third party information systems

Some other notable strengths of Velos eResearch are:

- An advanced, carefully considered commercially available clinical research information system.
- Velos was designed to provide off-the-shelf support for all of study administration, clinical data management, adverse event reporting, and integration with internal and third party cancer center systems through one integrally-designed system.
- The ability to add, modify, and apply study- and customer-specific data dictionaries with minimal technical involvement.
- HL7 compliance. Velos already has dozens of working laboratory, medical record, and device interfaces that are already in production.
- Compliance with industry standards (such as CFR11) and a commitment to supporting standards that foster higher collaboration. Velos is active in and supportive of government initiatives intended to foster greater collaboration among researchers (example FDA funded studies).
- Patient-level of study-level system architecture. Most research systems were primarily designed for research sponsors and focus on the needs of single studies. The system architecture to support research sites well is quite different and must consider both patient- and study-level views and also integrate the two.
- Advanced technology and security features to support multi-institutional, cooperative trials, community-based research and patient self-reporting, in a single environment.
- Through these capabilities, Velos helps effect a paradigm shift from the current sponsor-centric clinical research information model to one that is investigator-centric. In doing so, Velos believes it can help its customers, and the research community in general, unleash tremendous improvements in research productivity, collaboration, and, ultimately, patient care.

PARTNER INSTITUTIONS

CHILDREN’S MERCY Kansas City (CMKC)

Children’s Mercy Office of Research Integrity: Children’s Mercy has a Federalwide Assurance (FWA) with the Department of Health and Human Services, in which we assure Federal officials that any research project, whether it is a chart review or administration of investigational drugs, is conducted in accordance with Federal regulations. The Office of Research Integrity assists investigators in every step of the research process. The CMKC Institutional Review Board (IRB) is a completely electronic process through MARS, Mercy’s Automated Research System. Researchers use the MARS system to gain access and submit IRB submissions for review. Submissions are entered, routed, reviewed and finalized electronically. This tool improves efficiency for the IRB review and investigators.

RECRUITMENT INNOVATION CENTER (RIC)

Cohort Discovery Services: One of the first steps to assess capacity for adequate trial enrollment is to accurately identify recruitment cohorts. The database tools developed by the Informatics program integrate estimates of patient volume with providers’ clinical research experience. Informatics' experience with HERON (our i2b2-based integrated data repository) and PCORnet data infrastructure positions us to provide investigators, sponsors, and the RICs with accurate estimates of recruitment capacity. This Cohort Discovery resource is actively used for the NeuroNEXT unit and to support PCORnet activity (see GPC Vignette). HERON also links participants in the Frontiers and Pioneers Recruitment Registries (who have provided permission to be contacted for studies) with data in the EHR, allowing investigators to define the size of a highly-characterized pool of potential recruits and test the feasibility of study recruitment prior to study start-up. Through PCORnet and the GPC, we also augmented regional capabilities at PCORnet sites to interrogate our GPC CTSA hub i2b2 instances for trial feasibility and data requests. The Informatics program has established...
governance processes and has informatics coordinators to provide honest broker services and train investigators for self-service querying. We are developing methods to assist investigators to understand data utility for both trial estimation based on retrospective samples and to tailor prospective informatics recruitment strategies to support trial feasibility, and we are adding computable phenotyping capacity. The RTIU will thus provide essential information for a go/no-go decision on trial capacity and bring “red flags” to the attention of Frontiers leaders.

Recruitment Registries. Frontiers is a participating member of ResearchMatch.org (access to over 92,000 patients), with the RTIU Navigator as our liaison. In recognition of the need for local registries that provide unique opportunities to link directly to EHR data and local community engagement, the Frontiers team has developed two complementary registry programs (Figure FR-G.4). The Frontiers Research Recruitment Registry1 has unique features that differentiate it from other registries.2 6 It is fully integrated with clinic “front desk” registration and linked to the EHR. When checking in, patients have the opportunity to sign a single-page HIPAA authorization form to allow release of only their contact information to investigators who have IRB-approved studies for which the patient may be eligible. Following the success of the Frontiers Registry, and in response to the need for reaching people beyond our clinic patients, we developed a second registry program, the Pioneers Community Research Recruitment Registry. The Pioneers Registry is an IRB-approved project, with an innovative email verification step and electronic informed consent process for the self-reported health and health history information collected in a brief REDCap survey. Participants who sign up to be ‘Pioneers’ have the option to allow EHR data linkage (86% of current Pioneers have given this permission.)

Permission to receive name and contact information from either registry is governed by the Recruitment Registry Request Committee (RRRC) that includes a research participant representative member. To date, more than 46,000 individuals have agreed to be contacted for research, with ~1000 new people signing up each month. Over 60 investigators have used these registries to recruit for 92 studies.

Community/Participant Involvement. In addition to our participant representative on the RRRC, we had extensive patient/participant involvement provided by the Frontiers Community Engagement function in developing the Pioneers Registry and its website. One key feature of this website is an accurate, searchable listing of all actively enrolling studies by Frontiers investigators. Study information that directly queries the ClinicalTrials.gov database is automatically imported (software developed by our Informatics team). We have enhanced this by adding lay-friendly language and study team contact information. An additional, critically important enhancement to the Pioneers website is an embedded, customized study screening form. Although many potential participants might meet published inclusion/exclusion criteria, we have noted that a considerable number are ineligible due to co-morbidities identified during refined screening by study personnel. This often delays enrollment, wasting precious study staff time. Therefore, we added an option to include an “I AM INTERESTED” button that links to a more-detailed, study-specific, IRB-approved screening REDCap survey that allows interested people to provide further potentially relevant information. Once completed, the study team is alerted by automatic email and they contact the individual directly to schedule a consent visit. To enhance communication with participants, we have developed a full participation and communication plan for our registries. The Frontiers and Pioneers registries are complementary, allowing a flexible approach for multiple opportunities to enhance research participant recruitment (see Vignette).

While focused on efficient participant recruitment for specific studies and multi-site trials, we have discovered other uses for the Pioneers registry program. For example, an NCI SBIR-funded project is using Pioneers enrollment as a primary study outcome measure to determine effectiveness of an outreach and education program targeted to racial/ethnic minorities, rural, and older patients in the Midwest Cancer Alliance—an
organization that links the University of Kansas NCI Cancer Center with hospital and physician groups across Kansas and western Missouri to improve access to clinical trials. We are particularly excited about this effort to enhance the diversity of “pioneers” in our current registry.

**Recruiting Within the Clinic Workflow:** As described in *Informatics*, our next “frontier” for recruitment is integrating research within clinic workflows. We will capitalize on our PCORnet leadership and a $2.1M institutional commitment to recruit a chief research informatics officer and supporting team. We will embed recruitment and trial consent within Cerner’s Patient Portal and Epic’s MyChart modules, and harmonize our registry programs with new functionality in Epic. We also will tailor alerts in the clinical workflow to support recruitment while minimizing undue burden on clinical workflow.

### COMMUNITY RECRUITMENT SITES AND ENGAGEMENT PARTNERSHIPS

**The Kansas Patients and Providers Engaged in Prevention Research (KPPEPR) Network.** The Kansas Patients and Providers Engaged in Prevention Research (KPPEPR) Network is a collaborative of patients and professionals from geographically diverse communities across Kansas. All KPPEPR Network members are primary care patients, providers, public health and/or agency professionals involved directly in health-related activity on a daily basis. The network is led by an Executive Director, Anthony Wellever, at the University of Kansas Medical Center (KUMC), where an additional group of senior research faculty (Drs. Allen Greiner, Kim Kimminau, Edward Ellerbeck, Christie Befort and Joseph LeMaster) provide support and technical assistance on all projects. The network is further supported by the Frontiers translational science program and it’s Community Partnership for Health initiative. Over the past 15 years, the KPPEPR Network has relied on collaborative involvement of over 60 primary care practices, thousands of patients and scores of public health and other health service agencies.

Prior projects have utilized patient and physician surveys, office assessments, direct observation of primary care, key informant interviews, and qualitative data collection methods. Nearly all of these projects have been initiated by academic researcher faculty at KUMC. The projects have resulted in a host of scientific publications and abstracts since Drs. Greiner and Ellerbeck became involved in 1999. The KPPEPR Network has been utilized to study the delivery of preventive services in physician’s offices, including colorectal cancer screening, counseling on diet and physical activity and smoking cessation counseling. In 2004 and 2005, KPPEPR practices participated in an NIH-funded study to examine the impact of disease management on smoking cessation in rural primary care practices. This study recruited 50 rural clinics, 63 health care providers, and 750 participants for a 2-year trial using motivational interviewing for smoking cessation (CA101963). Several NIH and HRSA funded intervention studies followed over of the next four years. In 3 other separate studies (HS14857, CA121016, HL87643) 68 rural clinics and 1,340 participants were recruited and delivered health related interventions via phone and telemedicine. Most recently, in 2015 KPPEPR became the primary network for a $10 million dollar PCORI funded intervention (Befort, PI) to study the comparative effectiveness of 3 practice change strategies for weight loss among rural primary care patients.

The KPPEPR Network has utilized several unique research methodologies over the years. These include home visit data collections by research assistants, hospital and primary care practice interventions and the involvement of medical students in research activities and intervention delivery. In 2014, KPPEPR leaders, began a network reorganization to systematically involve patients, and an interdisciplinary group of health care providers and public health professionals as network leaders and active participants. The intention of these changes is to begin conducting projects that are instigated at the behest of patients and providers, rather than as conceptualized by full time researchers. The reorganization should result in a shared decision-making process whereby all parties have an equal voice and are valued as contributors throughout the research process. By reorienting the network to more fully serve the needs of patients and “on the ground” service providers, KPPEPR is poised to make significant contributions to evolving health care reform and new research initiatives such as the Federal Patient Centered Outcomes Research Institute, which seek to answer health research questions with immediate application for improving patient oriented outcomes.

**K-State Research and Extension.** K-State Research and Extension is a statewide network of educators sharing unbiased, research-based information and expertise on issues important to Kansans. It has established local, state, regional, national, and international partnerships. It is dedicated to a safe, sustainable, competitive food and fiber system and to strong, healthy communities, families, and youth through integrated research, analysis and education. With more than 125 years of research and 100 years of extension, K-State Research and Extension has been improving the quality of life and standard of living for Kansans for a century. This
An integrated system connects the university to every county through locally based educators who serve as sources of objective information. In partnership with the Community Engagement function, researchers are working to collaborate with K-State Extension agents to increase enrollment in clinical trials, participation in community health initiatives and to encourage enrollment in Frontiers’ patient registry, “Pioneers.”

**The American Academy of Family Physicians National Research Network (AAFP NRN) and MOSAIC Center of Excellence.** The American Academy of Family Physicians National Research Network (AAFP NRN) and MOSAIC Center of Excellence was established in 1999 to conduct, support, promote, and advocate for primary care research in practice-based settings. The AAFP NRN assists in realizing overall strategies for achieving improved primary care for the nation. These include: supporting initiatives in advancing the Patient Centered Medical Home, promoting an ongoing for practice change through improved use of technology, education and communication; assisting our members to achieve financial success through optimal practice management; involving family physicians in targeted public health activities; and increasing member and patient awareness of resources through educational programs. Within the American Academy of Family Medicine National Research Network (based locally in Leawood, KS) we have 1 of 8 national centers of excellence in practice-based research (Kimminau, P30 HS21647) that provide access for Frontiers investigators to nine regional and three national PBRNs that include primary care, dental, pharmacy, and dietetics research networks.

The AAFP NRN is working to gain a broader perspective from the patients’ point of view as it relates to the focus of family medicine and family medicine research. This perspective will provide better insights into the concerns and needs of patients and further help us to understand and improve the patient/physician relationship. AAFP members work with the patient/family dynamic every day. Engaging patients in their own care is the foundation of what family medicine does. Including the patients’ view throughout our research processes is a key component if we are striving for improvements in health care and health outcomes. Getting their perspective throughout the various phases will provide us with insights into health concerns, important areas for research and benefits to the patient, and ultimately improved care.

**Center for Excellence in Health Communication to Underserved Populations (CEHCUP).** Health disparities constitute a major problem for the United States. More focused research, as well as advanced training for communicators (being them journalists, advertising or public relations practitioners) is needed. The William Allen White School of Journalism and Mass Communications has established the Center for Excellence in Health Communication to Underserved Populations on the KU-Lawrence campus to promote dedicated student training as well as collaborative research and service to the community to address health disparities in the state of Kansas and abroad.

CEHCUP has three major roles:
- Educate and train undergraduate and graduate students in journalism and strategic communication about health communication practices to underserved populations and CBPR-driven approaches.
- Function as a research hub to facilitate interdisciplinary, multidisciplinary and cross-disciplinary research into communication practices for health campaigns addressing underserved populations.
- Provide support, assistance and know-how for community-based organizations that want to engage in health promotion or disease prevention activities.

**KUMC Office of Rural Health Education.** KUMC Office of Rural Health Education partners with health care providers, Kansas employers, and stakeholders to increase access to quality health care for the people of rural and urban underserved Kansas. We do this by advancing the health care workforce through recruitment, retention, research and education. Let us help you find Kansas health care jobs, loan forgiveness and repayment options, temporary coverage for medical professionals, committed providers for your hospital or clinic, and more.

**KCK Community Health Council.** KCK Community Health Council (CHC) exists to improve health and health care for the people of Wyandotte County. We believe that residents have the ability, and an inherent right, to provide leadership in the shaping of physical spaces and public policies which impact their health. CHC’s responsibility is to ensure the collective experiences and expertise of Wyandotte County residents are represented in matters of health design and policy, as well as identify and maximize opportunities for collaboration, planning and implementation of effective community health improvement initiatives.
CHC is a non-profit, 501 (c) (3) community health collaborative of hospitals, safety net clinics, federally-qualified health clinics (FQHCs), mental health providers, public health departments, academic research institutions and health care funding organizations. CHC member institutions support the work of the organization on a pre-determined pledge that is renewed each fiscal year.

The University of Kansas Cancer Center has been selected for National Cancer Institute (NCI) designation. NCI designation enhances the long-standing relationship of the Cancer Center with the Midwest Cancer Alliance, providing opportunities to expand research and link discoveries made in the lab at the University of Kansas to the MCA network of hospitals and health care organizations and enhance the quality and delivery of cancer care at all levels. KPPEPR (Kansas Patients and Providers Engaged in Prevention Research) is a practice-based research network that is also part of the MCA.

All MCA-member medical professionals have access to second opinion and consultation services with multi-disciplinary cancer experts, conferences and other networking events, outreach programs, patient navigation support, communication materials, web resources, and continuing education programs. For the convenience of our affiliated medical professionals, the MCA provides many of these services at member locations, thanks to technology like Interactive Televideo (ITV).

**Genesis Health Care Network, Garden City, Kansas (Finney County, KS).** The Genesis Health Care Clinic Network is the operator of the largest rural primary care network serving Hispanics and refugees in Kansas. Serving over 9,500 patients annually through six clinics throughout southwest Kansas, with more than 90 percent of these individuals below the 200% poverty level and as the leading ambulatory “safety-net” care provider for these underserved individuals and families in the region, Genesis recognizes the importance of health care and social services for clients. The flagship Genesis clinic, in Garden City, rests in a region where 5 large counties now have majority minority populations. Meat packing, and feedlot growth over the past 30 years has led to an influx of Latinos and refugees from across the globe. The incredible diversity in the region has shaped Genesis. All programs -- dental and medical clinics, oral health screening and education, social services such as the food bank, clothing room, emergency assistance, citizenship classes, immunizations, early literacy, health education and outreach -- are designed to improve the lives and health status of individuals and families.

KUMC faculty began collaborative work with Genesis over 14 years ago. Dr. Kimminau, while Vice President of Research at the Kansas Health Institute in 2002, conducted the *Minority Health Disparities in Kansas* project and completed focus groups and health assessments at Genesis clinics. For over 12 years, we have placed medical students in the Genesis Garden City Clinic for a six week summer practice/research experience. We worked with Genesis to recruit smokers from the clinic for the NCI-funded KanQuit smoking cessation study (PI, Ellerbeck) in 2005-2007. We partnered with Genesis and other primary care clinics on the tablet computer delivered Healthy Living colorectal cancer screening program in 2007 (NCI, PI, Engelman). In 2009, we began working with Genesis to deliver state of the art telemedicine smoking cessation counseling services in the *Connect to Quit* study (NHLBI, PI, Richter). The past six years the Genesis network has been a subcontracted primary partner in the NCI-funded Community Networks Program Center to reduce cancer disparities (U54 CA154253, PI, Greiner). Through this we worked with Genesis to develop a Community Health Worker program that is now self-sustaining. We have new partnership funding from CMS to conduct health promotion across the region. We expect our research partnership with Genesis to continue and to allow work on vulnerable and understudied rural populations.

**Institute for Community Engagement (ICE).** ICE is the KUMC outreach and service delivery infrastructure that spans over 100 staff across five departments (Area Health Education Centers, Center for Telemedicine & Telehealth, Continuing Education, Rural Health, and Research & Scholarship). ICE coordinates outreach across the School of Medicine, School of Nursing, and School of Health Professions and there is a strong interprofessional focus across activities. Collectively, the Institute departments and its extensive internal and external partners provide needs-driven educational and clinical services that span the entire state and reach into each of Kansas’ 105 counties. The Institute’s mission is to “improve the health of Kansans through communication, collaboration, and statewide partnerships.” The mission spans enhancing student education, strengthening the health care workforce, researching to improve health, advancing health care access, and serving communities. The Institute works closely with KU Hospital to advance integration and health system models. ICE’s departments and partners work with and help CPH facilitate community engaged research from concept to proposal implementation, including site/practice recruitment and retention, training, as well as reporting findings back to communities.
KU Center for Telehealth and Telemedicine (KUCTT). Using the range of telehealth technologies, KUCTT provides Kansans access to the best available health care while providing Kansas' health care professionals access to the best available health information and education. Kansas is the ideal state for telemedicine, with half of its population in two population centers and the other half located throughout 88 rural counties. From the very first consult in 1991 to present day, the KUCTT continues to expand its clinical services for children and across the lifespan. With more than 40,000 consults across 60 specialties from 1991 to present, KUCTT is a leader in the telemedicine field. The existing network connects some of the most clinically underserved communities, effectively enhancing Kansas' quality of healthcare. Urban and rural telehealth partners include schools, area health education centers, hospitals, early intervention satellite sites, community health clinics, mental health facilities, and other venues. KUCTT is one of the most active outpatient telemedicine programs in the country, with over 4,000 clinical consults per year across secure room-based, PC-based, and mobile telemedicine platforms. KUCTT also oversees the federally funded Heartland Regional Telehealth Center, spanning telehealth services across Kansas, Missouri, and Oklahoma.

Area Health Education Centers (AHECs). The AHECs are academic-community partnerships that train health care providers at sites and in programs that are responsive to state and local needs around health topics. The AHECs enhance the quality and accessibility of health care services in Kansas through partnerships with communities, health care professionals and organizations, educational institutions and other interested individuals and agencies. The three offices are geographically distributed across the East (Pittsburg, KS office), West (Hays, KS office), and Northeast (Lawrence, KS office). Rural Kansas has a diverse underserved population, with high poverty in southeast rural areas, a population faced with economic challenges related to downturns in farming and oil in central and northwest Kansas, and a new immigrant population associated with meat packing and other industries in southwest Kansas. The AHECs have a strong local presence in each of these regions to meet needs unique to the area. AHECs link the resources of university health science centers with local planning, educational, research, and clinical resources. This network of health-related institutions provides multidisciplinary educational services to students, faculty and local practitioners, ultimately improving health care delivery in medically underserved areas. From 2009-2011, the AHECs completed 468 education/training initiatives with 1,980 sessions and processed 29,792 continuing education enrollments from every county in Kansas. The AHECs have leveraged their strong rural relationships to support recruitment and retention of rural practices in previous rural primary care research related to epilepsy, pediatric cancer, smoking cessation, and other topics.

KU Center for Telehealth and Telemedicine (KUCTT). CE/PD's goal is to develop and deliver education that makes a positive difference in practice and patient outcomes. CE/PD provides continuing education directly related to the top practice concerns of Kansas' primary care providers, and provides interprofessional education with a growing emphasis on team-based medicine. CE/PD is nationally accredited by the Accreditation Council for Continuing Medical Education and the American Nurses Credentialing Center. CE/PD is the largest provider of continuing medical education in Kansas. In FY 12, CE/PD offered 81 courses, conferences or event series with an enrollment of 4,706. In addition, they supported 1,629 grand round sessions at KUMC, including broadcast via televideo of a number of sessions to metropolitan and rural sites across Kansas. Of note, CE/PD has accredited one of the most attended regional pediatric obesity conferences for the last decade, in addition to numerous grand rounds around obesity. CE has spearheaded two statewide initiatives that utilized training and performance improvement methodologies similar to the proposal in order to support adoption of national evidence-based guidelines in our rural and frontier communities. In particular, televideo technology supported team-based performance improvement activities and shared team learning because teams were geographically distributed across the states. One performance improvement initiative resulted in increased practice adoption of diabetes management practices and the second, while ongoing, is promising related to system-wide adoption of best practices in sepsis management.

Department of Family Medicine. This growing department is housed within three separate areas of the KU Medical Center complex. The research division, under Dr. Greiner's direction, occupies a 2400 ft² office suite within the KUMC Endowment Building. The Division has seven full time faculty investigators and over twenty sta staff with experience in health disparities research and community outreach. The Department now ranks within the top ten family medicine departments in the U.S. in NIH funding. Two research division faculty members maintain clinical practices and each of the other five members is experienced in partnering with organizations and agencies to improve health. All research division staff have been hired with the intent of building a translational health disparities program studying prevention, social determinants, cancer and chronic diseases. These staff have expertise in health informatics, community based participatory research, minority participant
recruitment, and biospecimen collection. The research division has been the primary home for the community engagement program within the KUMC Clinical and Translational Science Award, *Frontiers*, for over five years. The clinical portion of the Department of Family Medicine resides on the entire first floor of the recently completed medical office building. A large suite of faculty offices and educational program offices is housed separately in the Delp Building. This area also provides additional conference room and small classroom space for meetings and training sessions.

**Wyandotte County Safety-Net Clinic Coalition.** The Wyandotte County Safety-Net Clinic Coalition is a group of clinics serving low income individuals in Wyandotte County. The group has collaborated with multiple KUMC investigators on NIH funded projects over the last fifteen years. It includes two federally qualified community health center clinics run out of the Swope Health Services central location in Kansas City, Missouri. The clinics provide the vast majority of health care needs for the uninsured population of Kansas City, Kansas. This population segment is predominately minority with a rapidly growing Latino component. The coalition meets monthly and is currently working on collaborative programs to test the impact of community health workers on patient outcomes. The group has a shared patient database and referrals system. A number of local physicians and community leaders regularly attend coalition meetings and contribute to joint projects. The coalition works closely with the Wyandotte County Community Health Council. Swope Health Services has been extensively involved with coalition activities and has moved their largest Kansas City, KS clinic to a new location to facilitate expansion of services. Swope Parkway Health Center, Kansas City, Missouri is a federally qualified community health center with Pediatric, OB/GYN, General Medicine, Ophthalmology, Mental and Behavioral Health, and Community Outreach clinics. The Center also has a full service on-site pharmacy. Services are provided to patients with Medicare, Medicaid, and to the uninsured on a sliding scale fee schedule. Swope Central had 16,324 total visits and 7,138 unique patient visits in 2004. Swope Wyandotte Clinic, Kansas City, Kansas is a satellite office for Swope Central and serves as the primary federally qualified community health center in Kansas City, Kansas. The Clinic has recently moved into new office space and has expanded services. Services are provided to patients with Medicare, Medicaid, and to the uninsured on a sliding scale fee schedule. Swope Quindaro Clinic Kansas City, Kansas is a satellite office for Swope Central and serves a very low income section of the urban core in Kansas City, Kansas. Services are provided to patients with Medicare, Medicaid, and to the uninsured on a sliding scale fee schedule. Duchesne Clinic Kansas City, Kansas is a clinic operated by the Sisters of Charity of Leavenworth, a non-profit health care services organization that also runs several hospitals in the plains and western plains regions of the United States. The clinic only sees patients who have no insurance coverage. Southwest Boulevard Family Health Care Kansas City, Kansas is a full service primary care clinic. The clinic serves patients with Medicare, Medicaid, private insurance, and those with no insurance on a sliding scale fee schedule. The Wyandotte County – Kansas City, Kansas Unified Government Health Department operates Pediatrics, OB/GYN, Family Planning, Immunization, and STD clinics for those with Medicare, Medicaid, and the uninsured. Dr. Greiner serves as the health department’s medical officer.

**Kansas City CARE Clinic.** The KC CARE Clinic was formed in 1971 as a private 501(c)(3) organization to promote health and wellness by providing quality care, access, research, and education to the underserved and all people in our community. The clinic provides health care services in general medicine, HIV prevention and primary care, behavioral health, and dentistry with a full-time staff of 105 as well as over 1,200 volunteers. Full- and part-time staff includes two full-time physicians, six nurses, five nurse practitioners, 22 case managers, six behavioral health providers, seven community health workers, one dentist, one dental assistant, and seven prevention specialists. In 2014, 8,000 patients received primary care, mental and/or dental services at two clinic locations, both in underserved areas of the city. KC Care maintains relationships with many academic institutions in the area, allowing medical students from KUMC, KCU, UMKC, and other schools to gain experience in the clinic under professional supervision.

**Silver City Health Center.** Silver City Health Center offers affordable, high-quality primary care, in-depth clinical evaluation, and a range of program-specific health services to English and Spanish-speaking residents of Wyandotte and Johnson counties. The Center provides primary health care and health education resource access to individuals without insurance, as well as to those with government or private health insurance coverage.

Located in the Argentine community of Kansas City, Kan., the center employs skilled health care professionals from the KU Schools of Health Professions, Medicine and Nursing.
Haskell Indian Nations University. Haskell Indian Nations University (HINU) is the premiere tribal university in the United States, offering quality education to Native American students. Haskell’s student population averages about 1000 per semester, and all students are members of federally recognized tribes. Haskell’s faculty and staff is predominantly native. Haskell offers Associate and Bachelor’s degrees. Haskell’s historic campus is centrally located in Lawrence, KS in what is known as Kaw Valley. The mission of Haskell Indian Nations University is to build the leadership capacity of our students by serving as the leading institution of academic excellence, cultural and intellectual prominence, and holistic education to address the needs of Indigenous communities.

Mid-America All Indian Center. The Mid-America All-Indian Center serves as a cultural center and museum dedicated to educating people about and preserving the heritage of the American Indian.

Heart of American Indian Center. The mission of the Kansas City Indian Center is to encourage social, educational, and economic advancement of the American Indian community by promoting traditional and cultural values.

The Kansas City Indian Center (Heart of America Indian Center), a 501(c) (3) non-profit corporation, has been serving the Kansas City's American Indian population since 1971.

Today the Center remains dedicated to the following goals:
- provide health, welfare and cultural services to American Indian individuals and families of our community;
- promote fellowship among the American Indian people of all tribes living in the Kansas City Area;
- stimulate the natural integration of the American Indian into the community;
- encourage artistic and vocational pursuits by American Indian people; and
- preserve and foster traditional American Indian cultural values.

Services Available - Emergency Services for Low-Income American Indians, including Food Pantry and Holiday Baskets, emergency telephone calls to Reservation or Nation and referrals to additional services; and the Morningstar Substance Abuse Outpatient and Prevention Program.

Mexican Consulate. JUNTOS, Drs. Paula Cupertino and Allen Greiner collaborate with the Mexican Consulate and the Ventanilla de Salud program in Southwest Kansas. They provide health fairs, screening services and health assessments of individuals seeking services from the Consulate and thereby keep a high level of surveillance on this vulnerable population’s health status.

ALS Mid-America Chapter. Leading the fight to treat and cure ALS through global research and nationwide advocacy while also empowering people with Lou Gehrig’s Disease and their families to live fuller lives by providing them with compassionate care and support.

Muscular Dystrophy Association. The Muscular Dystrophy Association (MDA) is an American organization which combats muscular dystrophy and diseases of the nervous system and muscular system in general by funding research, providing medical and community services, and educating health professionals and the general public. The organization was founded in 1950 by a group of concerned parents of children with muscular dystrophy.

Leukemia/Lymphoma Society. The Leukemia & Lymphoma Society (LLS) is the world's largest voluntary health agency dedicated to blood cancer. The LLS mission: Cure leukemia, lymphoma, Hodgkin's disease and myeloma, and improve the quality of life of patients and their families. LLS funds lifesaving blood cancer research around the world and provides free information and support services.

Community Living Opportunities. Community Living Opportunities, Inc. (CLO) is a non-profit community organization that provides community living, day habilitation, in-home support and targeted case management services for over 300 people with developmental disabilities and employs more than 400 staff members. It was formed in 1977 as an alternative to state institutions and became one of the pioneers in providing community-based services to people with developmental disabilities. Their services include targeted case management, residential services, which includes family-teaching and extended family-teaching homes, day services, behavioral consultation, children’s services, health care services, training and staff certification and organizational behavior management consulting. CLO operates seven group homes in Johnson County,
Kansas (the metropolitan Kansas City area) and seven group homes in Douglas County, Kansas (Lawrence). CLO’s Early Childhood Autism Program (ECAP) provides in-home, intensive early intervention for 22 children with autism.

**Cottonwood, Inc.** Cottonwood Inc. is a not-for-profit community organization that provides services to people with developmental disabilities in Douglas and Jefferson County, Kansas. In their dual role as community service provider and the Community Developmental Disabilities Organization, Cottonwood is the single point of referral for people with developmental disabilities seeking services. Cottonwood provides services and support to people with developmental disabilities in their living and work environments in the community. Residential services encompass group living, supported living, semi-independent living, and recreation/leisure activities. Support Services include medical care, mental health care, advocacy, habilitative therapies, financial entitlements, transportation, employment, housing, recreation, and adult education. Employment services and work services assist people to obtain and maintain jobs in the Cottonwood Work Services Department and in the community. Cottonwood’s residential services include 48 living arrangements. Cottonwood promotes persons with developmental disabilities as qualified workers to employers, while offering incentives to employers for their cooperation in supported employment. Life enrichment services offer enhancement of job, social, cultural, and leisure skills. Transition services include helping the Lawrence School district provide for a smooth transition from school to adult living for students with disabilities. Cottonwood provides direct or indirect services to over 650 people, ranging in age from 18 to more than 60 years old. Finally, Cottonwood helps fund the Early Childhood Coordinating Council in Jefferson County for families with children in need of early intervention.

**Kansas Association for the Medically Underserved** (KAMU) is the primary care association for the state of Kansas, and consists of a network of 40 primary care and 13 dental clinics that provide health services to low-income and uninsured people throughout the state. KAMU serves as a connecting point for clinicians working in safety net clinics and participates in extensive workforce development programs. Recently, KUMC faculty assisted KAMU in designing a dental hub model for delivering dental care to counties and communities that either lack sufficient dentists and dental hygienists to meet their need or who have no dental providers at all. Funding to support the development of the dental hub represents a collaborative effort on the part of health philanthropies who wanted trusted, academic expertise from KUMC investigators during the design phase to ensure that the model would permit effective delivery of dental care services to those most in need.

**Communities Creating Opportunity.** Communities Creating Opportunity (CCO) is a longstanding organization in Kansas City that arose from the work of the Kansas City Organization Project (KCOP). KCOP began in 1977 with religious and community leaders to respond to the rapid racial transition and financial changes in the city’s Southeast neighborhoods. As black families moved into these communities in the mid-70’s, white families moved out in droves. Subsequently, real estate values dropped, lending in the area froze, and insurance rates skyrocketed. Increases in poverty and crime rates followed. KCOP provided community residents with the organizational tools and leadership training to address these trends and enhance their communities. In 1984, KCOP became Kansas City Church Community Organization to reflect its congregation and neighborhood-based model of community organizing. While continuing in its tradition of faith-based community organizing, CCO adopted a new name in 2007, Communities Creating Opportunity, to include all religious traditions and other community partners. The well-recognized acronym, CCO, continues as the organization’s principal signature. Over the past ten years the group has been heavily involved in health equity work. The organization received funding to conduct “hotspot” mapping projects with Truman Medical Center and KUMC in an effort to identify unmet health care need. More recently CCO received funding from the Kansas Health Foundation to study how social factors influence health outcomes in Wyandotte County. KUMC researchers have worked with CCO leaders on data analysis and grant submissions for over five years.

**Mid-America Regional Coalition (MARC).** MARC is a regional nonprofit group of city and county governments that works to bridge governmental divides created by a state line and various city and county borders across metropolitan Kansas City. It is the metropolitan planning organization for the bistate Kansas City region. Directed by a Board of Directors made up of local elected officials, and serves nine counties and 119 cities. They provide a forum for the region to work together to advance social, economic and environmental progress. MARC is funded by federal, state and private grants, local contributions and earned income. A major portion of their budget is passed through to local governments and other agencies for programs and services. The organization developed a health policy agenda in 2009. Most recently MARC has become the home base of a regional community health worker collaborative initiative. This group meets
Various Frontiers researchers have worked with MARC to organize and build capacity for health improvement and bioscience in the region.

El Centro. El Centro began in 1976 with a small amount of funding from the Archdiocese of Kansas City in Kansas. Church leaders and a group of energetic and caring community members saw a need for an organization to address the needs and concerns of Kansas City, Kansas’ rapidly growing Latino population. With in-migration accelerating, El Centro de Servicios para Hispanos was born.

El Centro has grown from a single location to three locations in Kansas City, Kansas and Olathe, serving more than 12,000 individuals and families per year. Our programming has evolved from our first program for elders – the Senior Day Program – to include The Academy for Children – a dual-language Pre-K program, workshops on money-management and homeownership, health education and healthy living outreach through our Promotores de Salud (Health Promoters) volunteers, health navigation and intervention, and our policy and advocacy efforts for issues of special interest to our community. The organization launched a community health worker program in 2008 and has been a close partner of KUMC’s JUNTOS, Center for Advancing Latino Health. El Centro has also assisted in recruiting participants in research and has partnered with KUMC researchers in the Department of Family Medicine and with the Alzheimer’s Disease Center.

Johnson County Department of Health and Environment. Since 1943, the Johnson County Health Department has been the official public health agency for the County, with the Board of County Commissioners serving as the Board of Health. In March 2012, the Health Department merged with the Johnson County Environmental Department to become the Johnson County Department of Health and Environment (JCDHE). The Director is Lougene Marsh and the Deputy Director is James Joerke. JCDHE is comprised of six divisions: Business Operations, Childcare Licensing, Community Health, Environmental, Health Services, and Strategic Planning. There are approximately 150 department employees. In June 2014, JCDHE became the first accredited health department in Kansas.

Services include: immunizations, communicable disease surveillance, TB testing, refugee health testing, prenatal, WIC, reproductive health, STD screening, HIV testing, child care facilities’ licensure, health education classes, workshops & trainings, injury prevention activities (Safe Kids Johnson County), chronic disease risk reduction activities, community wellness activities. Programs include: Outreach Nurse, Public Health Emergency Program, Targeted Case Management, ‘Making a Difference’, Air Quality, Household Hazardous Waste, Solid Waste Management, On-site Sewage Treatment, Ozone Reduction and Pool Inspections. Services are provided at three sites, 11875 S. Sunset and 11811 S. Sunset in Olathe and 6000 Lamar in Mission.

Dr. J. LeMaster, family physician at KUMC, serves as the medical director for JCDHE. His position facilitates research activities to engage residents seeking services to also participate in community based research. Most recently, researchers in family medicine conducted a comprehensive assessment of micro-food deserts in Johnson County to inform local policymakers, and the team collaborated with JCDHE’s WIC and immunization programs to interview residents about food insecurity, access and need.

Johnson County Developmental Supports. Johnson County Developmental Supports (JCDS) was established in 1972 as an agency of Johnson County (Kansas) government to provide community-based services for people with developmental disabilities. JCDS is headed by a seven-member governing board composed of parents, community advocates and professionals who are appointed by the Johnson County Board of County Commissioners. An executive director and a staff of 260 trained professionals lead daily operations. JCDS programs and services are partially funded on a contractual basis with the Kansas Department of Social and Rehabilitation Services. Additional funding sources include a county tax levy, state block grants, subcontract income, contracts with companies for workers, private grants and donations. JCDS provides office space, Internet access, and some clerical support for MRRC investigators working on site. Today, as a Community Service Provider (CSP), JCDS directly serves nearly 500 people daily. Through a person-centered planning process and within available resources, services are shaped to fit individual needs, preferences, goals, abilities and interests. Some examples of available services include Residential Supports (ranging from a few hours of support for those living independently to live-in, around-the-clock care), Day Supports (facility-based or community-based employment opportunities for paid work, or other activities including volunteer work), Alternative Supports (professional resources for nursing, occupational therapy and assistive technology), Behavior Supports (applied methods to maximize adaptive behavior) and Case Management.
In addition to being a service provider in Johnson County, JCDS has another, equally important role: that of Community Developmental Disabilities Organization (CDDO). As CDDO, JCDS provides a single point of contact and entry for all of Johnson County, Kansas and maintains a county-wide service needs list for those waiting for certain services. Johnson County Developmental Supports accomplishes its direct service mission by developing, linking, and monitoring services, supports, and resources for approximately 700 people. In addition, JCDS works with over 360 affiliates who are agencies and individual service providers to assist access to quality, cost-effective services.

**Schiefelbusch Institute for Life Span Studies (Life Span Institute)**

The Schiefelbusch Institute for Life Span Studies, located on the KU Lawrence campus, was created in 1990 out of the 67-year-old Kansas Bureau of Child Research and serves as an important resource for participant recruitment. Today it is one of the largest and most highly regarded human development and disabilities research centers in the country. The LSI brings together scientists of diverse disciplines including psychology, psychiatry, speech pathology, sociology, education, biology, pharmacology, physiology and medicine to study human development from its genetic origins through the final stages of life. The LSI supports basic and applied research, treatment and assessment clinics, service coordination and delivery, consultation, and training. The Life Span Institute’s 12 centers have more than 130 programs and projects active at any one time in Kansas and other states, directly serving individuals, families, and communities in underserved Kansas City neighborhoods and rural Kansas counties.

The Life Span Institute, which is directed by, Dr. J. Colombo, is integral to Frontiers. The Institute commands the largest external funding support of any research center on the Lawrence campus, a rarity for behavioral sciences centers. The success of the Life Span Institute is a reflection of the campus’ long-time strengths in child development and disability research and intervention, a commitment that spans several academic units, many clinical and research settings, and three campuses of the University. The Life Span Institute brings together 176 scientists who are affiliated with 20 academic departments to study human development from its genetic origins through the final stages of life. These investigators are supported by 175 research and administrative staff members, including 66 graduate research assistants and 114 student assistants. The Institute has two affiliated multidisciplinary graduate/doctoral programs, as well as several post-doctoral training programs. The Life Span Institute’s 14 centers and Peruvian affiliate currently have 135 active grants that constitute basic and basic and translational research, training, direct services, consultation, and technical assistance. Last year, some 30,500 Kansans also benefited from the Institute’s direct services, training and technical assistance. The Institute’s central office is in the Robert Dole Human Development Center in Lawrence with components at the John T. Stewart Children’s Center and Malott Hall and Wakarusa facility. The Institute also operates in Kansas City at the University of Kansas Medical Center, the Children’s Campus of Kansas City and the University of Kansas Edwards Campus, and at the Life Span Institute in Parsons, Kan. Much of the work of the Institute is accomplished in and directly benefits underserved Kansas City neighborhoods and rural Kansas counties. Several projects are collaborations with researchers in other parts of the state, region, country, and world, and are regional, national, or international in scope. The Life Span Institute attracts more combined federal, state, and private dollars than any other designated research center at the University of Kansas, drawing $32.8 million in sponsored project support in FY 2015.

- **Beach Center on Disability.** Through excellence in research, training, technical assistance and public service in Kansas, the nation and the world, the Beach Center on Disability seeks to make a significant and sustainable difference in the quality of life of families and individuals affected by disability. Research focuses on access to the general curriculum, assistive technology, deaf-blindness, disability policy, employment, family supports and services in early childhood, family quality of life, individual control of funding, positive behavior support and self-determination. Founded in 1988 by KU Distinguished Professors Ann and Rud Turnbull, the Beach Center honors Ross and Marianna Beach for their long-standing efforts on behalf of families affected by disability and was inspired by the Turnbulls’ son, Jay, who had several disabilities.

- The **Center for Biobehavioral Neurosciences in Communication Disorders (BNCD)** was founded in 2002 when the National Institute on Deafness and Other Communication Disorders awarded a core grant to establish the center. The BNCD is a natural outgrowth of the Life Span Institute’s long-standing focus on communication and language development and intervention. The BNCD’s research spans a
wide range of issues relevant to the causes and treatment of communication disorders from infancy to old age including studies on infant attention, the genetics of language impairments, language intervention, the decline of working memory in old age as reflected in speech and more precise measures of hearing loss to aid cochlear implant design.

- The Center for Research on Learning (CRL), joining the Life Span Institute in 2014, has a long history as an internationally recognized research and development organization noted for creating solutions that dramatically improve quality of life, learning, and performance, especially for those who experience barriers to success. The CRL encompasses six divisions, each with a slightly different research emphasis. Researchers study problems in education and work to place solutions that make a difference into the hands of educators, learners, employers, and policy makers.

- The Child Language Doctoral Program was established in 1983 as the first specialized degree program in the emerging field of child language acquisition. The program focuses on the interdisciplinary academic preparation and research training of child language specialists. The internationally recognized faculty brings diverse approaches to the study of how children communicate and speak. The program offers students a wide choice of research tools, facilities and field sites including the Child Language Acquisition Studies Lab that has the largest known archive of transcribed spontaneous samples from a longitudinal study of preschool children diagnosed as specific language impaired (SLI). The Life Span Institute, the Language Acquisition Preschool and the clinical and research facilities of the Speech-Language-Hearing Clinic provide research sites and practica.

- The Gerontology Center's affiliation with the Bureau of Child Research in 1990 paved the way for an extended research agenda of the newly formed Life Span Institute. Center researchers are interested in all areas of aging but are distinguished by seminal research in cognition, communication and aging, long-term health care and housing alternatives and decision making in later life. The Center coordinates a multidisciplinary graduate program that offers both masters and doctoral degrees in gerontology, as well as dual-title doctoral degrees that combine training in gerontology with certain social and behavioral sciences.

- The Juniper Gardens Children's Project (JGCP) began in 1964 when citizens from northeast Kansas City, Kansas joined with faculty from the University of Kansas to devise solutions to specific problems in educational achievement and parenting in that low-income community. The JGCP has grown over the years from a small, community-based research initiative housed in the basement of a liquor store to a unique, internationally recognized research center which includes local and national community sites in projects and investigations housed at the Children's Campus of Kansas City, four blocks from where it began. The Children's Campus of Kansas City is a joint community initiative in Kansas City, Kansas—an effort that the JGCP has been supporting for the past decade. The JGCP is particularly recognized for its contributions to the development of effective approaches for accelerating learning and reducing classroom conduct problems in both special and general education. In 1996, the JGCP was awarded the Research Award of the International Council for Exceptional Children in recognition of its outstanding research contributions.

- More than 40 years ago, as the Life Span Institute's research on developmental disabilities took root, efforts began to translate this research into practice through what is now known as the Kansas University Center on Developmental Disabilities (KUCDD). Virtually all of the Life Span Institute's direct service, technical assistance and post-doctoral, pre- and in-service training are associated with KUCDD. These include clinics to diagnose and treat children with disabilities, a statewide project that provides assistive technology to people with disabilities and their families and training childcare providers and social workers to support individuals with disabilities. In addition, investigators affiliated with the KUCDD conduct research that has state, national and international impact in areas like self-determination, positive behavior supports, inclusive educational practices, early childhood education, community and workplace supports, family systems and supports and other areas critical to the lives of people with developmental disabilities and their families.
H. OPTIONAL FUNCTION: INSTITUTE FOR ADVANCING MEDICAL INNOVATION (IAMI): FACILITIES AND OTHER RESOURCES

**Frontiers Resources.** Frontiers has an impressive array of resources available to achieve its aims of engaging stakeholders, creating a sustainable translational research workforce and strengthening infrastructure to accelerate translational research. We draw on the considerable strengths of the University of Kansas Medical Center (Kansas City and Wichita campuses), the University of Missouri-Kansas City, Children’s Mercy Kansas City, and the Kansas City University of Medicine and Biosciences. In addition, we take advantage of a strong history of entrepreneurship investment in the Kansas City region (e.g., the Ewing Marion Kauffman Foundation, the UMKC Regnier Institute for Entrepreneurship and Innovation, the Kansas City Area Life Sciences Institute and the KU Innovation and Collaboration Center) to leverage drug, device, diagnostic, medical device and population health product development to achieve faster success. We have a plethora of community organizations, clinics, and providers across the region willing and excited to collaborate with Frontiers investigators, experts in entrepreneurship who will lead and train the next generation of successful business developers in the biomedical sciences and a growing cadre of team science-trained teams to work in emerging lifespan clinical and translational research. Please refer to the Overall Section of Facilities and Resources for a comprehensive description of Frontiers resources that are available to all Frontiers members.

**INSTITUTE FOR ADVANCING MEDICAL INNOVATION (IAMI)**

IAMI’s vision is to change the standard of care for patients suffering from diseases including cancer and rare diseases, and its mission is to develop and demonstrate drugs, diagnostics, and medical devices with clear paths to market. IAMI’s central hypothesis is that, by selecting high potential projects with industry input, making sufficient investment to advance projects to the stage they can be partnered with the private sector, and industry-experienced leadership in project execution, the program will yield products with commercial potential that will directly benefit patients. Product development opportunities arise from laboratory and bedside discoveries made by Frontiers investigators, investigators at other CTSA hubs, as well as discoveries made by industry, academia, government and disease philanthropy partners. Promising projects have clear paths to commercialization through IAMI’s partnership with its Kansas City based for-profit partner, BioNovus Innovations LLC.

**Project Management.** IAMI-led multi-disciplinary, multi-organizational project teams develop drugs, diagnostics and medical devices through the execution of product development-focused project plans, and through execution, build data packages that support partnering drugs, diagnostics and medical devices with the private sector. To ensure coordination and integration across disciplines, across campuses, and across multiple organizations, project teams (led by IAMI project managers) are established and managed to advance projects. IAMI is strategically located in facilities at the University of Kansas Medical Center locations in Wyandotte and Johnson counties in Kansas and University of Kansas-Lawrence West campuses. Residing within the administrative office area of the University of Kansas Cancer Center (KUCC), IAMI uses 640 sq. ft. of office space with access to one 300 sq. ft. conference room, located on the second floor of the Wahl Hall West building. Additionally, IAMI has full office and meeting room facilities at Children’s Mercy Kansas City located within the Division of Clinical Pharmacology and Therapeutic Innovation.

The offices of IAMI Director Dr. Scott Weir, and Executive Administrative Assistant, Ms. Melissa Simpson, are co-located with KUCC leadership at this location. IAMI project managers Kevin Schorno and Tyce Bruns occupy an additional 780 sq. ft. of office and conference room space on the second floor of the Fairway North building, located at 4330 Shawnee Mission Parkway, Fairway, KS. Working closely with Frontiers administrative staff as well as early phase clinical trial operations located on the Fairway campus, Schorno and Bruns office one floor below Frontiers administrative staff. Ms. Melinda Broward, IAMI project manager for the Target Acceleration Group (TAG), primarily manages drug discovery projects. As such, Ms. Broward is co-located with the KU High Throughput Screening Core and medicinal chemistry laboratories (see below) residing within the Structural Biology Building located on the University of Kansas West Campus. Ms. Robyn Wood, IAMI project manager who works closely with bioengineering faculty located on the University of Kansas main campus, also resides within the

![Scott Weir](image)
Structural Biology building. Broward and Wood each occupy 200 sq. ft. of office space and have immediate access to two conference rooms located on the first floor of the Structural Biology building. Ms. Robyn Wood, Mr. Tyce Bruns, and Mr. Kevin Schorno provide project management support to projects across campuses, across the preclinical to clinical continuum, and also support strategic partnerships with industry, academia, government and disease philanthropy organizations such as The Learning Collaborative (a partnership with NCATS and The Leukemia and Lymphoma Society) and The Sarcoma Learning Collaborative (a partnership with NCATS and Children’s Mercy Kansas City (CMKC) in Kansas City, MO. Wood, Bruns, and Schorno work across KU campuses and local consortium member locations (e.g., CMKC).

IAMI Entrepreneurs-in-Residence. Kansas City-based and Boston-based biotechnology executives, Thomas Krol, PharmD and Fred Meyer, PhD, MBA, respectively, serves as IAMI Entrepreneurs-in-Residence, providing mentorship to research investigators and project teams. Krol and Meyer work both on-site (via visiting offices at KUMC) and remotely to support IAMI operations. IAMI’s Project Management managers utilizes Microsoft Project software to assist in developing project plans, assigning resources to tasks, tracking progress, managing project budgets, analyzing workloads, and collecting project performance metrics. IAMI project managers use conference rooms equipped with videoconferencing capabilities to facilitate communication across campuses and with external Universities, partners, and contacts. Audio/video conferencing facilities located on the KUMC campus are connected to the high speed Internet 2 network. Each facility has multiple microphones and echo cancellation on the amplifier systems for optimum audio quality in audio and videoconferences. The internal telecommunication systems can manage three-way teleconferences or connect to the KUMC’s audio bridge for conferences with up to 20 sites. Each facility uses standard Polycom video conferencing hardware and software to provide the widest possible compatibility with external sites. Both systems are capable of hosting videoconferences of up to three remote sites internally, or they can connect to the KUMC’s Multipoint Control Unit (MCU). The MCU allows us to host twenty-eight IP sites and eight ISDN sites simultaneously. Each of these facilities are capable of transmitting presentations along with the video images to provide faces and data simultaneously. This ensures that remote participants feel included in the experience and discussions. There are no fees to utilize these facilities. IAMI managers and personnel as well as KUMC and KU PI’s are equipped with PCs that are linked to the Internet via the University LAN. Communication with collaborators for drug discovery and development projects via the computer has been established and demonstrated.

Governance. IAMI is governed by a regional Supervisory Committee, chaired by KUMC Executive Vice Chancellor, Doug Girod, MD with membership summarized in Table FR-H. 1.

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<tr>
<td>Richard Barohn, MD</td>
<td>Director, Heartland Institute for Clinical and Translational Research</td>
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<td>Vice Chancellor for Research, University of Kansas Medical Center</td>
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<td></td>
<td>Chair, Department of Neurology, University of Kansas School of Medicine</td>
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<tr>
<td>Michael Artman, MD</td>
<td>Pediatrician-in-Chief, Children’s Mercy Kansas City</td>
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<td>Chair, Department of Pediatrics, University of Missouri-Kansas City School of Medicine</td>
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<td>Chair, Department of Pediatrics, University of Kansas School of Medicine</td>
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<tr>
<td>Doug Girod, MD (Chair)</td>
<td>Executive Vice Chancellor, University of Kansas Medical Center</td>
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<tr>
<td>Joseph Heppert, PhD</td>
<td>Associate Vice Chancellor for Research, University of Kansas</td>
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<tr>
<td>Roy Jensen, MD</td>
<td>Director, The University of Kansas Cancer Center</td>
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<tr>
<td>Robert Simari, MD</td>
<td>Dean, University of Kansas School of Medicine</td>
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Industry Advisory Board. IAMI employs fully integrated product development-focused translational research methods and processes to select, invest in, de-risk, market, and license drug, diagnostic, and medical device technologies. Comprehensive business plans (dubbed IAMI Investment Memos) are prepared and presented to the IAMI Industry Advisory Board (IAB, Table FR-H. 2) for their evaluation and recommendation on whether the opportunity warrants IAMI investment.
Drug Discovery and Development. Multidisciplinary teams of experts representing high throughput screening (HTS) assay development and validation, routine HTS screening of chemical libraries, medicinal chemistry, synthetic chemistry, pre-formulation, formulation development, preclinical safety and pharmacokinetics and project management expertise translate innovative laboratory discoveries into drug discovery projects.

High Throughput Screening Laboratory (HTS): The High Throughput Screening Laboratory provides researchers with high throughput technologies and compound libraries to assist in identifying biological probes and to provide hits and leads for drug discovery. High throughput screening of large chemical libraries of compounds is a proven way to identify novel chemical entities that target a biological system of interest. In order to have this technology available to biomedical researchers in Kansas and beyond, the HTS laboratory was established in 2002 at the University of Kansas, Lawrence with support from a NIH COBRE grant, the State of Kansas and KU. There are no other HTS facilities within a 250 mile radius of KUCC member laboratories. KU-HTS is a state-of-the-art facility dedicated to providing exceptional services in advancing drug discovery research initiatives, as well as assistance in preparing grant applications. HTS personnel have extensive experience in executing biochemical, cell-based, siRNA as well as high-content screening campaigns against a plethora of target classes. KU-HTS is a fee-for-service facility dedicated to providing exceptional quality services at the lowest cost. HTS staff partners with the investigators collaboratively to expedite their drug discovery efforts. The 4500 sq. ft. state-of-the-art High Throughput Screening Laboratory is housed in the Structural Biology Center new addition on the West Campus. It houses two cell culture laboratories, and the main laboratory with a variety of liquid handlers (6), bulk reagent dispensers (8) and microplate readers (8) to facilitate screening of compounds in a high-throughput mode. Several common signal detection technologies are also available, including UV-visible light absorbance, fluorescence, time-resolved fluorescence, FRET, TR-FRET, BRET, fluorescence polarization, AlphaScreen, Label-Free, radiometric and luminescence. The laboratory is fully equipped for conducting, cell-based, biochemical and siRNA assays and screens. There are two separate cell culture laboratories within the HTS main laboratory that house 5 BSL2 cell culture hoods and 6 Thermo Forma Series II CO₂ Incubators. Two separate rooms, with a total of 500 sq ft of space house the ImagXpress Micro and BD Pathway, the two high-content imaging systems. The personnel have access to Medline, Current Contents, CAB, PubMed, PubChem and Biosis. The laboratories have access to SciFinder and other on-line capabilities for database searches. Compound libraries are stored in a state-of-the-art Nexus Labstore compound management system for compound storage and retrieval. The HTS office space (740sq.ft) houses the office of the Director, and also has office space available for 10 researchers and a conference room. HTS staff has individual desks, bookcases, filing cabinets and internet connections in rooms separated from the laboratories. HTS currently has 3 people on staff plus an open position. Melinda Broward provides project management and administrative support for the group. The HTS-ready assays can be used to screen the KU-HTS compound collection of approximately 296,672 compounds. Chemoinformatics analysis has shown the presence of 61,980 scaffolds across the entire collection. KU HTS charges for compound usage and approximately 50-80% of these charges are placed in a designated compound library account to periodically purchase compounds to update and expand the library. The compound library was obtained from the following sources: (1) Repurposing library collection of 5,292 FDA approved compounds derived from Prestwick, Enzo, TimTec, Selleck, and BioFocus NIH clinical collection. All of the FDA-approved compounds have well-characterized bioactivity, safety and bioavailability and hits from this set of compounds will ensure

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<tr>
<td>Steven D. Averbuch,  MD</td>
<td>Vice President, Translational Clinical Development and Pharmacodiagnostics, Bristol-Myers Squibb Company, Lawrenceville, NJ</td>
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<tr>
<td>John Fisher, MD</td>
<td>Founder and CEO, Biopsy Sciences Inc., Clearwater, FL</td>
</tr>
<tr>
<td>Lili Portilla, MPA</td>
<td>Director of Strategic Alliances, Office of Policy, Communications and Strategic Alliances, Office of the Director, National Center for Advancing Translational Sciences at the National Institutes of Health, Rockville, MD</td>
</tr>
<tr>
<td>Michael D. Webb, MBA</td>
<td>Chief Executive Officer, Tyrogenix Inc., Boston, MA</td>
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<td>Chief Executive Officer, Xcovery Inc., Boston, MA</td>
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<td>Thomas Wiggins, MBA</td>
<td>Former Chairman, Massachusetts Biotechnology Council. Boston, MA</td>
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<td>Chief Executive Officer and Chairman, Peplin Inc., Menlo Park, CA</td>
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</table>
accelerated drug development and optimization processes. (2) Diversity sets representing a diverse scaffold collection include: (A) 5,197 unique compounds, not commercially available, from the KU CMLD Center (Chemical Methodology and Library Development Center) synthesized within the KU CMLD Center Synthesis Core as well as ~200 legacy compounds synthesized by the KU Medicinal Chemistry Department staff; (B) ChemBridge Library (43,736 compounds); (C) ChemDiv Library (56,232 compounds); (D) Life Chemicals Inc. Diversity Subset (15,040 compounds), and (E) Orthogonally Compressed Library (OCL) collection of 104,000 compounds from The Lankenau Institute for Medical Research (LIMR) Chemical Genomics Center (LCGC). Importantly, chemoinformatics analysis has demonstrated that at least 45,000 of the 104,000 compounds from the LIMR are unique to the collection and are not represented in ChemBridge and ChemDiv diversity sets. These KU-HTS libraries have been used extensively in screening various targets and have resulted in valuable hits. (3) Bioactives Compound Library; a collection of 1902 structurally diverse and cell permeable bioactive compounds and peptides which include inhibitors, natural products and chemotherapeutic agents. (4) GreenPharma Natural product library of 480 purified, chemically diverse and drug-like compounds, a subset of much larger 150,000 natural compound structures. Compounds like amino acids, peptides, nucleic acids, long fatty chains and metals were discarded and different phytochemical families were selected carefully in order to have as many family representatives as possible. (5) Anti-Infectives Library (TimTec) includes 960 low molecular weight, drug-like molecules with scaffolds found in antiseptic agents with anti-bacterial (Gram+ve and Gram-ve), anti-fungoid, anti-microbial activities. (6) ChemDiv CNS set (26,136 compounds), compounds that can cross blood-brain barrier. (7) ChemDiv Beyond the Flatland (33,864 compounds) sp3-hybridized carbon scaffolds and (8) Life natural product like compounds (8,128 compounds) with amenable scaffold synthesis. In 2015 KUCC Laboratory for Early Stage Translational Research (LESTR) program purchased the NCI 60 human tumor cell line panel. The panel is available to cancer center researchers to identify and characterize novel compounds (natural products or synthetic) for growth inhibition anticancer activity across the entire panel. Human tumor cell lines that are represented include breast, brain, colon, kidney, leukemia, lung, and prostate. The individual cell lines are also available to expand and for HTS to perform a primary cell line screen against the selected compound libraries as well as secondary screening assays or counter screens.

Biotechnology Innovation and Optimization Center (BIOC). The Biotechnology Innovation and Optimization Center (BIOC) is approximately 5,000 sq ft composed of 7 laboratory areas and associated supporting office space on two floors of McCollum Laboratories and in the Higuchi Laboratories animal facility on KU’s West Campus. The BIOC has provided drug delivery, solubilization and stabilization services to researchers since its inception in 1989 as the Center for Drug Delivery Research. Additional services include analytical chemistry and bio-analytical method development, physical /chemical characterization of drug candidates, preparation of dose formulations, animal pharmacokinetic studies and early-stage pharmacology testing. The BIOC conducts development projects for solid oral, liquid oral, topical and injectable (lipid and lyophilized) dosage forms, including development of pediatric dosage forms. More specifically, the BIOC conducts solubility and stability screening of compounds in pH=7.4 PBS, 0.1 N HCl and a representative analytical mobile phase (50:50 acetonitrile:water) using a UV analysis. If needed, HPLC can be used for the analysis of the stability screening samples. The saturated solutions used for solubility testing are diluted to avoid precipitation problems and these diluted solutions are evaluated for the 48 hour stability evaluations. Additional pharmacology screening testing including hepatic microsomal stability, plasma stability and plasma protein binding are all conducted using validated LC/MSMS bio-analytical testing. These same LCMSMS bio-analytical methods are applied for the analysis of blood and tissue samples obtained from pharmacokinetic studies. The BIOC routinely conducts both PK screening studies and more comprehensive PK studies with mice and rats. Analysis of tissue extracts including brain tissue for blood-brain-barrier penetration studies is also available. Plasma data is evaluated using WinNonLin software for the determination of routine pharmacokinetic parameters. The major instrumentation and equipment includes fully equipped analytical laboratories containing 4 Shimadzu HPLC systems with UV, fluorescence, diode array and/or evaporative light scattering detectors. Additional analytical / bio-analytical equipment includes a Shimadzu GC, Perkin Elmer differential scanning calorimeter, a Perkin Elmer TGA7 thermogravimetric analyzer, a Varian UV/Vis spectrophotometer and two Applied Biosystems Sciex 3200 LC-MS/MS systems. In the formulation laboratories, we have a Glatt Air Technologies UniGlatt fluid bed coater / drier, a Retsch mill, a Turbula shaker/mixer, a Stokes instrumented tablet press, a NicaSystem AB extruder, a Luwa Model QJ-320 maunurerizer , a Vitriss Genesis tray lyophilizer and several isolation glove boxes for hazardous chemicals. The staff at the BIOC (8 people) is a mixture of formulators, analytical and bio-analytical chemists, and preclinical /
pharmacokinetic specialists with many years of pharma industry, CRO and academic research experience. Approximately half of the staff have Ph.D. degrees and the remaining half have either MS or BS/BA degrees. The mix of expertise, experience and equipment provide for a unique capability and the ability to handle projects quickly and efficiently.

**Medicinal Chemistry:** The **Medicinal Chemistry** function is led by Frank Schoenen, Ph.D., a synthetic organic chemist, with 15 years’ experience as Medicinal Chemist and Manager at GlaxoSmithKline (GSK) and as Vice President at Nuada Pharmaceuticals, working in the inflammation and cancer therapeutic areas, and in high-throughput chemistry at the early stages of drug discovery. In 2005, Schoenen joined the University of Kansas (KU) Chemical Methodologies and Library Development Center as the Associate Director for the Administrative Core and the Director for the Synthesis Core, where he was responsible for imagining, creating, and operating high-functioning compound-library construction, library design, analysis & purification, and compound management cores, and for directing the synthesis and distribution of thousands of compounds to academic, government, and private-sector biological collaborators throughout the world. This led naturally in 2008 to his position as Associate Director, Project Manager, and Chemistry Team Leader for the KU Specialized Chemistry Center, one of only two laboratories funded by the National Institutes of Health (NIH) Molecular Libraries Probe Production Centers Network (MLPCN) to support synthesis and medicinal chemistry aspects of hit-to-probe optimization. In these roles, Schoenen provided scientific leadership and management for a diverse portfolio of over 40 MLPCN projects leading to 23 probe compounds. Currently, Schoenen is Associate Research Professor in the Higuchi Biosciences Center at the University of Kansas, and Medicinal Chemist on the Target Acceleration Group sponsored by the D3ET within the KUCC. Schoenen brings expertise to consultations and collaborations with KUCC members including compound screening collection building, chemical tools for biological target identification, compound identity and purity quality control, identification of Pan Assay Interference (PAINS) and PubChem Promiscuity compounds, compound physicochemical property assessment, compound and biological data deposition to PubChem, compound scale-up for *in vivo* studies, identification of commercial sources for compound sample purchase, identification of contract research organizations for compound scale-up, hit confirmation and prioritization, hit-to-probe optimization, probe-to-lead optimization, lead-to-preclinical-candidate optimization and preclinical-candidate to clinical-candidate optimization. In June 2008, the KU Chemical Methodologies and Library Development Center (CMLDC) moved into new laboratories in the Delbert M. Shankel Structural Biology Center (SBC) on the University of Kansas West Campus. Schoenen operates within the KU CMLD Center, directed by Professor Thomas E. Prisinzano, which has all of the laboratory space required to support the medicinal chemistry activities of the LDOSR. In addition to the facilities available to the Schoenen team for synthesis and medicinal chemistry, the CMLD Center contains a number of core laboratories which perform specialized functions, and all of these facilities are available for use on the present grant on a shared basis. Schoenen’s office is located adjacent to the CMLDC labs in the SBC building.

**Patenting, Marketing, Licensing.** The product development-focused translational research methods and processes established by IAMI to develop and demonstrate medical innovation technologies are novel and unique in the context of the larger KU research portfolio. To support IAMI in its execution of medical innovation projects, a Memorandum of Understanding (MOU) between IAMI and the University of Kansas Innovation and Collaboration organization (KUIC) was established in August 2014. Specific to medical innovation projects receiving IAMI investment, the MOU defines the roles and responsibilities of KUIC and IAMI in developing and executing patenting, marketing and licensing strategies. Unique to IAMI is its for-profit partner, BioNovus Innovations LLC. A group of Kansas City investors and community leaders recognized the value of this Frontiers core to the region. The investors also recognized the challenges IAMI faced in finding private sector partners with the resources and expertise necessary to further develop, demonstrate and disseminate promising medical innovations de-risked by IAMI. As a result, the investors formed BioNovus Innovations LLC in 2015. Through a preferred partnership agreement, IAMI and BioNovus jointly invest in promising projects with IAMI’s partner granted an exclusive to exercise pre-negotiated licensing terms.

**Clinical Pharmacology.** IAMI uses the Clinical Pharmacology Core, directed by Dr. Gregory Reed, professor in the Department of Pharmacology, Toxicology and Therapeutics, KUMC, to support clinical proof of concept studies evaluating drug and diagnostic technologies advanced to patients. Located in the Clinical Research Center on the Fairway campus of KUMC, the Bioanalytical Core provides GLP bioanalysis support to early phase clinical trials. The bioanalytical core is equipped with: Shimadzu LC-20-Waters Quattro
Premier LC-MS/MS, Waters Acquity -Quattro Premier XE UPLC-MS/MS, Shimadzu LC-20 binary gradient HPLC system, with UV, fluorescence, and radiometric detectors, auto sampler, and column oven and Shimadzu VP-Chrom computer-based data acquisition and data processing system; Agilent 6890N gas chromatograph with FID and ECD detectors. The core develops and validates bioanalytical methods to quantify drug and metabolites in biological matrices as well as biochemical-based biomarkers. The core provides design support to early phase clinical trials including biological sample sampling schemes, sample collection, processing, storage and shipment requirements, as well as pharmacokinetic and pharmacodynamics data analysis. Clinical Pharmacology works closely with the BIO Center to seamlessly and efficiently transfer validated bioanalytical methods from animal to human matrices. Parametric and non-parametric pharmacokinetic data analysis is performed using WINNONLIN™ software.

Regional Resources. The Ewing Marion Kauffman Foundation (KF), headquartered in Kansas City, MO, is one of the largest private foundations in the US with an asset base of approximately $2B. Founded by the late founder of Marion Laboratories, Inc., Ewing Kauffman, the Foundation’s vision is to foster a society of economically independent individuals who are engaged citizens in their communities. Consistent with the Kauffman Foundation’s investment in IAMI, they treat the Kansas City region as a program incubator where feasible, in which new approaches can be tried and tested before being disseminated nationally. The Foundation believes entrepreneurs are critical to the long-term health of our economy. Several of their programs advance entrepreneurship education and training, promote “start-up friendly” policies, and expand understanding of what new firms need. Nationally recognized entrepreneurship programs notably Founders School, FastTrac, and 1 Million Cups are proven education models developed and implemented by KF in select metropolitan areas across the US. The Foundation has been and continues to be an outstanding resource for Frontiers. IAMI leverages a wealth of contract research resources available in the Kansas City region organized as BioResearch Central. BioResearch Central is home to the 15th largest concentration of contract research organizations, who collectively employ 20,000 contract researchers working for over 200 companies, spending >$1.8B. With the majority of these firms tying back to the pharmaceutical company founded by Ewing Kauffman, Marion Laboratories, Inc., the breadth of services IAMI has access to include discovery, toxicology, bioanalysis, clinical trials, regulatory, and commercial support.
FRONTIERS KL2 INSTITUTIONAL CAREER DEVELOPMENT FACILITIES AND RESOURCES

**Frontiers Resources.** Frontiers has an impressive array of resources available to achieve its aims of engaging stakeholders, creating a sustainable translational research workforce and strengthening infrastructure to accelerate translational research. We draw on the considerable strengths of the University of Kansas Medical Center (Kansas City and Wichita campuses), the University of Missouri-Kansas City, Children’s Mercy Kansas City, and the Kansas City University of Medicine and Biosciences. In addition, we take advantage of a strong history of entrepreneurship investment in the Kansas City region (e.g., the Ewing Marion Kauffman Foundation, the UMKC Regnier Institute for Entrepreneurship and Innovation, the Kansas City Area Life Sciences Institute and the KU Innovation and Collaboration Center) to leverage drug, device, diagnostic, medical device and population health product development to achieve faster success. We have a plethora of community organizations, clinics, and providers across the region willing and excited to collaborate with Frontiers investigators, experts in entrepreneurship who will lead and train the next generation of successful business developers in the biomedical sciences and a growing cadre of team science-trained teams to work in emerging lifespan clinical and translational research. Together these institutions and resources provide the necessary research faculty, administrative staff, office and meeting space, educational technology and the research administration support necessary to successfully implement the Frontiers proposed KL2 Institutional Career Development Program.

UNIVERSITY OF KANSAS MEDICAL CENTER

**Overview.** The University of Kansas School of Medicine is a public medical school located on the University of Kansas Medical Center campuses in Kansas City, Kansas, Salina, Kansas, and Wichita, Kansas. The Kansas City campus is co-located with the independent University of Kansas Hospital.

Founded in 1905, the University of Kansas Medical Center (KUMC) now spans 50 acres within metropolitan Kansas City and includes extensive research and clinical facilities. (Figure FR-KL2.1.) KUMC has the ultimate objective of improving the quality and availability of health care in Kansas and the greater Kansas City area by providing research in the health sciences, educational programs for health care professionals, and clinical services for patients. The University of Kansas Hospital is a tertiary care facility serving patients from across the region (Kansas, Missouri, Oklahoma, Arkansas, and Nebraska). The KU Hospital has patient satisfaction ratings well above national means and is a nationally recognized biomedical research center with many academic programs ranking among the best in the nation.

**KUMC Clinical Facilities and Outreach** KU Hospital is equipped with over 500 beds and staffed to care for the approximately 25,000 inpatients admitted and approximately 550,000 outpatients each year. It is designated as Level 1 Trauma Center which serves over 350,000 outpatients annually, offering a variety of specialized treatments to provide comprehensive care to its patients. Among the specialized services are those offered through the Center for Advanced Heart Care, the Mid-America Radiation Center, the KU Cancer Center, the Bloch Cancer Care Pavilion, the Hoglund Brain Imaging Center, the Asher Comprehensive Spine Center, the Burnett Burn Center, the Sutherland Institute, the Epilepsy Center, the Diabetes Education and
Physician practices represent more than 200 specialty areas, including kidney transplant surgery, renal dialysis, treatment of polycystic kidney disease, the only liver transplant program in the region, sterile environments for bone marrow transplant patients and other patients whose immune systems are not functioning properly, a state-of-the-art facility for delicate facial and body reconstruction surgery services, hyperbaric oxygen therapy, comprehensive cardiology care, arthritis clinics with immunology specialists, medical and surgical treatments for epilepsy, specialized neurology programs for the treatment of multiple sclerosis and headaches as well as Parkinson’s and Alzheimer’s disease, and comprehensive gynecologic and obstetrics services for problem pregnancies with an intensive care nursery for premature and sick newborns. Additionally, comprehensive rehabilitation services and psychiatric services are offered on both an inpatient and outpatient basis.

**University of Kansas Hospital.** University of Kansas Hospital (Figure FR-KL2.2) in Kansas City, KS is ranked nationally in 11 adult specialties. It was also high-performing in 1 adult specialty. University of Kansas Hospital is a 713-bed general medical and surgical facility with 27,380 admissions in the most recent year reported. It performed 10,124 annual inpatient and 8,743 outpatient surgeries. Its emergency room had 47,771 visits. University of Kansas Hospital is a teaching hospital. It is also accredited by the Commission on Accreditation of Rehabilitation Facilities (CARF).

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Gender</th>
<th>Race</th>
<th>Race %</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-9 years old</td>
<td>Male 57.20%</td>
<td>American Indian or Alaskan Native</td>
<td>0.4%</td>
</tr>
<tr>
<td></td>
<td>Female 47.80%</td>
<td>Asian</td>
<td>2.7%</td>
</tr>
<tr>
<td>10-17 years old</td>
<td>Total 100%</td>
<td>Black or African American</td>
<td>9.1%</td>
</tr>
<tr>
<td>18-34 years old</td>
<td>Total 100%</td>
<td>Native Hawaiian/Other Pacific Islander</td>
<td>0.1%</td>
</tr>
<tr>
<td>35-44 years old</td>
<td>Total 100%</td>
<td>Two races</td>
<td>1.3%</td>
</tr>
<tr>
<td>45-54 years old</td>
<td>Total 100%</td>
<td>White or Caucasian</td>
<td>86.4%</td>
</tr>
<tr>
<td>55-64 years old</td>
<td>Total 100%</td>
<td>Total</td>
<td>100.0%</td>
</tr>
<tr>
<td>65-74 years old</td>
<td>Total 100%</td>
<td>KUMC RESEARCH ENVIRONMENT</td>
<td></td>
</tr>
<tr>
<td>75-84 years old</td>
<td>Total 100%</td>
<td>KUMC RESEARCH ENVIRONMENT</td>
<td></td>
</tr>
<tr>
<td>85 and older</td>
<td>Total 100%</td>
<td>KUMC RESEARCH ENVIRONMENT</td>
<td></td>
</tr>
<tr>
<td>Grand Total</td>
<td>Total 100%</td>
<td>KUMC RESEARCH ENVIRONMENT</td>
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</tbody>
</table>
The research enterprise at KUMC has expanded recently, with the construction of a 5-floor, 200,000 sq.ft. research building, and newly renovated space for the Kidney Institute and KU Cancer Center. Excellent support facilities exist, including an outstanding Transgenic and Gene-Targeting Institutional Facility (TGIF), a Biotechnology Support Facility (next generation DNA sequencing, RNA-Seq, microarray, and bioinformatics), and two Laboratory Animal Resources Facilities. The medical center also provides a number of other shared resource facilities for electron microscopy, histology, flow cytometry, proteomics and mass spectrometry, biostatistics, and drug development. Users of the biomedical research cores will have access to the following institutional cores and shared resource facilities located on the KUMC or KU-Lawrence campus. This rich and supportive research environment is also home to a number of research centers and institutes as well as research support services.

**RESEARCH ADMINISTRATION**

**KUMC Research Institute** Established in 1992, the KUMC Research Institute (RI) serves as the recipient of all grants and contracts to and with KUMC and assists with the research activities of KUMC faculty. Frontiers’ Regulatory Knowledge Support is housed within the RI, a private, not-for-profit 501(c)(3) corporation. The RI fosters individual partnerships between KUMC researchers and the private sector, enhances revenue to researchers and the University through the transfer of research discoveries and other information to the private sector, and facilitates a cooperative and profitable interaction between KUMC and corporations throughout Kansas, the greater Kansas City Metropolitan area, domestically and internationally. The Research Institute employs more than 50 staff members. Research Institute divisions are: Sponsored Programs Administration; Clinical Research Administration unit; Office of Legal Services; and Financial Services.

The KUMC RI is led by Jamie Caldwell (Executive Director) and Dr. Richard Barohn (President) (Figure FR-O.3). Table FR-O.2 displays the most recent statistics for research income from various sources to KUMC through the Research Institute.

<p>| Table FR-O.2 |</p>
<table>
<thead>
<tr>
<th>Research Activities for FY 2013/14 - FY 2014/15</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY 2013/14</td>
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<tr>
<td>-----------------</td>
</tr>
<tr>
<td>KUMC Research Institute Managed</td>
</tr>
<tr>
<td>Grants</td>
</tr>
<tr>
<td>Clinical Trials</td>
</tr>
<tr>
<td>Other Sources of Extramural Funding</td>
</tr>
<tr>
<td>Total of All Awards</td>
</tr>
</tbody>
</table>
**RI Sponsored Programs Administration (SPA).** The primary responsibility of SPA is to facilitate the research-related activities of all Schools within KUMC and to serve as a resource for the research faculty during all aspects of their research. SPA assists faculty and staff in acquiring extramural support in research, education and service projects and is responsible for post award administration of contracts and grants awarded to KUMC to ensure that these projects are conducted in compliance with federal and state regulations, university policies and commitments specified in grants, contracts and other agreements with external sponsors.

**RI Office of Legal Affairs.** The KUMC RI, located within a few minute drive from the main KUMC campus, is in a building across the street from the KU Clinical Research Center (Figure FR-KL2.4). The KUMC RI encourages relationships with the corporate sector and has participated in a wide variety of written agreements related to pre-clinical and clinical research. The Office of Legal Affairs will either review the contract provided by the company or initiate a contract based on the standard Research Institute Clinical Trials Agreement. The Research Institute negotiates master agreements with companies who place multiple clinical trials at the Research Institute. The Office of Legal Affairs provides rapid turn-around times on contract completion as well as consultation regarding any other legal issues related to research. Services include reviewing and negotiating:

- Clinical Trial Agreements
- Confidential Disclosure Agreements
- Fee-for-Service Agreements
- Grant Agreements (Federal and Privately Funded)
- License Agreements
- Material Transfer Agreements
- Sponsored Research Agreements
- Subcontract Agreements

**RI Clinical Research Administration (CRA)** Clinical Research Administration is the central liaison between the funding agency, Institutional Review Board and principal investigators at KUMC. The CRA markets KUMC to potential research sponsors, receives and manages protocol initiation, and provides ongoing administrative support to ensure timely and cost-effective completion of clinical trials. Clinical Research Administration services include:

Pre-Initiation
Attend, if requested by study staff, site evaluation visits to answer institutional questions on study processing and activation time

Serve as centralized contact between sponsors and the study staff for all clinical trial, regulatory, administrative, and budget and contract work at the University of Kansas Medical Center

Provide protocol development support for investigators

Prepare consent form for investigator's review

Secure Human Subjects Committee approval of protocol and consent form

File regulatory documents required by FDA and sponsor

Prepare and negotiate trial budgets

Request pricing for hospital and clinical services

Review and negotiate clinical trial and data use agreements

Notify investigator and sponsor of final HSC approval

Prepare and submit initial IND documents, amendment and annual progress reports for IND

Post-Initiation

Secure HSC approval of protocol revisions and revised consent forms

Obtain HSC approval for print or media advertising

Process internal adverse events and IND safety reports for HSC submission and approval

Provide status reports of each investigator's trials as requested

Submit reports to HSC for annual re-certification of trials

Coordinate ongoing communication between sponsor and investigator

Revise and negotiate budget and clinical trial agreements

Study Closure

Process study closure for trial termination

Complete reconciliation documents for trial account closure

Quality Improvement for Clinical Research

In conjunction with the Office of Compliance, conduct quality improvement visits [QIV]

Education Opportunities

Host and organize Clinical Trial Education Lecture (CTEL) series on a monthly basis

Provide training workshops (CTEC) for investigators and study coordinators

Meet with physicians and study coordinators to review Research Institute services

Provide new study coordinator/research nurse orientation

Facilitate coordinator certification, networking and educational opportunities
KUMC Office of Compliance. The major responsibility of this office is to assure the highest standards of excellence and integrity in all its research endeavors, and to promote ethical conduct of research through proactive mechanisms such as education and outreach; established policies and procedures for institutional and individual accountability; assessment, monitoring, auditing and reporting; and institutional oversight committees.

❖ KUMC Human Research Protection Program. In 2004, KUMC developed a comprehensive Human Research Protection Program (HRPP) that is designed to ensure the rights, safety and welfare of all subjects recruited or enrolled in research projects, regardless of funding source. The program supports weekly IRB meetings on the Kansas City Campus and monthly meetings on the Wichita campus. AAHRPP accreditation has been maintained since 2007. The program oversees the institutional review process and coordinates ancillary reviews with radiation safety, biosafety, HIPAA, conflicts of interest, and data security. To support efficient review, the IRB application identifies not only key elements necessary for IRB review but also captures information that supports the ancillary reviews. Streamlining of compliance functions occurs through cross-membership on the various committees and a parallel review process.

KUMC Grants and Awards. In fiscal year 2015, extramural expenditures for KU Medical Center totaled $108 million. Of that amount NIH expenditures were more than $57 million. Among our successful grants and contracts to date we include:

❖ Frontiers Clinical and Translational Sciences Award (2011), $20 million, NIH
❖ Alzheimer’s Disease Research Center (2016, second renewal), $8.75 million, NIH
❖ NCI-Designated Cancer Center, $7.5 million (NIH)
❖ Midwestern Collaborative for Treating Obesity in Rural Primary Care, $10 million (PCORI)
❖ Greater Plains Collaborative, $15.6 million (PCORI; 2 contracts)
❖ Kansas IDeA Network for Biomedical Research Excellence: $19 million, NIH
❖ Kansas Intellectual and Developmental Disabilities Research Center: $5.5 million NICHD

Frontiers Research Gateway. The Frontiers Research Gateway is a web-based resource to provide all Frontiers investigators with helpful tips and information to enable them to conduct their research. The webpages provide information ranging from generating research ideas to seeking extra-mural funding to executing research projects. Divided into four sections – Study Development, Study Initiation, Conducting a Study, and Study Close-Out – the Gateway walks investigators through the overall research process and breaks down that process with detailed steps. Those steps are supplemented with specific information on how Frontiers can help. The Research Gateway was developed by the Frontiers Administration team in 2013 with input from investigators who shared their experiences in navigating the research process and with the Frontiers website team. The webpages of the Gateway contain many useful links that researches frequently need and find useful. (www.frontiersresearch.org/frontiers/research-gateway)

Frontiers IRB Reciprocity. In 2013, Frontiers partner institutions, including University of Kansas Medical Center, University of Missouri–Kansas City, Children’s Mercy Kansas City, and University of Medicine and Biosciences entered into an IRB reciprocity agreement. Typically a research project involving partners from these institutions will only need one IRB review. Detailed instructions on how to initiate an IRB application with reciprocity are found on the Frontiers website (http://frontiersresearch.org/frontiers/IRB-reciprocity).

We have gained considerable experience by creating and participating in IRB consortia that positions the Frontiers program to deliver efficient implementation for regional and national multi-center trials. Frontiers institutions developed and implemented regional IRB reciprocal processes across all our affiliated institutions
early in the third year of our initial CTSA funding. When our PCORnet GPC was funded we leveraged this regional experience to establish reliance agreements at 12 GPC sites. Our experience with using single IRB models includes central IRBs, deferred reciprocal models, and shared review models. We are members of IRBShare, and most recently we were invited to participate in the pilot phase of the NCATS IRB Reliance Initiative (NIRI). Efficiencies gained through single IRB models like IRB reciprocity are further enhanced and complemented by our experiences with streamlined approaches for master agreements and budgets (e.g., NeuroNEXT, StrokeNet, Neonatal Research Network), our PCORnet CDRN sub-awards, and multiple master agreements with external sponsors. We have a great deal of experience both leading multicenter trials involving CTSA hubs and other sites and being a part of such trials led by others.

**KUMC Electronic IRB submissions.** Since 2013, all proposals to the KUMC IRB are submitted through our electronic IRB system (eIRB) using Huron’s Click IRB7. Our eIRB automates all aspects of submission, routing, review and approval for the entire lifecycle of the project. The system supports compliance by serving as the repository for all IRB-approved documents and by tracking human subjects training and current conflict of interest disclosures. For research conducted under a central IRB or other reliance mechanism, eIRB delivers a truncated application process that allows investigators to register their study and upload the approval of the reviewing IRB.

**KU Health System and Research Institute Steering Committee and Sub-Committees.** In an effort to improve communications and processes across the KU Health System and the Research Enterprise, a collaborative group has been created to improve clinical and translational research that occurs in the KU Hospital setting. This process was started by Dr. Barohn after he became Vice Chancellor for Research. He asked Dr. Ator, the KU Hospital Chief Information Officer to co-chair the steering committee. The steering committee and workgroups are composed of members from KUMC, KU Hospital, and KU Physicians, Inc. A number of workgroups meet regularly and report to the steering committee chaired by Drs. Barohn and Ator. Drs. Barohn and Ator then report final recommendations to the Executive Vice chancellor, Dr. Girod, and the Hospital CEO, Mr. Page for endorsement.

**Full Steering Committee**

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
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</thead>
<tbody>
<tr>
<td>Greg Ator (Steering Committee co-chair)</td>
<td>Joseph McGuirk</td>
</tr>
<tr>
<td>Rick Barohn (Steering Committee co-chair)</td>
<td>Tamara McMahon</td>
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<tr>
<td>Debra Brogden (Committee Support)</td>
<td>Seamus Murphy</td>
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<tr>
<td>Karen Blackwell</td>
<td>Andrea Nicol</td>
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<tr>
<td>Marge Bott</td>
<td>Dinesh Pal Mudaranthakam</td>
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<tr>
<td>Jamie Caldwell</td>
<td>Jeff Reene</td>
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<tr>
<td>Chad Cannon</td>
<td>Michael Rippee</td>
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<tr>
<td>Carol Cleek</td>
<td>David Robbins</td>
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<tr>
<td>Mazen Dimachkie</td>
<td>Marilyn Rymer</td>
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<tr>
<td>Ed Ellerbeck</td>
<td>Steve Simpson</td>
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<tr>
<td>Peter Griffith</td>
<td>Peter Smith</td>
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<tr>
<td>Chris Hansen</td>
<td>Jim Vacek</td>
</tr>
<tr>
<td>Lisa Hoebelheinrich</td>
<td>Russ Waitman and/or Tamara McMahon</td>
</tr>
<tr>
<td>Patty Kluding</td>
<td>Dawn Walters</td>
</tr>
</tbody>
</table>
Colette Lasack                      Susanne Welborn
Bill Marting                        Steve Williamson
Matt Mayo and/or Brooke Fridley    Jeff Wright

**Research Revenue Cycle / Research Clinical System Operations (Inpatient/Outpatient Research)** The purpose of this subcommittee is to improve efficiencies in patient billing and invoicing by determining whether it was research versus routine or standard of care.

Workgroup Support: Shawn Fapp

Jamie Caldwell (co-chair)            Chris Mackay
Colette Lasack (co-chair)            Dinesh pal Mudaranthakam
Greg Ator                            Seamus Murphy
Angie Ballew                         Caroline Murray
Ethan Carter                         Ted Noravong
Carol Cleek                          Marilyn Rymer
Kelly Daniels                        Debra Seyfried
Rolina Everett                       Reta Studnicka
Dhanunjaya Lakkireddy                Peter Tadros
Barbara MacArthur                    Sue Welborn

**Personnel & Access to O2 / Consent Form/Patient Identification**

Workgroup Support: Kelly Robertson   Theresa Jackson
Peter Griffith (co-chair)            Bart Lindsley
Greg Ator (co-chair)                 Joe McGuirk
Hobs Apell                          Seamus Murphy
Sandra Bergquist-Beringer            Caroline Murray
Marge Bott                          Dineshpal Mudaranthakam
Jamie Caldwell                       Trish Palmer
Melinda Clark                       David Robbins
Carol Cleek                         Debra Seyfried
Mazen Dimachkie (co-chair)           Bob Spaniol
Rolina Everett                      Reta Studnicka
Susie Farkas                        Karen Tevault
Ensley Fleming (ECG)                 Sue Thomas
Laura Herbelin                      Sue Welborn
Angella Herrman                     Steve Williamson (co-chair)
Brad House II                       Jennifer Wilson

**Recruiting Subjects via the Electronic Medical Record (EMR)** The purpose of this subcommittee is to determine the best method of identifying study participants using the electronic medical record.
Workgroup Support:  Debra Brogden          Matt Mayo
Tamara McMahon (co-chair)         Joe McGuirk
Dineshpal Mudaranthakam (co-chair)   Kieran Pemberton
Bhargav Adagarla                  Kevin Smilor
Hobs Apell                        Carol Smith
Greg Ator                         Bob Spaniol
Susie Farkas                      Terry Tsue
Peter Griffith                    Jeff Wright
Brad House

Frontiers Affiliate Regulatory Committee Comprised of regulatory representatives and officials from Frontiers partners and affiliates, this consortium-wide group was established to address regulatory hurdles affecting Frontiers research. The Committee divided into smaller groups to address specific issues: IRB Reciprocity Subcommittee, RB Forms Subcommittee, Conflict of Interest Subcommittee, and Training Subcommittee. These groups held numerous meetings over many months, resulting in Frontiers-wide regulatory efficiencies, including IRB reciprocity among KUMC, KU-Wichita, Children’s Mercy, Truman Medical Centers, University of Missouri-Kansas City, and St. Luke’s Health System.

PHYSICAL INFRASTRUCTURE
The Hemenway Life Sciences Innovation Center (2007; Figure FR-KL2.5) is a $58-million, 200,000 ft² facility that houses 300 people and more than 125 research projects focusing on cancer, liver disease, reproductive and developmental sciences, neuroscience, diabetes and proteomics. This serves as home to all KIDDRC cores at KUMC, and nearly all members of Themes 3 and 4.

The Wahl/Hixon Research Complex (2011) is a $26.4-million renovation of an existing building that will create new space devoted entirely to cancer research.

The Health Education Building (groundbreaking 2015) will be a new 171,000 ft² facility that will become the face of the KU Medical Center campus to accommodate modern learning and facilitate the education of a greater number of physicians, nurses and allied health care professionals to address critical health care worker shortages in Kansas.

The University of Kansas Hospital is building an additional hospital tower north of the main campus. The 300,000 ft² Cambridge North Tower will expand access to healthcare in Kansas City and be home to highly specialized surgical services for oncology, neurosciences and otolaryngology. Cambridge North is expected to be completed in late 2017.

Figure FR-KL2.5 Hemenway Life Sciences Innovation Center
University of Kansas Information Technology at the University of Kansas Medical Center, Information Resources (IR) provides researchers and faculty with critical technology infrastructure, as well as technical services and support. Recent technology improvements and relevant services include:

- KUMC made several large commitments to ensure a robust and secure network and storage including: a $3.4M Network Infrastructure Upgrade to bring 1GB bandwidth to all desktops, improve wireless coverage throughout the campus; a $2.5M Research and Employee File-Level Storage Expansion, providing long-term storage via expandable one-petabyte NAS with additional backend storage for backups; and, $2.4M for Information Security Architecture Improvements.
- Acellion Secure File Transfer service allows researchers to securely send and receive large files from colleagues at KUMC and/or external recipients.
- Proofpoint secure email is an encrypted messaging system that works seamlessly with the Medical Center's existing email system. Secure email gateways encrypt email as it leaves the University's private networks and heads out onto the Internet.
- The Barracuda Spam Firewall system has been expanded to further reduce SPAM e-mail messages, virus attachments, and phishing attacks aimed at compromising our researchers.
- SharePoint is a browser-based collaboration platform that includes document management, workflow management, and social networking.
- Researchers can securely collaborate in real-time with both video (Polycom) and web (Adobe Connect) conferencing.
- IT policies and procedures are being reviewed and updated to ensure that our research mission is well protected and situated to remain competitive in the marketplace.
- Portable electronic device theft tracking and recovery options have been expanded to ensure that our research data is protected while at rest, while in transit, and if lost or stolen.

KUMC Department of Biostatistics. The Department of Biostatistics occupies 6834 ft² of contiguous office space at the University of Kansas Medical Center located on the ground and 5th floors of the Robinson building as well as the 5th floor of the adjacent Wescoe building. This includes 20 lockable offices, two conference rooms and cubical spaces that can house up to 26 staff/students. The Department of Biostatistics personnel consists of 13 biostatistics faculty members, 2 teaching associates, 4 research analysts, 4 information specialist personnel, 1 project manager, 2 administrators, and 1 administrative assistant.

KUMC BERD Computer Resources

Hardware. Shared high speed workstation with dual Xeon 3.40 GHz processor, 8 GB of SDRAM, over 500GB of high speed storage, digital tape backup, and a DVD read/write drive. 34 HP Intel Core i5 CPU @ 3.40 GHz processor, 16 GB of SDRAM, over 800GB of high speed storage; 4 HP Intel Core i7 CPU @ 3.60 GHz processor with 32 GB of SDRAM along with 1 TB hard drive.

Networking/Internet and Servers HP PowerEdge 4600 file server with a 3.6GHz Xeon CPU, 8GB of DDR SDRAM, six 18GB SCSI Hard Drives in a RAID 5 configuration, 200GB digital tape backup system. Internet Explorer 11; Microsoft Outlook email; Internet 2 access through KUMC's LAN. The Department also has 14 windows 2008 R2 virtual servers - with dual Xeon processors, 8 GB SDRAM and over 240 GB of storage area ; 5 windows 2012 R2 virtual servers - with dual Xeon processors, 16 GB SDRAM and over 320 GB of storage area; 1 SUSE Linux server Quad core processor, 8 GB SDRAM. An HP PowerVault tape backup is also located in the server room along with a cooling system to maintain optimal conditions for optimal server performance. Tape backups are performed daily on modified data and full tape backups are performed weekly and stored off-site for 9 weeks.

KUMC Velos eResearch Velos eResearch supports patient recruitment, patient scheduling, study monitoring, project planning, study design, protocol compliance, budget, invoicing, and milestone management, data safety monitoring, adverse event reporting, system integration and study execution.

Velos was designed from the ground up to support both study administration and clinical data management. This type of design is fundamental to Velos’ customer service abilities to solve customers’ research, information and coordination challenges. Key features are:

STUDY ADMINISTRATION
- Protocol management
- Patient scheduling
- Regulatory reporting
- Adverse event management and reporting
- Budgeting, milestones, invoice, and payment/receipts processing
- Management of research organizations, personnel, and collaborators

CLINICAL DATA MANAGEMENT
- Patient profiling
- Longitudinal, patient-level information collection and analysis
- Study-specific data collection and analysis
- Workflow configuration
- Integration with internal and third party information systems

Some other notable strengths of Velos eResearch are:
- An advanced, carefully considered commercially available clinical research information system.
- Velos was designed to provide off-the-shelf support for all of study administration, clinical data management, adverse event reporting, and integration with internal and third party cancer center systems through one integrally-designed system.
- The ability to add, modify, and apply study- and customer-specific data dictionaries with minimal technical involvement.
- HL7 compliance. Velos already has dozens of working laboratory, medical record, and device interfaces that are already in production.
- Compliance with industry standards (such as CFR11) and a commitment to supporting standards that foster higher collaboration. Velos is active in and supportive of government initiatives intended to foster greater collaboration among researchers (example FDA funded studies).
- Patient-level of study-level system architecture. Most research systems were primarily designed for research sponsors and focus on the needs of single studies. The system architecture to support research sites well is quite different and must consider both patient- and study-level views and also integrate the two.
- Advanced technology and security features to support multi-institutional, cooperative trials, community-based research and patient self-reporting, in a single environment.

Through these capabilities, Velos helps effect a paradigm shift from the current sponsor-centric clinical research information model to one that is investigator-centric. In doing so, Velos believes it can help its customers, and the research community in general, unleash tremendous improvements in research productivity, collaboration, and, ultimately, patient care.
KUMC Division of Medical Informatics and Office of Enterprise Analytics (TICS). The Division of Medical Informatics (MI) provides capabilities and expertise for clinical investigators and other health professionals in software engineering, data warehousing, data management and administration of clinical trial and electronic data capture systems. MI works with internal and external partners for consultation, training and access to tools enabling research data collection. MI tools and resources include:

- **HERON**: The Healthcare Enterprise Repository for Ontological Narration (HERON) is a method to integrate clinical and biomedical data for translational research. The MI team has distributed the open-source HERON framework to collaborators using the i2b2 (Informatics for Integrating Biology and the Bedside) software and have leveraged other open source environments to increase data transparency and reusability.

- **REDCap**: REDCap is used by more than 700 institutions in over 60 countries and has become a dominant tool for electronic data capture for research studies at most academic medical centers in the United States.

The Office of Enterprise Analytics (EA) provides business intelligence and other analytical support for planning and decision-making at KUMC, and serves as the source for official data.

EA manages and develops online reports within a QlikView environment, distributed to departments and upper management via a secure Access Point. Currently, EA offers reports on finance, payroll, commitments, and extramural research (summary and detail reports, research efforts), as well as reports designed for executives at the Medical Center (e.g. All Sources/All Spends). The EA staff possesses enhanced skills in data mining, analysis, and reporting, with backgrounds in academics, data management, finance and accounting, and application development.

Together, the Division of Medical Informatics and the Office of Enterprise Analytics occupy a total of 4,228 ft² on the third floor of the Student Center: Medical Informatics occupies 2,276 ft²; Enterprise Analytics occupies 1,055 ft²; and both departments share 897 ft².
The University of Kansas Cancer Center. The University of Kansas Cancer Center earned National Cancer Institute (NCI) designation in June 2012 (P30 CA168524). KU Cancer Center operates as a matrix organization and includes: the University of Kansas Medical Center (KUMC) campuses in Kansas City, Wichita and Salina, the University of Kansas in Lawrence (KU-Lawrence) and its School of Pharmacy, The University of Kansas Hospital, the Stowers Institute for Medical Research, and Children's Mercy.

Currently, there are 345 KU Cancer Center members in four research programs: Cancer Biology, Cancer Control & Population Health, Drug Discovery, Delivery, and Experimental Therapeutics, and Cancer Prevention & Survivorship. These scientists use more than 85,000 ft² of laboratory space across campus and an additional 22,000 ft² of office space. The total KUMC research laboratory space is more than 400,000 ft².

Our KU Cancer Center researchers grew federal funding 28% in fiscal year 2015, competing successfully against other prominent research institutions. KU Cancer Center researchers currently have more than 600 published papers, 75 NCI-funded studies and $69.8 million in extramural funding from government, private and national philanthropic organizations.

KU Cancer Center provides financial and administrative support for six shared resources: Biospecimen, Biostatistics and Informatics, Lead Development & Optimization, Transgenic and Gene-Targeting, Health Communications Research, and Clinical Pharmacology. These shared resources are fully equipped to provide KU Cancer Center investigators with access to state-of-the-art research technology, equipment, and technical support that would otherwise be too difficult or expensive for individual investigators or programs to develop. KU Cancer Center shared resources occupy more than 20,000 ft² of space located in a number of facilities on the KUMC campus, the KU Lawrence west campus, The University of Kansas Hospital's Westwood campus, and the University of Kansas Clinical Research Center.

The mission of our PKD Center is to promote research leading to a better understanding of PKD through the discovery of therapy targets and development of clinical trials to improve patient outcomes. The National Institute of Diabetes and Digestive and Kidney Diseases at the NIH awarded the Kansas PKD Center a five-year Center Grant (P30 DK106912) that provides $5.4 million in funding to support our innovative biomedical research cores and a robust pilot and feasibility program. The PKD Center is comprised of four cores: Gene Targeting, Epigenetics, Biomarkers, and Clinical Research.
**KUMC Kansas Intellectual and Developmental Disabilities Research Center.** The Kansas Intellectual and Developmental Disabilities Research Center (KIDDRC) has been funded by the National Institute of Health and Human Development for the past 45 years (as P30 HD002528). Our recent renewal application (now U54 HD090216) scored well (23) and was recommended for funding for its 50-54th year to the NICHD Advisory Council in August 2016. Throughout its history, the KIDDRC has played a major role in elucidating the causes, prevention and treatment of intellectual disabilities and related secondary conditions. The center brings together researchers from the KU-Lawrence and Kansas University Medical Center campuses, as well as from the Juniper Gardens Children’s Project at the Children’s Campus of Kansas City. For more than four decades, the KIDDRC has served as a model of interdisciplinary collaboration across campuses and disciplines. More than 80 percent of KIDDRC investigators collaborate with one another on funded projects, and half of these represent collaborations across the three Center sites. Many KIDDRC investigators collaborate with investigators at other IDDRCs at Vanderbilt, UNC-Chapel Hill, the University of Washington, the University of Wisconsin, Washington University in St. Louis and Johns Hopkins University/ Kennedy Krieger Center. Core support services and facilities include: design and implementation of measurement tools for behavioral research; experimental design and analysis; bioinformatics; genomics expression analysis; histology and biological image acquisition and analysis; digital video acquisition and editing; and 3-D image manipulation and model output. The KIDDRC will have four cores: Clinical Translational Core (CTC), Preclinical Models Core (PMC), Clinical Outcomes/Biobehavioral Technology Core (CBC), and a Research Design and Analysis Core (RDAC).

**KUMC Theo and Alfred M. Landon Center on Aging.** In 1986, the Kansas Legislature approved a new appropriation to start an interdisciplinary Center on Aging at the KUMC campus to provide state-of-the-art educational, clinical and research facilities for faculty and the older adult patients they serve. In 1998, the legislature invested in a new building and committed a new state base line item. With the help of then-U.S. Sen. Nancy Kassebaum, a further $4 million federal grant paved the way for the 52,000 ft² complex building that stands at 36th Avenue and Rainbow on the medical center campus. Named for Sen. Kassebaum’s parents, the Theo and Alfred M. Landon Center on Aging includes: a Geriatric Medicine Clinic providing both primary care and consultative services facilities for researchers to study important aging-related issues such as prevention and treatment of disability, patterns of healthcare delivery and cognitive function; coursework for the next generation of healthcare providers to learn from Faculty about the care of older adults in state-of-the-art classrooms; an optimal location for community participants to engage in a variety of outreach programs from fitness and exercise to elder law clinics and brownbag presentations. The Center on Aging research mission is to encourage, promote, and carry out research that is relevant to older adults in Kansas and around the country. Our goal is to build aging-relevant research programs, including collaborations within the University of Kansas Medical Center, and in the wider metropolitan community. Research since 2011 has focused on advancing the understanding of motor function through interdisciplinary research and education, primarily with regard to people with multiple sclerosis and Parkinson’s disease. Research resources include cognitive testing laboratories and a human performance laboratory dedicated to advancing the understanding of motor function through interdisciplinary research and education. The primary focus of the human performance laboratory is the study of age related changes in mobility, which includes the study of healthy elderly as well as those with age related pathologies. Human Performance Laboratory - a gait and balance assessment laboratory with state-of-the-art equipment for biomechanical and kinematic studies in neurological disorders. Major equipment includes six high speed digital cameras (Motion Analysis Inc.) six high speed digital cameras for upper extremity assessment (Vicon Motion Systems), Delsys wireless EMG systems, four AMTI 1000 force platforms, a Cybex 6000 Testing and Rehabilitation System, Biodex Rehabilitation Treadmill, GaitRite mat, an overhead harness system, Opal wireless inertial sensors, and a customized treadmill device for postural response testing. Data collection from the wireless inertial sensor system is synchronized with data collection from the motion capture system. Beyond the main laboratory space, three additional spaces house graduate student research offices, an electronics/design shop and equipment storage.
Center activities are carried out in partnership with other academic units of KUMC, including the schools of Medicine, Allied Health, and Nursing and with affiliated institutions, such as area geriatric care centers, VA Medical Centers, the Wichita branch of the School of Medicine, the University of Kansas in Lawrence, state agencies, and service organizations. Research protocols undertaken at the Center by KUMC faculty address a variety of problems related to aging, ranging from social concerns to cellular biology.

**KUMC RESEARCH INSTITUTES**

**KUMC Kidney Institute.** The Kidney Institute is a world-class, internationally recognized research center comprised of 44 doctoral level faculty investigators representing eight School of Medicine departments, including Internal Medicine, Molecular and Integrative Physiology, Biochemistry and Molecular Biology, Anatomy and Cell Biology, Pathology and Laboratory Medicine, and Pharmacology, Toxicology and Therapeutics, and two from the School of Health Professions (Clinical Laboratory Sciences and Dietetics and Nutrition). The Kidney Institute also has interactions with the NCI-Designated KU Cancer Center and Liver Center, and collaborates with other nearby entities including the Department of Molecular Biosciences at KU-Lawrence, the KC Veterans Administration Hospital, Children’s Mercy Kansas City, UMKC and the Stowers Institute for Medical Research, all in Kansas City or nearby. Kidney Institute investigators occupy open-access laboratory space on two floors of Wahl Hall East and West, providing clinician-scientists and basic-scientists opportunities to closely interact on joint research projects and clinical trials. The Kidney Institute is active in training the next-generation of professionals through the T32 nephrology fellowship program (NIDDK T32DK071496) and weekly salt & water conferences, the nephrology fellows’ journal club and Sullivan conferences. The Kidney Institute is home to the Kansas PKD Research and Translation Core, a P30 grant from the NIDDK (P30 DK106912). Research strengths in the Kidney Institute include polycystic kidney disease, glomerular development and disease, bone-kidney interactions, renal transport physiology, and health outcomes research.

**KUMC KU Diabetes Institute.** The KU Diabetes Institute was formed in 2007. It is a virtual Institute comprising diabetes researchers at the University of Kansas Medical Center (with campuses in Kansas City, Wichita, and Salina) and the University of Kansas-Lawrence engaged in a wide range of basic science, clinical and translational research projects centering around diabetes and its complications. The clinical arm of the KU Diabetes Institute is the Cray Diabetes Center. The KU Diabetes Institute supports the fundamental role of basic research, data collection, and outcomes research in order to improve the lives of people with diabetes.

**KUMC Cardiovascular Research Institute.** The Cardiovascular Research Institute (CVRI) provides an integrative framework for cardiovascular research conducted at the University of Kansas Medical Center and the University of Kansas Hospital. The CVRI connects investigators from a wide spectrum of cardiovascular research that includes cellular and molecular investigation, physiological experimentation in whole animals, investigator-initiated clinical research, population studies, large multicenter clinical trials, and translational research that brings discoveries from the bench to the bedside. In addition to pursuing excellence in science and innovation, training the future generation of scientists and physicians remains one of our primary goals.

**KUMC Institute for Neurological Discoveries.** The Institute for Neurological Discoveries, a regional resource for advancing neuroscience research based at KU Medical Center, focuses on team-based scientific discovery. The IND unites over 120 basic and clinical neuroscientists in different disciplines from nine institutions to work collaboratively as teams. Its mission is to work with patients and the community to identify and advance research in neuroscience therapies. Goals include: to find cures for neurodegenerative disorders, seek ways to repair the injured brain, and identify lifestyles that promote brain health. The Institute focuses on six specific neurological disease areas, selected because of their prevalence, personal and economic impact, and because they represent areas of exceptional strength: Brain Injury and Repair, Neuromuscular and Movement Disorders, Neurodegenerative Disorders, Hearing and Equilibrium Disorders, Women’s Pain Division, and Cognitive and Behavioral Health.
**KUMC Institute for Reproductive Health and Regenerative Medicine.** Research at the Institute for Reproductive Health and Regenerative Medicine (IRHRM) was established to focus on fertility and infertility, developmental origins of health and disease, and epigenetics and stem cell biology. The IRHRM is organized into three centers with overlapping research interests: the Center for Epigenetics and Stem Cell Biology (CESCB), the Center for Reproductive Sciences (CRS), and the Center for the Developmental Origins of Health and Adult Disease (CDOHAD). The research efforts of the centers include basic, translational, and clinical research. Furthermore the centers are highly interactive. Programs in faculty development, postdoctoral training, and graduate education are key activities of the Institute and its membership.

**KUMC CEN</p>
staff, KUCTT has provided more than 45,000 consults across 60 specialties from 1991 to present. KUCTT’s network connects some of the most clinically underserved communities, effectively enhancing Kansas’ quality of healthcare. Urban and rural telehealth partners include schools, area health education centers, hospitals, early intervention satellite sites, community health clinics, mental health facilities, and other venues. KUCTT is one of the most active outpatient telehealth programs in the country across secure room-based, PC-based, and mobile telemedicine platforms. KUCTT has been an integral piece of several national and international collaborations that have demonstrated the potential of telehealth across the lifespan to eliminate distance as a barrier to healthcare.

KUCTT also assists faculty with telemedicine and telehealth research across rural and urban settings. The community engaged research approach includes health services research, cost analyses, health communication research, patient/family outcomes research, and implementation research. Pre- and post-doctoral research trainees have participated across disciplines (e.g., medicine, nursing, health professions, psychology, health communication, health services administration). KUCTT is spearheading new models of patient-centered services, including home-based, mobile televideo services for homebound patients and their caregivers. In addition to clinical telemedicine, KUCTT also leads the institution’s replication and evaluation of the capacity building telementoring approach, Project ECHO (Extension of Community Healthcare Outcomes).

KUCTT assists researchers throughout the planning, implementation, and evaluation of telemedicine and telehealth projects, following community-engagement best practices. This includes: 1. Project development and application for funding (e.g., NIH, HRSA, SAMHSA, PCORI, and non-federal foundations); 2. Technology selection to fit project needs; 3. Project implementation, including ongoing evaluation and technical support consistent with telemedicine research best practices; 4. Project evaluation including telemedicine-specific domains; and 5. Results dissemination to participating communities as well as to national audiences through KUCTT’s federally funded Heartland Telehealth Resource Center. KUCTT also supports student research, ranging from semester-long participation in ongoing KUCTT research to independent student projects, including completion of Masters’ thesis and dissertation projects. The KUCTT Director and related Center faculty provide ongoing mentorship to support student completion of research tasks as well as numerous opportunities for presentations, publications, and grant submissions.

KUMC Hoglund Brain Imaging Center. The Hoglund Brain Imaging Center (HBIC) is under the direction of William Brooks, PhD. The HBIC is located at the KU SOM campus. It occupies a free-standing 11,500 square foot building and brings a combination of neuroimaging technologies and neuroscientists under one roof. It is supported through philanthropic, state, and federal monies. Center activities are primarily focused on research studies at basic and clinical translational levels. A major goal of the HBIC is to integrate structural and functional approaches for the assessment of the brain in both health and disease. It houses a 3T Siemens Skyra MRI system capable of high resolution structural and functional MRI, MR spectroscopy, and diffusion and perfusion imaging. Complementing this human system is a 9.4T Varian MRI system for animal studies. The HBIC also provides whole-cortex child and adult magnetoencephalography (MEG) and high-density electroencephalography and fetal magnetoencephalography and magnetocardiography.

The Heartland Center for Mitochondrial Medicine (HCMM). The HCMM was established in 2014. It evolved through a series of meetings arranged between regional investigator stakeholders pursuing energy metabolism research. Russell Swerdlow, MD was elected the Director and Mission and Vision statements prepared. Quarterly general meetings of HCMM investigators are held at KUMC, with sub-committees meeting more regularly as needed. A current sub-committee is now meeting monthly to arrange a regional Mitochondrial Medicine Symposium to be held on May 2nd and 3rd, 2016, with Dr. Douglas Wallace as our keynote speaker. This symposium is being held with support from the KU ADC, KCUMB, the KU-L Higuchi Biosciences Center, and industry support we have procured from Seahorse Biosciences.

The HCMM mission is to organize investigators with thematic interests in mitochondria and bioenergetics, and through this effort create a supportive and interdisciplinary environment that encourages a team-science approach and facilitates energy metabolism-related research. As envisioned, the HCMM will be a national/international leader known for cutting-edge, interdisciplinary research programs that advance basic science,
translational, and clinical research that focuses on mitochondrial dysfunction, disorders, and medicine. We will develop and sustain cross-disciplinary research programs that help us better understand the fundamental role of energy metabolism in biological systems and in disease. Specific vision statements are as follows:

- We will develop and sustain interdisciplinary innovative translational research programs that identify energy metabolism-related therapeutic targets, as well as novel therapeutic approaches that emphasize manipulations of mitochondria and energy metabolism pathways.
- We will develop and test next generation mitochondria and bioenergetics-based treatments that improve the lives of persons with defective or deficient energy metabolism.

**JUNTOS Center for Advancing Latino Health.** Over the past 8 years, KUMC has invested in the development of a dedicated center to address health disparities in the Latino community called the JUNTOS Center for Advancing Latino Health. The JUNTOS Center for Advancing Latino Health is focused on building community-based participatory research (CBPR) programs that translate research findings toward the elimination of health disparities and building healthier communities. JUNTOS involves a tight collaboration between highly successful teams at KUMC and a number of time-honored regional and national institutions.

A diverse, multidisciplinary team has collaborated on NIH clinical trials, smoking cessation with Latinos, evaluation of mobile health interventions, pharmacotherapy trials with underserved smokers, and evaluation of cultural and psychosocial aspects of tobacco use. Dr. Cupertino, Director of JUNTOS, has led federally and privately supported research, and has devoted efforts over the past 8 years to developing the JUNTOS community infrastructure to support clinical intervention research, primarily addressing tobacco use. Dr. Cupertino completed a NIH K01 (CA136993) focused on advancing understanding of smoking among Latino immigrants and pilot tested a novel intervention to enhance smoking cessation treatment for Latinos.

**Center for American Indian Community Health (CAICH).** The CAICH was funded in 2010 through a National Institute on Minority Health and Health Disparities Exploratory Center of Excellence (P20) grant (Pis: Daley/Greiner). CAICH began as the Program in American Indian Community Health in 2006, since which time member investigators have brought in nearly $30 million in externally-funded grants focused on the AI community. CAICH is led by Dr. Christine Daley and conducts studies focused primarily on cancer prevention and control, including smoking cessation, weight loss, breast cancer screening, colorectal cancer screening, community education about cancer research and clinical trials, and health beliefs and behaviors. CAICH also has three Community Advisory Boards (CABs). We have an Executive CAB (7 members) who meets monthly to provide insight on day-to-day activities within the center, a longitudinal CAB (approximately 40 members) who meets quarterly, and a nationwide College and University (CU) CAB who meet regularly via social media. CAICH provides monthly cultural trainings and monthly in-service trainings focused on research methods and content. It has 6 Cores or shared resources, including an Administrative Core led by Dr. Christine Daley (PI) to help with grant administration; a Methods Core led by Dr. Byron Gajewski, a co-investigator on this application, to help with biostatistics and informatics needs; an Education Core, led by Dr. Won Choi, with paid graduate assistants and an educational pipeline; an Environmental Health Core led by Dr. Charles Barnes of the Children’s Mercy Kansas City in Kansas City, MO; a Law and Policy Core, that provides oversight of all appropriate approvals and ethical research questions through a Cultural Review and Monitoring Committee that is part of the KUMC Human Subjects Committee; and a Community Outreach Core that assists with recruitment, advertisement, and dissemination efforts, as well as overall community engagement.

**KUMC Liver Center.** The primary mission of the liver center is to be a multidisciplinary intellectual focus for liver researchers by bringing the Basic Science, Translational Science, Clinical Research, Pathology, Radiology, Clinical Hepatology, and Surgery communities together. The liver center is a research center and its focus is on research. It aims to collaborate closely with the clinical care components of the Liver community, the Liver Treatment Center and the Center for Transplantation in a mutually supportive relationship that will allow both clinical and research aspects of the liver enterprise to reach their full potential.
KUMC Midwest Stem Cell Therapy Center. The Midwest Stem Cell Therapy Center (MSCTC) was created by the Kansas Legislature in the 2013 session, with a state appropriation. The MSCTC helped establish a systematic mechanism for Kansans to receive adult stem cell therapy in the state and region and served as a coordinated center to translate basic stem cell research findings into clinical applications. The MSCTC faculty and staff include physicians, scientists, and trainees representing the fields of adult stem cell biology, neurology, oncology, hematology, cardiac and vascular, endocrine, and other sub-specialties. These individuals represent several local and regional institutions, enabling the formation of a stem cell network of knowledge and information. This synergy among various institutions also fosters productive collaborations that may result in faster translation of basic science discoveries into the clinic. The MSCTC houses an FDA-registered GMP facility with the demonstrated capability to provide clinical grade adult stem cells for use in clinical trials. Several clinical trials with adult stem cells are in the start-up phase within KUMC and external research collaborations are being discussed. In addition, cutting edge molecular stem cell research is being conducted by MSCTC scientists. These ongoing studies involve induced pluripotent stem cells, regulation of cellular differentiation, cord blood cells, as well as various transcription factors and other molecular pathways in adult stem cells. For patients interested in stem cell studies going on around the country, there is a set of "ready-made" searches that automatically search ClinicalTrials.gov for the latest studies. In addition, the MSCTC is planning to expand the training of postdoctoral fellows in basic research in adult stem cell biology, as well as clinicians in adult stem cell-related topics.

COMMUNITY RESOURCES

The Kansas Patients and Providers Engaged in Prevention Research (KPPEPR) Network. The Kansas Patients and Providers Engaged in Prevention Research (KPPEPR) Network is a collaborative of patients and professionals from geographically diverse communities across Kansas. All KPPEPR Network members are primary care patients, providers, public health and/or agency professionals involved directly in health-related activity on a daily basis. The network is led by an Executive Director, Anthony Wellever, at the University of Kansas Medical Center (KUMC), where an additional group of senior research faculty (Drs. Allen Greiner, Kim Kimminau, Edward Ellerbeck, Christie Befort and Joseph LeMaster) provide support and technical assistance on all projects. The network is further supported by the Frontiers translational science program and it’s Community Partnership for Health initiative. Over the past 15 years, the KPPEPR Network, has relied on collaborative involvement of over 60 primary care practices, thousands of patients and scores of public health and other health service agencies.

Prior projects have utilized patient and physician surveys, office assessments, direct observation of primary care, key informant interviews, and qualitative data collection methods. Nearly all of these projects have been initiated by academic researcher faculty at KUMC. The projects have resulted in a host of scientific publications and abstracts since Drs. Greiner, and Ellerbeck became involved in 1999. The KPPEPR Network has been utilized to study the delivery of preventive services in physician’s offices, including colorectal cancer screening, counseling on diet and physical activity and smoking cessation counseling. In 2004 and 2005, KPPEPR practices participated in a NIH-funded study to examine the impact of disease management on smoking cessation in rural primary care practices. This study recruited 50 rural clinics, 63 health care providers, and 750 participants for a 2-year trial using motivational interviewing for smoking cessation (CA101963). Several NIH and HRSA funded intervention studies followed over of the next four years. In 3 other separate studies (HS14857, CA121016, HL87643) 68 rural clinics and 1,340 participants were recruited and delivered health related interventions via phone and telemedicine. Most recently, in 2015 KPPEPR became the primary network for a $10 million dollar PCORI funded intervention (Befort, PI) to study the comparative effectiveness of 3 practice change strategies for weight loss among rural primary care patients.

The KPPEPR Network has utilized several unique research methodologies over the years. These include home visit data collections by research assistants, hospital and primary care practice interventions and the involvement of medical students in research activities and intervention delivery. In 2014, KPPEPR leaders,
began a network reorganization to systematically involve patients, and an interdisciplinary group of health care providers and public health professionals as network leaders and active participants. The intention of these changes is to begin conducting projects that are instigated at the behest of patients and providers, rather than as conceptualized by full time researchers. The reorganization should result in a shared decision-making process whereby all parties have an equal voice and are valued as contributors throughout the research process. By reorienting the network to more fully serve the needs of patients and “on the ground” service providers, KPPEPR is poised to make significant contributions to evolving health care reform and new research initiatives such as the Federal Patient Centered Outcomes Research Institute, which seek to answer health research questions with immediate application for improving patient oriented outcomes.

**K-State Research and Extension.** K-State Research and Extension is a statewide network of educators sharing unbiased, research-based information and expertise on issues important to Kansas. It has established local, state, regional, national, and international partnerships. It is dedicated to a safe, sustainable, competitive food and fiber system and to strong, healthy communities, families, and youth through integrated research, analysis and education. With more than 125 years of research and 100 years of extension, K-State Research and Extension has been improving the quality of life and standard of living for Kansans for a century. This integrated system connects the university to every county through locally based educators who serve as sources of objective information. In partnership with the Community Engagement function, researchers are working to collaborate with K-State Extension agents to increase enrollment in clinical trials, participation in community health initiatives and to encourage enrollment in Frontiers’ patient registry, “Pioneers.”

**The American Academy of Family Physicians National Research Network (AAFP NRN) and MOSAIC Center of Excellence.** The American Academy of Family Physicians National Research Network (AAFP NRN) and MOSAIC Center of Excellence was established in 1999 to conduct, support, promote, and advocate for primary care research in practice-based settings.

The AAFP NRN assists in realizing overall strategies for achieving improved primary care for the nation. These include: supporting initiatives in advancing the Patient Centered Medical Home, promoting an ongoing for practice change through improved use of technology, education and communication; assisting our members to achieve financial success through optimal practice management; involving family physicians in targeted public health activities; and increasing member and patient awareness of resources through educational programs.

Within the American Academy of Family Medicine National Research Network (based locally in Leawood, KS) we have 1 of 8 national centers of excellence in practice-based research (Kimminau, P30 HS21647) that provide access for Frontiers investigators to nine regional and three national PBRNs that include primary care, dental, pharmacy, and dietetics research networks.

The AAFP NRN is working to gain a broader perspective from the patients’ point of view as it relates to the focus of family medicine and family medicine research. This perspective will provide better insights into the concerns and needs of patients and further help us to understand and improve the patient/physician relationship. AAFP members work with the patient/family dynamic every day. Engaging patients in their own care is the foundation of what family medicine does. Including the patients’ view throughout our research processes is a key component if we are striving for improvements in health care and health outcomes. Getting their perspective throughout the various phases will provide us with insights into health concerns, important areas for research and benefits to the patient, and ultimately improved care.

**Center for Excellence in Health Communication to Underserved Populations (CEHCUP).** Health disparities constitute a major problem for the United States. More focused research, as well as advanced training for communicators (being them journalists, advertising or public relations practitioners) is needed. The William Allen White School of Journalism and Mass Communications has established the Center for Excellence in Health Communication to Underserved Populations on the KU-Lawrence campus to promote dedicated student training as well as collaborative research and service to the community to address health disparities in the state of Kansas and abroad.
CEHCUP has three major roles:

- Educate and train undergraduate and graduate students in journalism and strategic communication about health communication practices to underserved populations and CBPR-driven approaches.
- Function as a research hub to facilitate interdisciplinary, multidisciplinary and cross-disciplinary research into communication practices for health campaigns addressing underserved populations.
- Provide support, assistance and know-how for community-based organizations that want to engage in health promotion or disease prevention activities.

**KUMC Office of Rural Health Education.** KUMC Office of Rural Health Education partner with health care providers, Kansas employers, and stakeholders to increase access to quality health care for the people of rural and urban underserved Kansas. We do this by advancing the health care workforce through recruitment, retention, research and education. Let us help you find Kansas health care jobs, loan forgiveness and repayment options, temporary coverage for medical professionals, committed providers for your hospital or clinic, and more.

**KCK Community Health Council.** KCK Community Health Council (CHC) exists to improve health and health care for the people of Wyandotte County. We believe that residents have the ability, and an inherent right, to provide leadership in the shaping of physical spaces and public policies which impact their health. CHC’s responsibility is to ensure the collective experiences and expertise of Wyandotte County residents are represented in matters of health design and policy, as well as identify and maximize opportunities for collaboration, planning and implementation of effective community health improvement initiatives.

CHC is a non-profit, 501 (c) (3) community health collaborative of hospitals, safety net clinics, federally-qualified health clinics (FQHCs), mental health providers, public health departments, academic research institutions and health care funding organizations. CHC member institutions support the work of the organization on a pre-determined pledge that is renewed each fiscal year.

The University of Kansas Cancer Center has been selected for National Cancer Institute (NCI) designation. NCI designation enhances the long-standing relationship of the Cancer Center with the Midwest Cancer Alliance, providing opportunities to expand research and link discoveries made in the lab at the University of Kansas to the MCA network of hospitals and health care organizations and enhance the quality and delivery of cancer care at all levels. KPPEPR (Kansas Patients and Providers Engaged in Prevention Research) is a practice-based research network that is also part of the MCA.

All MCA-member medical professionals have access to second opinion and consultation services with multi-disciplinary cancer experts, conferences and other networking events, outreach programs, patient navigation support, communication materials, web resources, and continuing education programs. For the convenience of our affiliated medical professionals, the MCA provides many of these services at member locations, thanks to technology like Interactive Televideo (ITV).

**Genesis Health Care Network, Garden City, Kansas (Finney County, KS).** The Genesis Health Care Clinic Network is the operator of the largest rural primary care network serving Hispanics and refugees in Kansas. Serving over 9,500 patients annually through six clinics throughout southwest Kansas, with more than 90 percent of these individuals below the 200% poverty level and as the leading ambulatory “safety-net” care provider for these underserved individuals and families in the region, Genesis recognizes the importance of health care and social services for clients. The flagship Genesis clinic, in Garden City, rests in a region where 5 large counties now have majority minority populations. Meat packing, and feedlot growth over the past 30 years has led to an influx of Latinos and refugees from across the globe. The incredible diversity in the region has shaped Genesis. All programs -- dental and medical clinics, oral health screening and education, social services such as the food bank, clothing room, emergency assistance, citizenship classes, immunizations, early literacy, health education and outreach -- are designed to improve the lives and health status of individuals and families.
KUMC faculty began collaborative work with Genesis over 14 years ago. Dr. Kimminau, while Vice President of Research at the Kansas Health Institute in 2002, conducted the Minority Health Disparities in Kansas project and completed focus groups and health assessments at Genesis clinics. For over 12 years, we have placed medical students in the Genesis Garden City Clinic for a six week summer practice/research experience. We worked with Genesis to recruit smokers from the clinic for the NCI-funded KanQuit smoking cessation study (PI, Ellerbeck) in 2005-2007. We partnered with Genesis and other primary care clinics on the tablet computer delivered Healthy Living colorectal cancer screening program in 2007 (NCI, PI, Engelman). In 2009, we began working with Genesis to deliver state of the art telemedicine smoking cessation counseling services in the Connect to Quit study (NHLBI, PI, Richter). The past six years the Genesis network has been a subcontracted primary partner in the NCI-funded Community Networks Program Center to reduce cancer disparities (U54 CA154253, PI, Greiner). Through this we worked with Genesis to develop a Community Health Worker program that is now self-sustaining. We have new partnership funding from CMS to conduct health promotion across the region. We expect our research partnership with Genesis to continue and to allow work on vulnerable and understudied rural populations.

**Institute for Community Engagement (ICE).** ICE is the KUMC outreach and service delivery infrastructure that spans over 100 staff across five departments (Area Health Education Centers, Center for Telemedicine & Telehealth, Continuing Education, Rural Health, and Research & Scholarship). ICE coordinates outreach across the School of Medicine, School of Nursing, and School of Health Professions and there is a strong interprofessional focus across activities. Collectively, the Institute departments and its extensive internal and external partners provide needs-driven educational and clinical services that span the entire state and reach into each of Kansas’ 105 counties. The Institute’s mission is to "improve the health of Kansans through communication, collaboration, and statewide partnerships." The mission spans enhancing student education, strengthening the health care workforce, researching to improve health, advancing health care access, and serving communities. The Institute works closely with KU Hospital to advance integration and health system models. ICE’s departments and partners work with and help CPH facilitate community engaged research from concept to proposal implementation, including site/practice recruitment and retention, training, as well as reporting findings back to communities.

**KU Center for Telehealth and Telemedicine (KUCTT).** Using the range of telehealth technologies, KUCTT provides Kansans access to the best available health care while providing Kansans’ health care professionals access to the best available health information and education. Kansas is the ideal state for telemedicine, with half of its population in two population centers and the other half located throughout 88 rural counties. From the very first consult in 1991 to present day, the KUCTT continues to expand its clinical services for children and across the lifespan. With more than 40,000 consults across 60 specialties from 1991 to present, KUCTT is a leader in the telemedicine field. The existing network connects some of the most clinically underserved communities, effectively enhancing Kansas’ quality of healthcare. Urban and rural telehealth partners include schools, area health education centers, hospitals, early intervention satellite sites, community health clinics, mental health facilities, and other venues. KUCTT is one of the most active outpatient telemedicine programs in the country, with over 4,000 clinical consults per year across secure room-based, PC-based, and mobile telemedicine platforms. KUCTT also oversees the federally funded Heartland Regional Telehealth Center, spanning telehealth services across Kansas, Missouri, and Oklahoma.

**Area Health Education Centers (AHECs).** The AHECs are academic-community partnerships that train health care providers at sites and in programs that are responsive to state and local needs around health topics. The AHECs enhance the quality and accessibility of health care services in Kansas through partnerships with communities, health care professionals and organizations, educational institutions and other interested individuals and agencies. The three offices are geographically distributed across the East (Pittsburg, KS office), West (Hays, KS office), and Northeast (Lawrence, KS office). Rural Kansas has a diverse underserved population, with high poverty in southeast rural areas, a population faced with economic challenges related to downturns in farming and oil in central and northwest Kansas, and a new immigrant population associated with meat packing and other industries in southwest Kansas. The AHECs have a strong
local presence in each of these regions to meet needs unique to the area. AHECs link the resources of university health science centers with local planning, educational, research, and clinical resources. This network of health-related institutions provides multidisciplinary educational services to students, faculty and local practitioners, ultimately improving health care delivery in medically underserved areas. From 2009-2011, the AHECs completed 468 education/training initiatives with 1,980 sessions and processed 29,792 continuing education enrollments from every county in Kansas. The AHECs have leveraged their strong rural relationships to support recruitment and retention of rural practices in previous rural primary care research related to epilepsy, pediatric cancer, smoking cessation, and other topics.

KUMC Continuing Education and Professional Development (CE/PD). CE/PD’s goal is to develop and deliver education that makes a positive difference in practice and patient outcomes. CE/PD provides continuing education directly related to the top practice concerns of Kansas’ primary care providers, and provides interprofessional education with a growing emphasis on team-based medicine. CE/PD is nationally accredited by the Accreditation Council for Continuing Medical Education and the American Nurses Credentialing Center. CE/PD is the largest provider of continuing medical education in Kansas. In FY 12, CE/PD offered 81 courses, conferences or event series with an enrollment of 4,706. In addition, they supported 1,629 grand round sessions at KUMC, including broadcast via televideo of a number of sessions to metropolitan and rural sites across Kansas. Of note, CE/PD has accredited one of the most attended regional pediatric obesity conferences for the last decade, in addition to numerous grand rounds around obesity. CE has spearheaded two statewide initiatives that utilized training and performance improvement methodologies similar to the proposal in order to support adoption of national evidence-based guidelines in our rural and frontier communities. In particular, televideo technology supported team-based performance improvement activities and shared team learning because teams were geographically distributed across the states. One performance improvement initiative resulted in increased practice adoption of diabetes management practices and the second, while ongoing, is promising related to system-wide adoption of best practices in sepsis management.

Department of Family Medicine. This growing department is housed within three separate areas of the KU Medical Center complex. The research division, under Dr. Greiner’s direction, occupies a 2400 square foot office suite within the KUMC Endowment Building. The Division has seven full time faculty investigators and over twenty staff with experience in health disparities research and community outreach. The Department now ranks within the top ten family medicine departments in the U.S. in NIH funding. Two research division faculty members maintain clinical practices and each of the other five members is experienced in partnering with organizations and agencies to improve health. All research division staff have been hired with the intent of building a translational health disparities program studying prevention, social determinants, cancer and chronic diseases. These staff have expertise in health informatics, community based participatory research, minority participant recruitment, and biospecimen collection. The research division has been the primary home for the community engagement program within the KUMC Clinical and Translational Science Award, Frontiers, for over five years. The clinical portion of the Department of Family Medicine resides on the entire first floor of the recently completed medical office building. A large suite of faculty offices and educational program offices is housed separately in the Delp Building. This area also provides additional conference room and small classroom space for meetings and training sessions.

Wyandotte County Safety-Net Clinic Coalition. The Wyandotte County Safety-Net Clinic Coalition is a group of clinics serving low income individuals in Wyandotte County. The group has collaborated with multiple KUMC investigators on NIH funded projects over the last fifteen years. It includes two federally qualified community health center clinics run out of the Swope Health Services central location in Kansas City, Missouri. The clinics provide the vast majority of health care needs for the uninsured population of Kansas City, Kansas. This population segment is predominately minority with a rapidly growing Latino component. The coalition meets monthly and is currently working on collaborative programs to test the impact of community health workers on patient outcomes. The group has a shared patient database and referrals system. A number of local physicians and community leaders regularly attend coalition meetings and contribute to joint projects. The coalition works closely with the Wyandotte County Community Health Council. Swope Health Services has been extensively
involved with coalition activities and has moved their largest Kansas City, KS clinic to a new location to facilitate expansion of services. Swope Parkway Health Center, Kansas City, Missouri is a federally qualified community health center with Pediatric, OB/GYN, General Medicine, Ophthalmology, Mental and Behavioral Health, and Community Outreach clinics. The Center also has a full service on-site pharmacy. Services are provided to patients with Medicare, Medicaid, and to the uninsured on a sliding scale fee schedule. Swope Central had 16,324 total visits and 7,138 unique patient visits in 2004. Swope Wyandotte Clinic, Kansas City, Kansas is a satellite office for Swope Central and serves as the primary federally qualified community health center in Kansas City, Kansas. The Clinic has recently moved into new office space and has expanded services. Services are provided to patients with Medicare, Medicaid, and to the uninsured on a sliding scale fee schedule. Swope Quindaro Clinic Kansas City, Kansas is a satellite office for Swope Central and serves a very low income section of the urban core in Kansas City, Kansas. Services are provided to patients with Medicare, Medicaid, and to the uninsured on a sliding scale fee schedule. Duchesne Clinic Kansas City, Kansas is a clinic operated by the Sisters of Charity of Leavenworth, a non-profit health care services organization that also runs several hospitals in the plains and western plains regions of the United States. The clinic only sees patients who have no insurance coverage. Southwest Boulevard Family Health Care Kansas City, Kansas is a full service primary care clinic. The clinic serves patients with Medicare, Medicaid, private insurance, and those with no insurance on a sliding scale fee schedule. The Wyandotte County – Kansas City, Kansas Unified Government Health Department operates Pediatrics, OB/GYN, Family Planning, Immunization, and STD clinics for those with Medicare, Medicaid, and the uninsured. Dr. Greiner serves as the health department’s medical officer.

**Kansas City CARE Clinic.** The KC CARE Clinic was formed in 1971 as a private 501(c)(3) organization to promote health and wellness by providing quality care, access, research, and education to the underserved and all people in our community. The clinic provides health care services in general medicine, HIV prevention and primary care, behavioral health, and dentistry with a full-time staff of 105 as well as over 1,200 volunteers. Full- and part-time staff includes two full-time physicians, six nurses, five nurse practitioners, 22 case managers, six behavioral health providers, seven community health workers, one dentist, one dental assistant, and seven prevention specialists. In 2014, 8,000 patients received primary care, mental and/or dental services at two clinic locations, both in underserved areas of the city. KC Care maintains relationships with many academic institutions in the area, allowing medical students from KUMC, KCU, UMKC, and other schools to gain experience in the clinic under professional supervision.

**Silver City Health Center.** Silver City Health Center offers affordable, high-quality primary care, in-depth clinical evaluation, and a range of program-specific health services to English and Spanish-speaking residents of Wyandotte and Johnson counties. The Center provides primary health care and health education resource access to individuals without insurance, as well as to those with government or private health insurance coverage. Located in the Argentine community of Kansas City, Kan., the center employs skilled health care professionals from the KU Schools of Health Professions, Medicine and Nursing.

**Haskell Indian Nations University.** Haskell Indian Nations University (HINU) is the premiere tribal university in the United States, offering quality education to Native American students. Haskell’s student population averages about 1000 per semester, and all students are members of federally recognized tribes. Haskell’s faculty and staff is predominantly native. Haskell offers Associate and Bachelor’s degrees. Haskell’s historic campus is centrally located in Lawrence, KS in what is known as Kaw Valley. The mission of Haskell Indian Nations University is to build the leadership capacity of our students by serving as the leading institution of academic excellence, cultural and intellectual prominence, and holistic education to address the needs of Indigenous communities.

**Mid-America All Indian Center.** The Mid-America All-Indian Center serves as a cultural center and museum dedicated to educating people about and preserving the heritage of the American Indian.
Heart of American Indian Center. The mission of the Kansas City Indian Center is to encourage social, educational, and economic advancement of the American Indian community by promoting traditional and cultural values.

The Kansas City Indian Center (Heart of America Indian Center), a 501(c)3 non-profit corporation, has been serving the Kansas City’s American Indian population since 1971.

Today the Center remain dedicated to the following goals:

- provide health, welfare and cultural services to American Indian individuals and families of our community;
- promote fellowship among the American Indian people of all tribes living in the Kansas City Area;
- stimulate the natural integration of the American Indian into the community;
- encourage artistic and vocational pursuits by American Indian people; and
- preserve and foster traditional American Indian cultural values.

Services Available - Emergency Services for Low-Income American Indians, including Food Pantry and Holiday Baskets, emergency telephone calls to Reservation or Nation and referrals to additional services; and the Morningstar Substance Abuse Outpatient and Prevention Program.

Mexican Consulate. JUNTOS, Drs. Paula Cupertino and Allen Greiner collaborate with the Mexican Consulate and the Ventanilla de Salud program in Southwest Kansas. They provide health fairs, screening services and health assessments of individuals seeking services from the Consulate and thereby keep a high level of surveillance on this vulnerable population’s health status.

ALS Mid-America Chapter. Leading the fight to treat and cure ALS through global research and nationwide advocacy while also empowering people with Lou Gehrig’s Disease and their families to live fuller lives by providing them with compassionate care and support.

Muscular Dystrophy Association. The Muscular Dystrophy Association (MDA) is an American organization which combats muscular dystrophy and diseases of the nervous system and muscular system in general by funding research, providing medical and community services, and educating health professionals and the general public. The organization was founded in 1950 by a group of concerned parents of children with muscular dystrophy.

Leukemia/Lymphoma Society. The Leukemia & Lymphoma Society (LLS) is the world’s largest voluntary health agency dedicated to blood cancer. The LLS mission: Cure leukemia, lymphoma, Hodgkin's disease and myeloma, and improve the quality of life of patients and their families. LLS funds lifesaving blood cancer research around the world and provides free information and support services.

Community Living Opportunities. Community Living Opportunities, Inc. (CLO) is a non-profit community organization that provides community living, day habilitation, in-home support and targeted case management services for over 300 people with developmental disabilities and employs more than 400 staff members. It was formed in 1977 as an alternative to state institutions and became one of the pioneers in providing community-based services to people with developmental disabilities. Their services include targeted case management, residential services, which includes family-teaching and extended family-teaching homes, day services, behavioral consultation, children’s services, health care services, training and staff certification and organizational behavior management consulting. CLO operates seven group homes in Johnson County, Kansas (the metropolitan Kansas City area) and seven group homes in Douglas County, Kansas (Lawrence). CLO’s Early Childhood Autism Program (ECAP) provides in-home, intensive early intervention for 22 children with autism.

Cottonwood, Inc. Cottonwood Inc. is a not-for-profit community organization that provides services to people with developmental disabilities in Douglas and Jefferson County, Kansas. In their dual role as community
service provider and the Community Developmental Disabilities Organization, Cottonwood is the single point of referral for people with developmental disabilities seeking services. Cottonwood provides services and support to people with developmental disabilities in their living and work environments in the community. Residential services encompass group living, supported living, semi-independent living, and recreation/leisure activities. Support Services include medical care, mental health care, advocacy, habilitative therapies, financial entitlements, transportation, employment, housing, recreation, and adult education. Employment services and work services assist people to obtain and maintain jobs in the Cottonwood Work Services Department and in the community. Cottonwood’s residential services include 48 living arrangements. Cottonwood promotes persons with developmental disabilities as qualified workers to employers, while offering incentives to employers for their cooperation in supported employment. Life enrichment services offer enhancement of job, social, cultural, and leisure skills. Transition services include helping the Lawrence School district provide for a smooth transition from school to adult living for students with disabilities. Cottonwood provides direct or indirect services to over 650 people, ranging in age from 18 to more than 60 years old. Finally, Cottonwood helps fund the Early Childhood Coordinating Council in Jefferson County for families with children in need of early intervention.

Kansas Association for the Medically Underserved (KAMU) is the primary care association for the state of Kansas, and consists of a network of 40 primary care and 13 dental clinics that provide health services to low-income and uninsured people throughout the state. KAMU serves as a connecting point for clinicians working in safety net clinics and participates in extensive workforce development programs. Recently, KUMC faculty assisted KAMU in designing a dental hub model for delivering dental care to counties and communities that either lack sufficient dentists and dental hygienists to meet their need or who have no dental providers at all. Funding to support the development of the dental hub represents a collaborative effort on the part of health philanthropies who wanted trusted, academic expertise from KUMC investigators during the design phase to ensure that the model would permit effective delivery of dental care services to those most in need.

Communities Creating Opportunity. Communities Creating Opportunity (CCO) is a longstanding organization in Kansas City that arose from the work of the Kansas City Organization Project (KCOP). KCOP began in 1977 with religious and community leaders to respond to the rapid racial transition and financial changes in the city’s Southeast neighborhoods. As black families moved into these communities in the mid-70’s, white families moved out in droves. Subsequently, real estate values dropped, lending in the area froze, and insurance rates skyrocketed. Increases in poverty and crime rates followed. KCOP provided community residents with the organizational tools and leadership training to address these trends and enhance their communities. In 1984, KCOP became Kansas City Church Community Organization to reflect its congregation and neighborhood-based model of community organizing. While continuing in its tradition of faith-based community organizing, CCO adopted a new name in 2007, Communities Creating Opportunity, to include all religious traditions and other community partners. The well-recognized acronym, CCO, continues as the organization’s principal signature. Over the past ten years the group has been heavily involved in health equity work. The organization received funding to conduct “hotspot” mapping projects with Truman Medical Center and KUMC in an effort to identify unmet health care need. More recently CCO received funding from the Kansas Health Foundation to study how social factors influence health outcomes in Wyandotte County. KUMC researchers have worked with CCO leaders on data analysis and grant submissions for over five years.

Mid-America Regional Coalition (MARC). MARC is a regional nonprofit group of city and county governments that works to bridge governmental divides created by a state line and various city and county borders across metropolitan Kansas City. It is the metropolitan planning organization for the bistate Kansas City region. Directed by a Board of Directors made up of local elected officials, and serves nine counties and 119 cities. They provide a forum for the region to work together to advance social, economic and environmental progress. MARC is funded by federal, state and private grants, local contributions and earned income. A major portion of their budget is passed through to local governments and other agencies for programs and services. The organization developed a health policy agenda in 2009. Most recently MARC has
become the home base of a regional community health worker collaborative initiative. This group meets monthly and works to support and help expand the activities of lay health workers through Kansas City. Various Frontiers researchers have worked with MARC to organize and build capacity for health improvement and bioscience in the region.

**El Centro.** El Centro began in 1976 with a small amount of funding from the Archdiocese of Kansas City in Kansas. Church leaders and a group of energetic and caring community members saw a need for an organization to address the needs and concerns of Kansas City, Kansas’ rapidly growing Latino population. With in-migration accelerating, *El Centro de Servicios para Hispanos* was born.

El Centro has grown from a single location to three locations in Kansas City, Kansas and Olathe, serving more than 12,000 individuals and families per year. Our programming has evolved from our first program for elders – the Senior Day Program – to include The Academy for Children – a dual-language Pre-K program, workshops on money-management and homeownership, health education and healthy living outreach through our *Promotores de Salud* (Health Promoters) volunteers, health navigation and intervention, and our policy and advocacy efforts for issues of special interest to our community. The organization launched a community health worker program in 2008 and has been a close partner of KUMC’s JUNTOS, Center for Advancing Latino Health. El Centro has also assisted in recruiting participants in research and has partnered with KUMC researchers in the Department of Family Medicine and with the Alzheimer’s Disease Center.

**Johnson County Department of Health and Environment.** Since 1943, the Johnson County Health Department has been the official public health agency for the County, with the Board of County Commissioners serving as the Board of Health. In March 2012, the Health Department merged with the Johnson County Environmental Department to become the Johnson County Department of Health and Environment (JCDHE). The Director is Lougene Marsh and the Deputy Director is James Joerke. JCDHE is comprised of six divisions: Business Operations, Childcare Licensing, Community Health, Environmental, Health Services, and Strategic Planning. There are approximately 150 department employees. In June 2014, JCDHE became the first accredited health department in Kansas.

Services include: immunizations, communicable disease surveillance, TB testing, refugee health testing, prenatal, WIC, reproductive health, STD screening, HIV testing, child care facilities’ licensure, health education classes, workshops & trainings, injury prevention activities (Safe Kids Johnson County), chronic disease risk reduction activities, community wellness activities. Programs include: Outreach Nurse, Public Health Emergency Program, Targeted Case Management, ‘Making a Difference’, Air Quality, Household Hazardous Waste, Solid Waste Management, On-site Sewage Treatment, Ozone Reduction and Pool Inspections. Services are provided at three sites, 11875 S. Sunset and 11811 S. Sunset in Olathe and 6000 Lamar in Mission.

Dr. J. LeMaster, family physician at KUMC, serves as the medical director for JCDHE. His position facilitates research activities to engage residents seeking services to also participate in community based research. Most recently, researchers in family medicine conducted a comprehensive assessment of micro-food deserts in Johnson County to inform local policymakers, and the team collaborated with JCDHE’s WIC and immunization programs to interview residents about food insecurity, access and need.

**Johnson County Developmental Supports.** Johnson County Developmental Supports (JCDS) was established in 1972 as an agency of Johnson County (Kansas) government to provide community-based services for people with developmental disabilities. JCDS is headed by a seven-member governing board composed of parents, community advocates and professionals who are appointed by the Johnson County Board of County Commissioners. An executive director and a staff of 260 trained professionals lead daily operations. JCDS programs and services are partially funded on a contractual basis with the Kansas Department of Social and Rehabilitation Services. Additional funding sources include a county tax levy, state
block grants, subcontract income, contracts with companies for workers, private grants and donations. JCDS provides office space, Internet access, and some clerical support for MRRC investigators working on site. Today, as a Community Service Provider (CSP), JCDS directly serves nearly 500 people daily. Through a person-centered planning process and within available resources, services are shaped to fit individual needs, preferences, goals, abilities and interests. Some examples of available services include Residential Supports (ranging from a few hours of support for those living independently to live-in, around-the-clock care), Day Supports (facility-based or community-based employment opportunities for paid work, or other activities including volunteer work), Alternative Supports (professional resources for nursing, occupational therapy and assistive technology), Behavior Supports (applied methods to maximize adaptive behavior) and Case Management.

In addition to being a service provider in Johnson County, JCDS has another, equally important role: that of Community Developmental Disabilities Organization (CDDO). As CDDO, JCDS provides a single point of contact and entry for all of Johnson County, Kansas and maintains a county-wide service needs list for those waiting for certain services. Johnson County Developmental Supports accomplishes its direct service mission by developing, linking, and monitoring services, supports, and resources for approximately 700 people. In addition, JCDS works with over 360 affiliates who are agencies and individual service providers to assist access to quality, cost-effective services.

COMMUNITY ENTREPRENEURSHIP RESOURCES
The Bioscience & Technology Business Center at the University of Kansas Medical Center
The Bioscience and Technology Business Center (BTBC) was a unique creation in 2006 by the City of Lawrence (City), Douglas County (County), the University of Kansas (KU) and the Lawrence Chamber of Commerce (Chamber). Its missions are to create, grow, recruit, and retain bioscience and technology companies from within the region and spun out from the University and build a sustainable economic development infrastructure and tax base for the region.

Beyond the unique BTBC stakeholder structure and strategic partnerships, the BTBC has developed a dynamic and successful environment for innovation and entrepreneurship, and an engine for creating and accelerating high-tech and bioscience businesses. These successes have been accomplished through:

- Startups based on research and technology from KU and the KU Medical Center;
- State-of-the-art BTBC facilities with advanced amenities such as gigabit fiber internet;
- BTBC resources including business services and the expansive BTBC network;
- Competitive incentive packages to worthy companies starting new business operations; and
- Strong coordination with KUIC in accessing KUMC academic and technology resources for BTBCMC companies.

BTBC will continue to build and leverage its assets and other resources for further development of its footprint at KUMC and KUMC’s relationships and value to the region’s economy.

Digital Sandbox KC provides proof-of-concept resources to support early-stage commercialization processes including access to technology, business and market experts and funding for early stage market validation, prototyping and beta testing services.

Kansas City Area Life Sciences Institute (KCALSI). As a nonprofit institute with a goal to stimulate and coordinate regional life sciences initiatives, KCALSI is:

- Fostering relationships between the academic and private sector life sciences communities
Assisting scientific collaborative research efforts through identifying funding opportunities, proposal review facilitation, resource allocation, and maintaining accountability

Raising awareness of the life sciences and the value it brings to people, the region and institutions

Assisting in life sciences advocacy efforts at the local, state, and national levels

Providing support to economic development and technology transfer & commercialization organizations.

KUMC CORE FACILITIES

KU Clinical Research Center (Figure FR-KL2.6). Designed unlike any other research facility in the country, the 82,400 ft² building, which was donated by the Hall Family Foundation, has been remodeled with state-of-the-art features and a more efficient use of space, resources and manpower to best accommodate patients and researchers:

- Easily accessible outpatient exam and treatment rooms, office space and specimen collection laboratories
- A pavilion for gatherings and community events
- Clinical research functions combined into one location

The Clinical Research Center is home to the Clinical and Translational Science Unit (see next) and the NIA-supported Alzheimer’s Disease Center (described above).

Clinical and Translational Science Unit (CTSU). The Clinical and Translational Science Unit (CTSU) provides state-of-the-art space for researchers to see patients who are enrolled in clinical trials. The CTSU is staffed by experienced registered nurses and medical assistants, who provide routine care, complex protocol procedures and help record research data in study flow sheets. The space features an exercise physiology laboratory and a commercial-quality metabolic kitchen.

The CTSU does this through:

1) Physical infrastructure and resources to support all aspects of research from patient involvement to complex multidisciplinary, multi-institutional collaborations.
2) A team-based environment with established methods and processes to stimulate collaborative research and support increasingly complex trials.
3) Training opportunities for the translational science workforce in an integrated, continuous-learning environment.
4) The CTSU currently supports 137 approved protocols: 86 investigator-initiated and 51 industry-sponsored studies. In 2015 we had 4887 participant visits to the CTSU (non-unique), up 140% over our first year in 2011 (n=2055) and a 60% increase over the 2014 (n=3061 participants). We attribute this recent growth (Figure FR-KL2.7) to the increasing user-base as investigators have adapted to our new location in the Clinical Research Center.
Center. Currently, the CTSU’s 137 protocols are directed by 68 different PIs from 27 different KUMC departments and centers. Additionally, we support PIs from various campuses in the region including the University of Missouri-Kansas City (Dr. Lundgren), KU-Wichita (Drs. Collins and Redmond in Preventive Medicine), KU-Lawrence (Dr. Storkel, Life Span Institute) and a local physician (Dietz) with the Kansas City CARE Clinic. Our increasing user base from regional institutions underscores our usefulness to a broad and varied research base and the unifying, collaborative mission of the CTSU as a site for team science.

**CTSU Infrastructure:** The CTSU (25,000 ft²) is housed on the third floor of the KU Clinical Research Center. The Clinical Research Center is a unique regional resource supported by the Johnson County Education and Research Triangle (JCERT) initiative, a 1/8th cent sales tax passed in 2008 to create economic stimulus through new facilities for clinical research, animal health, engineering, business, science and technology. This new, 75,000 ft² facility is located near the KU campus with easy access for all HICTR network institution investigators and research participants.

- **Clinic Space:** The CTSU contains 17 clinic rooms, 2 cognitive testing rooms, and open workspaces for up to 5 visiting study coordinators (Figure FR-KL2.8).
- **Infusion Center:** The CTSU’s infusion center has 11 infusion bays supported by two nursing stations and activity in the center has steadily grown. We have supported seven phase 1 first-in-human studies (Pompe’s disease, Fabry’s, myotonic dystrophy, multiple sclerosis, and pancreatitis). The center also supports research infusions (480 infusions in 2015) and intensive and complex metabolic research assessments such as hyperinsulinemic-euglycemic clamps (n=70).
- **Overnight Stay Unit / Sleep Lab:** The Overnight Stay Unit (1,200 ft²) consists of 3 dedicated rooms supported by a nursing station. The unit also is a fully functional sleep lab supporting both clinical and research sleep studies when research overnight stays are not scheduled. We have supported 42 overnight stays since moving into the new building.
- **Bionutrition Unit:** The CTSU’s bionutrition unit includes an 830 ft² metabolic kitchen and a 600 ft² demonstration kitchen. The kitchen is fully equipped to provide meals required by study protocols, including regular, therapeutic, modified, and calculated and weighed research meals.
**Exercise Physiology Laboratory:** The CTSU’s dedicated Exercise Physiology Lab contains two metabolic carts (ParvoMedics TrueOne 2400), treadmills, bicycle ergometer, and electrocardiogram. The CTSU has a Dual Energy X-ray Absorptiometry (iDEXA, GE Healthcare) for detailed body composition assessments. The exercise physiology laboratory is currently supporting 17 studies and in 2015 conducted 84 treadmill tests and 179 DEXA scans.

**Clinical Laboratories:** The CTSU has a sample processing lab that contains a glucose analyzer (YSI STAT Plus), refrigerated centrifuge (Heraeus Labofuge 400 R), and three –80 degree freezers (Thermo Electron Forma). The Clinical Research Center also has a state-of-the-art Bioanalytical Lab equipped with two Waters UPLC-Xevo TQ-S LC-MS/MS systems.

**CTSU Team-based Environment:** The CTSU adheres to (and develops as needed) high-quality methods and processes to support complex trials and procedures. This infrastructure and expertise enables investigators to avoid developing these costly resources on their own and provides them with the team-based environment essential to performing these complex studies.

**Research Nursing Team:** The CTSU team is composed of an administrative director, nurse manager, 6 research nurses and a medical assistant. This flexible team provides staffing for any needed assessments, phlebotomy, complex procedures, overnight stays, and processing of lab samples.

**Research Coordinators:** The CTSU maintains a pool of research coordinators who can conduct all aspects of research coordination. The pool is currently composed of 2 full time coordinators and 2 part time coordinators (CTSU research nurses “flex” between the research nursing team and coordination, as needed). The coordinators have supported a total of 48 trials (28 different PIs) since 2011 and are currently supporting 20 trials (from 14 different PIs).

**“CTSU without Walls” Program:** The CTSU offers a CTSU without Walls program to increase access to CTSU resources by supporting research outside the structured unit. Deployable research nurses are available to assist investigators with 1) drawing blood; 2) performing IV infusions; 3) collecting and processing specimens; 4) administering study drugs; 5) monitoring for adverse events; and 6) performing other protocol procedures such as oral glucose tolerance tests.

**Investigational Pharmacy:** The Investigational Pharmacy (1200 ft²) is located on the second floor of the Clinical Research Center and is staffed with a director and two pharmacists. The Investigational Pharmacy stores, handles, and prepares all the study drugs and infusions for CTSU protocols.

**Medical Monitoring:** The CTSU offers medical monitoring as needed for studies needing clinical oversight. Medical monitoring includes two nurse practitioners and a physician who are available to monitor procedures such as treadmill exercise testing or infusions, perform physical exams, and provide AE assessments when needed. This service lowers barriers to conduct complex, intensive procedures such as exercise testing in high risk patients.

**PCI Clinical Research Satellites.** The CTSU maintains 3 satellite spaces on the main KUMC campus. This enables participants or researchers who need basic support offsite to conduct research visits and access to some of the resources of the CTSU.

**Swope Health Services Satellite:** The PCI program also has site at the Swope Health Center in Kansas City, MO, a safety-net clinic that enhances access to a largely minority, underserved research population. Swope is a patient-centered medical home that provides primary health care and behavioral health services in Kansas City. Swope Health Services mission is to improve the health and wellness of the community by delivering accessible, quality, comprehensive patient care. Today, Swope Health Services provides care for more than 40,000 patients in western Missouri and eastern Kansas. The PCI program has dedicated research space at Swope that includes 2215 ft² of space that includes 10 offices and 3 workstations. The space enhances access to the patient population served at Swope and provides the space to accommodate over 2400 research
assessments annually. Currently, there are three smoking cessation projects including two R01 funded projects led by Drs. Nollen (DA031815) and Cox (DA035796) and a PCORI-funded project (AD-1310-08709) led by Dr. Nollen. Additionally, the satellite presence created opportunities for the KU AD Center to participate in an NIA funded multi-site trial of aspirin in reducing clinical events in older adults.

- **Delp Satellite (KUMC Main Campus):** The Delp satellite is located on the main KUMC campus and consists of 250 ft² of dedicated research space. This basic unit is outfitted with a calibrated centrifuge, lab collection supplies, desk top computer, exam table, crash cart, scale, stadiometer, and vitals machine. Utilization averages 28 subjects per month.

- **Hoglund Brain Imaging Satellite:** the Hoglund satellite space is located at the Hoglund Brain Imaging Center to support clinical research procedures such as phlebotomy, clinical assessments, and cognitive testing that may accompany brain scanning protocols. The space is 150 ft² and outfitted with centrifuge, exam table, and phlebotomy supplies. Utilization averages 28 subjects per month.

**KUMC Laboratory Animal Resources.** The Laboratory Animal Resources (LAR) is charged with housing and care of research animals at KUMC. The LAR is comprised of 99,388 gross assigned sq. ft. in 4 buildings located on the KUMC campus in Kansas City (independent of the University of Kansas, Lawrence campus facilities). The LAR employs 37 staff. The entire centralized animal care program was fully accredited by the Association for Accreditation and Assessment of Laboratory Animal Care International (AAALAC) in February 1992 and has maintained its accreditation since that time. Housing facilities are available for a wide variety of animal species, including the usual laboratory animals. The facilities include a variety of dual purpose animal rooms. Animals are housed separately by species and, when possible, by source and/or microbiological status. Research support also includes model development assistance, technical assistance, and IACUC protocol review. The principal site is the Research Support Facility (RSF), which includes conventional rodent rooms, biohazard suites, isolation cubicles, surgical suites, cagewash and support facilities. This facility totals ~75,896 sq ft and houses all species of animals. The second animal facility occupies the fifth floor of the Smith Building, including cagewash and support space as well as conventional rooms for housing rodent species and monkeys. The Smith Building animal facility totals ~6170 sq ft. A third animal facility is in the ground floor of the KLSIC building and totals ~14,340 sq ft. This facility includes housing and support space, cagewash, procedure rooms, the transgenic core facility, a rodent behavioral core, and an ABSL3 laboratory. This is a barrier facility equipped with bulk autoclaves and ventilated racks. The animal care facilities are integrated into a comprehensive program for animal care and use and have reporting responsibilities to two major organizational components of the university administration. Animals for specialist purposes are also housed in several small satellites.

The financial and policy management falls under the office of the School of Medicine Senior Associate Dean for Research as a core facility and the Director of Laboratory Animal Resources reports to the Senior Associate Dean for Research. The regulatory and compliance management falls under the Animal Research Protection Program (ARPP) in the Office of Compliance. The Institutional Official for the program is the Vice Chancellor for Administration, who oversees the Office of Compliance. The institutional official appoints the Institutional Animal Care and Use Committee (IACUC). The IACUC is managed by the ARPP program, which is independent of the LAR (to eliminate any conflict of interest). The director of ARPP is a certified IACUC administrator.

**KUMC Rodent Behavior Facility.** The Facility assists researchers in incorporating and executing sensorimotor behavioral research techniques using rodents in their individual research projects. The Rodent Behavior Facility provides both equipment and services, and is available for use with the appropriate training and approval.
KUMC Transgenic and Gene-targeting Institutional Facility. This Facility is an animal genetic model development and research facility that supports transgenic and gene-targeting research endeavors, promotes technology development, and serves as a resource for these technologies. It provides "3D" service for design, development, and depository of mouse models for researchers at KUMC and their collaborators at other academic institutions.

KUMC Confocal Imaging Center. This facility provides affordable, readily accessible, user-friendly state of the art laser confocal microscopy services to researchers at KUMC and other area institutions.

KUMC Electron Microscopy Research Laboratory. The Electron Microscopy Research Laboratory office is well equipped for routine electron microscopy applications and technical personnel are available to assist investigators. This technology is available to researchers by appointment.

KUMC Genomics Core. The Genomics Core was formed with the merger of the Genome Sequencing Facility and the Microarray Facility. By combining these core resources investigators have access to both Next Generation sequencing technology and Microarray technology in a centralized core. The Genomics Core provides access to both deep sequencing and array technologies to Institutional Investigators who participate in the Frontiers Clinical and Translational Research mission. Participating investigators receive affiliate pricing for all services provided by the Genomics Core. The Genomics Core has worked closely with Frontiers Investigators to provide deep sequencing and array data sets for the advancement of the research efforts.

The Genome Sequencing Facility provides deep sequencing services using the Illumina HiSeq2500 sequencing system. Full service library preparation services are also available. The Microarray Facility features microarray services using the Affymetrix GeneChip system. The Agilent Bioanalyzer services and nucleic acid isolation services provided through the Microarray Facility supports both the Next Generation sequencing and GeneChip microarray services provide through the Genomics Core. The Genomics Core also provides the following services: Paired end or single read Genome sequencing using the HiSeq 2500 Sequencing System with multiple sequencing cycle strategies. Sequencing library preparation services for a wide range of sequence interrogation strategies. Affymetrix GeneChip array interrogation for expression analysis (mRNA and transcriptome) and genome wide studies. Agilent Bioanalyzer QC analysis of RNA isolates. RNA / genomic DNA isolation services. Access to discounted Sanger sequencing and oligonucleotide synthesis through outsourcing agreements with GENEWIZ and Integrated DNA Technologies (IDT).

KUMC Histology Imaging Analysis Core. The Histology Services facility houses sample preparation areas, including a fume hood and equipment for sample preparation for light and electron microscopy. The facility is supervised by a histology specialist who is responsible for maintaining all equipment and for training investigators and personnel in equipment use. The Histology laboratory is fully equipped for paraffin histology, including automated processing, embedding, sectioning and staining. Facilities also are available for the embedding and sectioning of frozen specimens. For viewing sectioned material, the histology laboratory is equipped with dissecting and light microscopes.

KUMC Hypoxia Core Laboratory. This Laboratory contains two profiling chambers located inside a glove box as well as two mobile chambers that can be set up in individual labs. The profiling chambers are controlled for temperature, humidity, CO₂ and oxygen. These chambers are operated by computer and allow for set point and profiled oxygen concentrations. The glove box is a controlled environment that can be used to change media and work with cells in an oxygen controlled workspace. Mobile chambers can operate in any temperature-controlled environment at any single oxygen set point. A computerized controller maintains the oxygen concentration by infusing a mixed gas that effectively dilutes the oxygen concentration to the set point.

KUMC MicroArray Facility. This Facility provides centralized access to gene expression microarray technology for advancing research conducted by investigators from KUMC, Kansas Reagents Institutions, and member institutions of the Kansas City Area Life Science Initiative (KCALSI). Using the GeneChip® expression arrays, researchers can monitor gene expression in multiple modeling systems. Expression data can be
analyzed using the expression analysis software. The Microarray Facility operates in conjunction with the KUMC Bioinformatics Core which serves as a resource for data analysis.

**KUMC Flow Cytometry Core.** The mission of the Flow Cytometry Core Laboratory is to provide access to state-of-the-art flow cytometry and related technologies to researchers at the University of Kansas Medical Center and other area institutions. The FCCL has served more than 70 researchers at KUMC, including support of projects in the basic, translational, and clinical sciences. Programs that heavily use the core include the Cancer Center and the Institute for Reproductive Health and Regenerative Medicine and the Departments of Microbiology, Hematology/Oncology, and Pathology. Core Staff provide assistance in experimental design, protocol development, sample preparation, data acquisition, and data analysis. In addition, staff perform all cell sorting experiments. Staff train users in the proper use of the instruments with level of service depending on the experience and wishes of the user. Experienced users receive training related to the specifics of our instruments and are able to operate the instruments independently. Novice users receive more extensive training and often choose to pay an hourly rate for staff to perform aspects of the experiments.

An extensive array of instrumentation is available in a suite of 775 ft². The *BD LSR II* which was present when the core was founded in 2005, has been upgraded and now is a four-laser, eighteen-parameter instrument. *Attune NxT* is the newest instrument in the core. It is a two-laser, nine-parameter instrument that has features that offer flexibility for our users. Specifically, the autosampler allows the acquisition of data from a 96-well plate in as little as 15-20 min. In addition, the Attune is automated to allow simpler start-up and shut-down procedures and 24/7 access. *FACS Ari A III U* has undergone two major upgrades that included the addition of lasers and detectors, as well as a new fluidics system. *Celigo* can take brightfield or fluorescence images of tissue culture plates and flasks. *Luminex* allows multiplex analysis of cytokines, chemokines, and other small molecules from small samples. The technology combines the concept of an ELISA with flow cytometry detection of beads bound to analytes. The instrument is often used as a screening tool for investigators to choose the analytes of interest and then pursue the findings with less expensive technology. *RoboSep* is an automated magnetic bead-based separation assay purchased from the funds provided by individual users.

**Shared Glassware Facility.** The Shared Glassware Facility (380 ft²) provides shared glassware washing and autoclaving, media preparation and other services as requested by faculty at KUMC. Facility is operated by the Microbiology Department and is available to any KUMC investigator who chooses to participate by paying a portion of the technician's salary and supply costs. This facility has been part of the Microbiology Department for more than 20 years and continues to provide services as requested by KUMC faculty. The SOM has been involved with purchase of equipment and service contracts along with the glassware facility manager cap for salary. In recent years, salary support for the technician has been partially provided through the Microbiology Department COBRE Phase III grant.

**Biospecimen Repository.** This is a cancer focused but non-disease or site specific collection resource for highly annotated human samples. Specimens are available to qualified researchers at KUMC and vetted collaborating institutions. Services include Fresh frozen tissue (1mL aliquots) in monitored liquid nitrogen vapor phase freezers; Formalin-Fixed Paraffin-Embedded (FFPE) tissue; Blood products (1mL aliquots of buffy coats, plasma, viable lymphocytes and serum) in -80°C freezers; Isolated DNA; Urine; Saliva. The Biospecimen Repository is an established biospecimen bank of the University of Kansas Cancer Center that supports sample processing and storage for a wide variety of investigator-initiated studies on the KUMC campus. The BRCF coordinates the ethical collection, storage, annotation, and distribution of tissue and peripheral blood samples to support translational research. The BRCF supports the KU ADC sample processing and storage of whole blood, plasma, serum, buffy coat, platelets, DNA, and RNA. The laboratory is equipped with three -80°C Harris upright freezers (Model SLT-25V-8S5IA37), installed with a Revco CO2 back-up system (Model 6593-1); and two Custom Biogenics liquid nitrogen vapor phase freezers (Model ASC24T); a Sensaphone alarm system (Model 1104). These freezers are available for the purpose of storing tissue and blood samples. The BSR will support the processing and storage of blood samples for this study.
KU Program in Integrative Medicine. KU Integrative Medicine focuses on biomedical based therapies, combining the best therapies from conventional medicine with an integrative medicine approach. Practitioners at KU Integrative Medicine include physicians, a naturopathic doctor, nurse practitioner, nurse, certified neurofeedback technicians and registered dietitians. Research at KU Integrative Medicine is moving forward in both the basic science lab and in the clinical realm, with research on intravenous vitamin C leading the country.

KU SCHOOL OF MEDICINE-WICHITA

KUSM-Wichita Campus. KUSM-W is a community-based campus with offices spread across Wichita. The main campus building houses all administrative units and the Departments of Family and Community Medicine, Internal Medicine, Psychiatry and Behavioral Sciences, and Preventive Medicine and Public Health. Other departments are housed at one of the local community hospitals, including Pediatrics, Radiology, Orthopedics, Obstetrics and Gynecology, Surgery, and Anesthesiology (Figure FR-KL2.9). Resources also include the Farha Medical Library and the Office of Rural Health Education and Services. The KU Wichita School of Pharmacy is co-located with the School of Medicine. The School of Pharmacy provides unique opportunities for interprofessional education and research in Wichita.

KUSM-W Clinical Services. The KU School of Medicine-Wichita has considerable clinical and patient care facilities and resources. As a community-based medical school, faculty and staff have access to three major community hospitals for education, clinical practice, and research.

- Wesley Medical Center, part of Hospital Corporation of America, is an acute-care center licensed for 760 beds and 102 bassinets. Wesley treats more than 24,000 patients annually and delivers more than 6,000 babies, more than any hospital in a 13-state region. Wesley provides the most extensive emergency network in Wichita. Wesley also houses a resident continuity clinic for Obstetrics and Gynecology and Family Medicine.

- Via Christi Health is a member of Ascension Health, the largest Catholic and largest nonprofit health system in the US. Via Christi Health is the largest provider of healthcare services in Kansas. It serves Kansas and northeast Oklahoma through its doctors, hospitals, senior villages, and health services. Via Christi includes more than 245 physicians and more than 175 advanced practice professionals employed through Via Christi Clinic, hospitals, and community sites. More than 1,200 physicians have medical privileges at Via Christi Hospitals. Via Christi also houses a resident continuity clinic for Family Medicine.

- The Robert J. Dole VA Medical Center is a Joint Commission accredited, complexity level 2 facility. The Medical Center serves over 30,000 Veterans living in 59 counties of the state. The Medical Center is a primary and secondary care facility. It is a teaching hospital, providing a full range of patient care services, with state-of-the-art technology. Comprehensive health care is provided through primary care, secondary care, and long-term care in areas of medicine, surgery, psychiatry, physical medicine and rehabilitation, cardiology, neurology, oncology, dentistry, visual impairment and low vision rehabilitation, spinal cord dysfunction, traumatic brain injury, polytrauma, pain management, post-traumatic stress
syndrome, homeless, mental health intensive case management, prosthetic laboratory/orthotics, and extended care services. In addition to the main facility in Wichita, they offer services in six community-based outpatient clinics.

The KUSM-W Medical Practice Association was established to provide medical education, research, and medical care through its members who are full-time faculty at the University of Kansas School of Medicine-Wichita. It includes the KU Wichita clinics: Adult Medicine (an internal medicine clinic), Internal Medicine Midtown (an internal medicine clinic), Center for Breast Cancer Survivorship, Center for Internal Medicine (the residency continuity clinic), Endocrinology, Gastroenterology, General Pediatrics, Subspecialty Pediatrics, Psychiatry, and Psychology.

**KU Wichita Clinical Trial Unit.** The KU School of Medicine-Wichita Clinical Trials Unit (CTU) is dedicated to determining the safety and optimal dosing of significant new medications to relieve the burden of mental illness on patients and families. This involves testing novel mechanism of action drugs and biologics for the most serious neuropsychiatric illness including Major Depression, Alzheimer’s disease, and Schizophrenia.

CTU investigators have between 8 and 30 years of experience covering the spectrum from trial design to study operationalization and execution across all phases of human testing. This includes development of study protocols, ensuring compliance with federal guidelines for good clinical practice, and analysis of results. The research group includes three investigators, four full time staff, and one site manager and has been funded by private foundations, pharmaceutical companies, and the National Institutes of Mental Health.

Site resources include fourteen fully furnished research and clinical offices with telecommunications capabilities, two examination rooms, two centrifuges, one refrigerator, one full size -20 freezer, one full size -80 freezer, one half size -80 freezer, one reception area, one patient waiting area, one conference room, and one record-storage room.

Because of the group’s background in biological psychiatry and neuroscience, the CTU’s efforts have focused on central nervous system drug development. In addition, the expertise and resources of the CTU are being utilized to expand the research efforts of other clinical departments on the Wichita campus. This involves oversight of study startup and operationalization including administrative oversight and training of investigators and site staff.

In addition to growing the academic mission of the campus, this work directly relates to the Universities teaching and clinical missions because health care providers must understand the process of drug development so they can critically evaluate the literature and judge whether and how to introduce new medications and devices into the treatment of patients.

**KUSM-W Laboratory.** The KU School of Medicine-Wichita (KUSM-W) does not have laboratory resources. However, laboratory resources are available through Wichita State University.

**KUSM-W Animal.** The KU School of Medicine-Wichita does not have animal facilities. However, animal facilities are available through Wichita State University.

**KUSM-W Computer.** Computer resources are provided by the KUSM-W Office of Information Technology (IT). These resources are linked to the information technology department at KUMC in Kansas City. Thus, KUSM-W has full access to all institutional IT resources. Locally, the Office of Information Technology develops computer-based tools and provides IT education and support in the areas of data retrieval, storage, manipulation, composition, production, and distribution. They support mobile and remote technology including interactive television, smartphone applications, and audience response systems.

**The Wichita Community Clinical Oncology Program (CCOP) is affiliated with KUSM-W.** The CCOP includes 11 medical oncologists; 6 radiation oncologists; 2 gynecologic oncologists; 1 pediatric oncologist; and
16 surgeons, urologists, and primary care physicians. The program receives patient referrals from more than 175 additional physicians. It first received funding through NCI in 1983.

KUSM-W publishes the Kansas Journal of Medicine, an online general medical journal (kjm.kumc.edu). The Kansas Journal of Medicine publishes original research, reviews, commentaries, and case studies on all aspects of clinical medicine, health care delivery, health policy, and medical education.

 Universidad de Kansas – Lawrence

University of Kansas. The University of Kansas is a major public research and teaching institution that operates through a diverse, multi-campus system. This multi-campus system is comprised of the University of Kansas Campus in Lawrence, the University of Kansas Medical Center (KUMC) in Kansas City, the University of Kansas School of Medicine in Wichita and in Salina, and the University of Kansas Edwards Campus in Overland Park. KUMC houses the School of Nursing, the School of Allied Health, and the School of Medicine.

The University of Kansas (KU) is a comprehensive educational and research institution with more than 28,000 students and 2,800 faculty members. More than 98% of the faculty hold terminal degrees in their field. The University offers more than 360 academic degree programs.

KU occupies 1,000 acres at five principal locations in Kansas. The main campus is in Lawrence (KU-L; Figure FR-KL2.10), a thriving city of 90,000 in eastern Kansas. The KU Medical Center (KUMC) in Kansas City, Kan., about 45 miles east of Lawrence, is home to the academic schools of the health professions, medicine and nursing, as well as clinics and research centers. The KU Edwards Campus (KU-E) in Overland Park offers courses primarily for working adult students. The KUMC Wichita campus offers a four-year degree program, as does the KUMC campus in Salina. In addition, the University has numerous educational and research facilities throughout the state.

Institutional Excellence Highlights. The Carnegie Foundation classifies KU as one of 115 R1: Doctoral Universities: Highest Research Activity institutions. KU has been a member of the prestigious Association of American Universities since 1909. University of Kansas graduate programs continue to excel nationally, with 44 ranked programs, according to the 2016 U.S. News and World Report rankings. Ten KU programs appear in the top 10 among public universities nationally, and 38 are in the top 50.

Research at the University of Kansas. As noted above, KU is classified as an R1: Research Universities: Highest Research Activity institution. This designation reflects the breadth and depth of its graduate programs,
particularly its doctoral programs. KU is a national public research university and the state’s flagship institution, as measured by the broad range and global impact of its research enterprise and its high level of research funding.

As a comprehensive research university, the University of Kansas has outstanding research programs across the range of academic disciplines. Research efforts are organized through major multidisciplinary research centers at the KU-L and KUMC campuses. These major centers reflect KU strengths and provide resources necessary to build these strengths. The Lawrence campus also houses two state surveys that conduct research and provide vital service to the state of Kansas. Many additional research centers, institutes, and other non-academic units reflect the breadth of its research enterprise.

**Research Rankings.** For FY2013, the annual National Science Foundation survey of federally funded research and development expenditures ranked KU 72nd overall and 38th in the country among comparable, national, public, research universities.

**Recent Notable Research-Related Awards.** Since 2010, large, new and renewed, externally funded research and development awards at KU include:

- Frontiers Clinical and Translational Sciences Award (2011), $20 million, NIH
- Alzheimer’s Disease Research Center (2011), $8.7 million, NIH
- School-Wide Integrated Framework for Transformation (SWIFT) (2012), $24.5 million, ED
- NCI-Designated Cancer Center, $7.5 million (NIH)
- Alaska Assessments Program (2014), $25 million, State of Alaska
- Center for the Remote Sensing of Ice Sheets (2010 Renewal): $17.9 million, NSF
- Dynamic Learning Maps Alternate Assessment System (2010): $22 million, ED
- COBRE: Protein Structure and Function (2014 renewal): $5.6 million, NIH
- Kansas IDeA Network for Biomedical Research Excellence: $19 million, NIH
- The SWIFT Center became one of 14 affiliated centers of the Life Span Institute in April 2015 and is closely associated with the Department of Special Education at KU

The School of Pharmacy ranks second in the nation among pharmacy schools for the amount of research funding received from the National Institutes of Health.

**KU Strategic Planning.** During 2010-11, KU undertook a major strategic planning initiative at the Lawrence Campus. The result was a five-year plan known as Bold Aspirations. It features six overarching goals and four strategic initiative themes built around existing and emerging KU research strengths. Outcomes of the plan include the formation of a Research Investment Council for competitive internal grants that support the themes, as well as the hiring of 12 Foundation Distinguished Professors in strategic categories. Greater emphasis is being given to community-engaged research, innovation and doctoral education. The Changing for Excellence program has identified opportunities for cost-savings that can be reallocated to high priority areas. Bold Aspirations continues through 2017. On the Lawrence campus, this has resulted in the awarding of a number of Strategic Initiative Grants at various levels, several cluster hires, and the hiring of 17 Foundation Professorships. The recent recruitment of translational scientists such as Steven Soper, PhD, a biomedical engineer, biomarker expert and entrepreneur who engages clinicians on CTR projects, adds new depth to the Frontiers.

**PHYSICAL INFRASTRUCTURE**

**KU Information Technology (KU IT).** at the Lawrence campus supports the academic and research missions of the University of Kansas by providing a broad range of technology services, tools and infrastructure that
support research, learning, scholarship and creative endeavor. KU IT includes a 24/7 enterprise data center and knowledgeable staff with expertise in server and desktop support, application support, software development, IT security, networking, customer support and project management.

Collaboration and communications among KU researchers and colleagues at other institutions is paramount. KU IT has completed a number of projects in recent years to support research and facilitate collaboration on campus and around the world:

- Significantly expanded Wi-Fi on the Lawrence campus, including in core research buildings.
- Joined the eduroam global consortium, which allows KU researchers to use their KU credentials for logging in to Wi-Fi at eduroam partner institutions around the world, and allows visiting researchers from eduroam partners to access KU’s fast and secure Wi-Fi network.
- Upgraded older optical fiber backbone cabling to modern single-mode fiber in a number of buildings, allowing for gigabit connectivity and room for future expansion and growth.
- Upgraded bandwidth to multiple 10Gb connections within and between research buildings, as well as from campus to the outside world.
- Completed a redundant optical fiber loop on KU's West Campus to provide speed, bandwidth and capacity for growth to support discovery and innovation in up to 20 current or future buildings.
- Partnered with KU’s Information & Telecommunications Technology Center and the Office of Research to create the Center for Research Computing, which identifies and delivers cross-functional technology services and support to meet the needs of researchers.
- Provides high-performance, easily accessible file sharing and storage for KU research projects, research groups and service labs that need terabytes of secure, scalable data storage.
- KU has a dedicated team to provide workstation and other technology support to researchers. In addition, a Research Dashboard in KU’s portal provides 24/7 access to IT and other information needed for completing successful research grant applications. The dashboard includes a PI Proposal Checklist and links to other important resources.

The University of Kansas Libraries. The KU Libraries are committed to supporting the teaching, research and outreach efforts of the University and to serving the state of Kansas, the nation, and the world through the acquisition, preservation, application and dissemination of knowledge. Resources include 10 library facilities on 4 campuses, holding more than 4.7 million volumes, including photographs, maps, current serial subscriptions, and access to information through hundreds of electronic databases. Among university libraries nationwide, in terms of holdings KU ranked 49th overall and 27th among public institutions in 2013.

- Libraries supporting science and medicine. The main Watson Library on the Lawrence campus houses the University's collections in the social sciences, humanities and professional fields of journalism and social welfare.
  - Anschutz Library, constructed in 1989, houses collections in the sciences, business, education, U.S government and international documents and maps
  - A.R. Dykes Medical Library, located at the University of Kansas Medical Center, is one of the premier medical libraries in the Midwest
  - In 2010, KUMC launched Meet Our Experts, an online service based on BibApp software to facilitate collaboration and public information access to the Medical Center's faculty and staff
New, Recent or Renovated Research-Related Space

- The Biodiversity Institute Genomics Complex (2013) is a $2.8-million project in historic Dyche Hall that provided major laboratory renovations, advance and modernize research facilities, and increased the capacity for training graduate students in biodiversity science.

- The Measurement, Materials and Sustainable Environment Center (2012) is an $18.8-million, 35,000 ft² facility for the School of Engineering. It provides space for engineering and other research groups to cooperate on developing projects in biofuels, remote sensing technologies, commercial avionics, and materials fracture and fatigue.

- The Learned Engineering Expansion Phase 2 (LEEP2) opened in 2015. It integrates with Learned Hall, Spahr Library and the Measurement, Materials and Sustainable Environment Center, adding more than 135,000 ft² to KU’s engineering facilities. Features include six active-learning classrooms, teaching and research labs, a remodeled library and numerous new collaboration and study spaces. Elsewhere on the Lawrence campus, the School of Engineering’s Structural Testing and Student Projects Facility also opened in 2015. Nearby is the Hill Engineering Research and Development Center (2013), which houses student projects related to sustainable energy approaches for automobiles and infrastructure.

- The Bioinformatics Computing Facility (2011) is a $4.6-million, 6,000 ft² renovation in Nichols Hall, home to the Information and Telecommunication Technology Center. The project supports a 20-fold boost in computing power and a 15 percent reduction in the building’s energy consumption. Business, Engineering, The Earth, Energy and Environment Center is currently under construction at Lawrence. It will be a multidisciplinary facility for programs in geology and engineering. Nearby, KU is preparing the site for a new Integrated Science Building, housing both research and teaching that is part of the Central District Redevelopment and the “Innovation Way” initiative.

- The Business, Engineering, Science and Technology Building (2011) at the KU-Edwards Campus in Overland Park is a component of the Johnson County Education and Research Triangle project. Funded by a special sales tax, the $25-million, 75,000 ft² facility is part of a partnership involving the Kansas State University Innovation Campus in Olathe and the KU Clinical Research Center in Fairway.

- The Children’s Campus /Educare of Kansas City (2010) is a $15.5-million, 72,000 ft²-facility in Kansas City that serves as a collaborative model for education, research and service. It houses KU’s Juniper Gardens Children’s Project and Kansas Center for Autism Research and Training, KUMC’s Project EAGLE Community Programs and the non-profit Family Conservancy. KU Medical Center Pediatrics offers clinical services.

- The School of Pharmacy observed its 125th anniversary in 2010, making it the third-oldest program west of the Mississippi River. The school ranks second nationally in the amount of research funding it receives annually from NIH. Also, in 2010, the school opened a new $45 million, 110,000 ft² teaching and practice building in Lawrence, adjacent to the West Campus Research Circle laboratory facilities. That year a $5-million satellite teaching facility opened at the KU Medical Center campus in Wichita.

- The Shankel Structural Biology Center (2004, 2008) is a $30-million, 60,000 ft² facility that houses 70 researchers on two levels and is home to the NIH-funded Center of Excellence in Chemical Methodologies and Library Development and NIH-funded Specialized Chemistry Center, as well as the High-Throughput Screening Lab and two COBRE centers: Cancer Experimental Therapeutics and Protein Structure and Function.

- The Multidisciplinary Research Building (2006) is a $40-million, 106,000 ft² facility featuring group lab space, a shared BSL-3 facility, and Class 100 and 1000 clean rooms for researches in medicinal chemistry,
bioanalytical chemistry, pharmaceutical chemistry and other programs. It is designed to accommodate approximately 200 researchers on three levels.

**Recent major equipment investments**

- An 800-MHz nuclear magnetic resonance (NMR) spectrometer was installed in the new Structural Biology Center as well as a second NMR, a mass spectrometer, and an X-ray diffractometer. This state-of-the-art instrument array is used to analyze proteins and provides additional capabilities for KU scientists not available at other universities in the region.

- The Microscopy and Electronic Imaging Laboratory acquired a LEO 1550 field-emission scanning electron microscope. In addition to the usual secondary and backscatter electron detectors, this high-resolution microscope is equipped with additional detectors that provide elemental analysis, mapping of zonal variation and chemical composition in materials, identification of phase changes and crystal deformations, and nanostructure device fabrication.

- The Mass Spectrometry Laboratory installed a dedicated HPLC/MS instrument with a triple quadrupole analyzer (Micromass Ultima) and another high performance tandem instrument of quadrupole-time of flight configuration (Micromass Q-TOF2). Together with other instruments already in place, the new equipment supports a wide range of research from small-molecule synthesis to analysis of whole proteins isolated from organisms.

- A High Throughput Screening Laboratory was established in 2002. Equipment in this laboratory allows a large number of small organic compounds to be screened against biochemical and cell-based assays. The systems provide the technology necessary for advancing drug development in the pharmaceutical industry.

- A Rigaku/MSCw X-Ray diffractometer was acquired in 2003. This equipment enhances the capabilities of KU researchers for determining the bonding arrangement of atoms in a crystalline solid.

- An Applied Biosystems Model 4700 MALDI/TOF/TOF mass spectrometer was acquired in 2003 as well as a ThermoFinnigan Model LTQ ion trap FT-MS hybrid mass spectrometer with electrospray source. These instruments will extend KU’s ability for proteomics research.

**Haworth and Malott Halls.** Both Haworth Hall and Malott Hall, connected by skywalk, house office and laboratory space for many Frontiers scientists.

*Haworth Hall* is the home of the Division of Biological Sciences comprising the departments of molecular biosciences (biochemistry; microbiology; molecular, cellular and developmental biology; neurobiology; and genetics) and of ecology and evolutionary biology (undergraduate biology; graduate programs in ecology and population biology, entomology, plant biology and systematics, macroevolution and biodiversity). Haworth also houses the offices of the Life Span Institute affiliated center, the Beach Center on Disability, the Kansas University Center on Developmental Disabilities, as well as the KU Genetics Program.

*Malott Hall* houses the departments of chemistry and of physics and astronomy and its observatory; the Molecular Structures Group of laboratories in mass spectrometry, nuclear magnetic resonance, protein structures and other specialties; administrative offices; faculty and staff offices; classrooms; specialty laboratories and research facilities; and the main Lawrence campus Animal Care Unit.

*Smissman Laboratories* is located on KU-L’s Campus. Housed in this laboratory is the locus for KU-L’s Affymetrix GeneChip-based microarray gene expression profiling, for broad applications such as pharmacogenomics and toxicogenomics, SNP (single nucleotide polymorphisms) based whole-genome association studies, Real-time quantitative PCR for nucleic acid sequence detection and quantitation, High-throughput genomics data generation, curation, biological knowledge extraction, Integration with high-throughput proteomics data through bioinformatics algorithms and genomics data storage (Dell PowerEdge 2850 Microarray Data Server and Dell PC Data Analysis Workstations).
Importantly, chemoinformatics analysis has demonstrated that at least 45,000 of the 104,000 compounds from The Lankenau Institute for Medical Research (LIMR) Chemical Genomics Center (LCGC) Diversity Subset (15,040 compounds), and (E) ChemBridge Library (43,736 compounds); (C) ChemDiv Library (56,232 compounds); (D) Life Chemicals Inc. Core as well as ~200 legacy compounds synthesized by the KU Medicinal Chemistry Department staff; (B) (Chemical Methodology and Library Development Center) synthesized within the KU CMLD Center collection include: (A) 5,197 unique compounds, not commercially available, from the KU CMLD Center accelerated drug development and optimization projects. The compound library was obtained from Prestwick, Enzo, TimTec, Selleck, and BioFocus NIH clinical collection. All of the FDA-approved compounds have well-characterized bioactivity, safety and bioavailability and hits from this set of compounds will ensure accelerated drug development and optimization processes. (2) Diversity sets representing a diverse scaffold collection include: (A) 5,197 unique compounds, not commercially available, from the KU CMLD Center (Chemical Methodology and Library Development Center) synthesized within the KU CMLD Center Synthesis Core as well as ~200 legacy compounds synthesized by the KU Medicinal Chemistry Department staff; (B) ChemBridge Library (43,736 compounds); (C) ChemDiv Library (56,232 compounds); (D) Life Chemicals Inc. Diversity Subset (15,040 compounds), and (E) Orthogonally Compressed Library (OCL) collection of 104,000 compounds from The Lankenau Institute for Medical Research (LIMR) Chemical Genomics Center (LCGC). Importantly, chemoinformatics analysis has demonstrated that at least 45,000 of the 104,000 compounds from

Wakarusa Research Facility. In 2011, the Wakarusa Research Facility, built in 1994 at 1315 Wakarusa Dr., was acquired by the KU Center for Research Inc., the university’s not-for-profit research foundation. The 20,432 ft², two-story building had been leased by the center since 1999 and houses a variety of KU researchers. The facility lends itself to social sciences research because it affords easy access for families due to its off-campus location and plentiful parking. The Wakarusa Facility houses the offices of the School-Wide Integrated Framework for Transformation (SWIFT) Center.

High Throughput Screening Laboratory (HTS). The High Throughput Screening Laboratory provides researchers with high throughput technologies and compound libraries to assist in identifying biological probes and to provide hits and leads for drug discovery. High throughput screening of large chemical libraries of compounds is a proven way to identify novel chemical entities that target a biological system of interest. In order to have this technology available to biomedical researchers in Kansas and beyond, the HTS laboratory was established in 2002 at the University of Kansas, Lawrence with support from a NIH COBRE grant, the State of Kansas and KU. There are no other HTS facilities within a 250 mile radius of KUCC member laboratories. KU-HTS is a state-of-the-art facility dedicated to providing exceptional services in advancing drug discovery research initiatives, as well as assistance in preparing grant applications. HTS personnel have extensive experience in executing biochemical, cell-based, siRNA as well as high-content screening campaigns against a plethora of target classes. KU-HTS is a fee-for-service facility dedicated to providing exceptional quality services at the lowest cost. HTS staff partners with the investigators collaboratively to expedite their drug discovery efforts. The 4500 sq. ft. state-of-the-art High Throughput Screening Laboratory is housed in the Structural Biology Center new addition on the West Campus. It houses two cell culture laboratories, and the main laboratory with a variety of liquid handlers (6), bulk reagent dispensers (8) and microplate readers (8) to facilitate screening of compounds in a high-throughput mode. Several common signal detection technologies are also available, including UV-visible light absorbance, fluorescence, time-resolved fluorescence, FRET, TR-FRET, BRET, fluorescence polarization, AlphaScreen, Label-Free, radiometric and luminescence. The laboratory is fully equipped for conducting, cell-based, biochemical and siRNA assays and screens. There are two separate cell culture laboratories within the HTS main laboratory that house 5 BSL2 cell culture hoods and 6 Thermo Forma Series II CO₂ Incubators. Two separate rooms, with a total of 500 sq ft of space house the ImagXpress Micro and BD Pathway, the two high-content imaging systems. The personnel have access to Medline, Current Contents, CAB, PubMed, PubChem and Biosis. The laboratories have access to SciFinder and other on-line capabilities for database searches. Compound libraries are stored in a state-of-the-art Nexus Labstore compound management system for compound storage and retrieval. The HTS office space (740sq.ft) houses the office of the Director, and also has office space available for 10 researchers and a conference room. HTS staff has individual desks, bookcases, filing cabinets and internet connections in rooms separated from the laboratories. HTS currently has 3 people on staff plus an open position. Melinda Broward provides project management and administrative support for the group. The HTS-ready assays can be used to screen the KU-HTS compound collection of approximately 296,672 compounds. Chemoinformatics analysis has shown the presence of 61,980 scaffolds across the entire collection. KU HTS charges for compound usage and approximately 50-80% of these charges are placed in a designated compound library account to periodically purchase compounds to update and expand the library. The compound library was obtained from the following sources: (1) Repurposing library collection of 5,292 FDA approved compounds derived from Prestwick, Enzo, TimTec, Selleck, and BioFocus NIH clinical collection. All of the FDA-approved compounds have well-characterized bioactivity, safety and bioavailability and hits from this set of compounds will ensure accelerated drug development and optimization processes. (2) Diversity sets representing a diverse scaffold collection include: (A) 5,197 unique compounds, not commercially available, from the KU CMLD Center (Chemical Methodology and Library Development Center) synthesized within the KU CMLD Center Synthesis Core as well as ~200 legacy compounds synthesized by the KU Medicinal Chemistry Department staff; (B) ChemBridge Library (43,736 compounds); (C) ChemDiv Library (56,232 compounds); (D) Life Chemicals Inc. Diversity Subset (15,040 compounds), and (E) Orthogonally Compressed Library (OCL) collection of 104,000 compounds from The Lankenau Institute for Medical Research (LIMR) Chemical Genomics Center (LCGC). Importantly, chemoinformatics analysis has demonstrated that at least 45,000 of the 104,000 compounds from

High Throughput Screening Labora
the LIMR are unique to the collection and are not represented in ChemBridge and ChemDiv diversity sets. These KU-HTS libraries have been used extensively in screening various targets and have resulted in valuable hits. (3) Bioactives Compound Library: a collection of 1902 structurally diverse and cell permeable bioactive compounds and peptides which include inhibitors, natural products and chemotherapeutic agents. (4) GreenPharma Natural product library of 480 purified, chemically diverse and drug-like compounds, a subset of much larger 150,000 natural compound structures. Compounds like amino acids, peptides, nucleic acids, long fatty chains and metals were discarded and different phytochemical families were selected carefully in order to have as many family representatives as possible. (5) Anti-Infectives Library (TimTec) includes 960 low molecular weight, drug-like molecules with scaffolds found in antiseptic agents with anti-bacterial (Gram+ve and Gram-ve), anti-fungoid, anti-microbial activities. (6) ChemDiv CNS set (26,136 compounds), compounds that can cross blood-brain barrier. (7) ChemDiv Beyond the Flatland (33,864 compounds) sp3-hybridized carbon scaffolds and (8) Life natural product like compounds (8,128 compounds) with amenable scaffold synthesis. In 2015, KUCC Laboratory for Early Stage Translational Research (LESTR) program purchased the NCI 60 human tumor cell line panel. The panel is available to cancer center researchers to identify and characterize novel compounds (natural products or synthetic) for growth inhibition anticancer activity across the entire panel. Human tumor cell lines that are represented include breast, brain, colon, kidney, leukemia, lung, and prostate. The individual cell lines are also available to expand and for HTS to perform a primary cell line screen against the selected compound libraries as well as secondary screening assays or counter screens.

**Biotechnology Innovation and Optimization Center (BIOC).** The Biotechnology Innovation and Optimization Center (BIOC) is approximately 5,000 ft² composed of 7 laboratory areas and associated support space. It is located on two floors of McCollum Laboratories and in the Higuchi Laboratories animal facility on KU’s West Campus. The BIOC has provided drug delivery, solubilization and stabilization services to researchers since its inception in 1989 as the Center for Drug Delivery Research. Additional services include analytical chemistry and bio-analytical method development, physical/chemical characterization of drug candidates, preparation of dose formulations, animal pharmacokinetic studies and early-stage pharmacology testing. The BIOC conducts development projects for solid oral, liquid oral, topical and injectable (liquid and lyophilized) dosage forms, including development of pediatric dosage forms. More specifically, the BIOC conducts solubility and stability screening of compounds in pH=7.4 PBS, 0.1 N HCl and a representative analytical mobile phase (50:50 acetonitrile:water) using a UV analysis. If needed, HPLC can be used for the analysis of the stability screening samples. The saturated solutions used for solubility testing are diluted to avoid precipitation problems and these diluted solutions are evaluated for the 48 hour stability evaluations. Additional pharmacology screening testing including hepatic microsomal stability, plasma stability and plasma protein binding are all conducted using validated LCMSMS bio-analytical testing. These same LCMSMS bio-analytical methods are applied for the analysis of blood and tissue samples obtained from pharmacokinetic studies. The BIOC routinely conducts both PK screening studies and more comprehensive PK studies with mice and rats. Analysis of tissue extracts including brain tissue for blood-brain-barrier penetration studies is also available. Plasma data is evaluated using WinNonLin software for the determination of routine pharmacokinetic parameters. The major instrumentation and equipment includes fully equipped analytical laboratories containing 4 Shimadzu HPLC systems with UV, fluorescence, diode array and/or evaporative light scattering detectors. Additional analytical/bio-analytical equipment includes a Shimadzu GC, Perkin Elmer differential scanning calorimeter, a Perkin Elmer TGA7 thermogravimetric analyzer, a Varian UV/Vis spectrophotometer and two Applied Biosystems Sciex 3200 LC-MS/MS systems. In the formulation laboratories, we have a Glatt Air Technologies UniGlatt fluid bed coater / drier, a Retsch mill, a Turbula shaker/mixer, a Stokes instrumented tablet press, a NicaSystem AB extruder, a Luwa Model QJ-320 maurumerizer, a Vitris Genesis tray lyophilizer and several isolation glove boxes for hazardous chemicals. The staff at the BIOC (8 people) is a mixture of formulators, analytical and bio-analytical chemists, and preclinical/pharmacokinetic specialists with many years of pharma industry, CRO and academic research experience. Approximately half of the staff have Ph.D. degrees and the remaining half have either MS or BS/BA degrees. The mix of expertise, experience and equipment provide for a unique capability and the ability to handle projects quickly and efficiently.
**Medicinal Chemistry.** The *Medicinal Chemistry* function is led by Frank Schoenen, Ph.D., a synthetic organic chemist, with 15 years’ experience as Medicinal Chemist and Manager at GlaxoSmithKline (GSK) and as Vice President at Nuada Pharmaceuticals, working in the inflammation and cancer therapeutic areas, and in high-throughput chemistry at the early stages of drug discovery. In 2005, Schoenen joined the University of Kansas (KU) Chemical Methodologies and Library Development Center as the Associate Director for the Administrative Core and the Director for the Synthesis Core, where he was responsible for imagining, creating, and operating high-functioning compound-library construction, library design, analysis & purification, and compound management cores, and for directing the synthesis and distribution of thousands of compounds to academic, government, and private-sector biological collaborators throughout the world. This led naturally in 2008 to his position as Associate Director, Project Manager, and Chemistry Team Leader for the KU Specialized Chemistry Center, one of only two laboratories funded by the National Institutes of Health (NIH) Molecular Libraries Probe Production Centers Network (MLPCN) to support synthesis and medicinal chemistry aspects of hit-to-probe optimization. In these roles, Schoenen provided scientific leadership and management for a diverse portfolio of over 40 MLPCN projects leading to 23 probe compounds. Currently, Schoenen is Associate Research Professor in the Higuchi Biosciences Center at the University of Kansas, and Medicinal Chemist on the Target Acceleration Group sponsored by the D3ET within the KUCC. Schoenen brings expertise to consultations and collaborations with KUCC members including compound screening collection building, chemical tools for biological target identification, compound identity and purity quality control, identification of Pan Assay Interference (PAINS) and PubChem Promiscuity compounds, compound physicochemical property assessment, compound and biological data deposition to PubChem, compound scale-up for in vivo studies, identification of commercial sources for compound sample purchase, identification of contract research organizations for compound scale-up, hit confirmation and prioritization, hit-to-probe optimization, probe-to-lead optimization, lead-to-preclinical-candidate optimization and preclinical-candidate to clinical-candidate optimization. In June 2008, the KU Chemical Methodologies and Library Development Center (CMLDC) moved into new laboratories in the Delbert M. Shankel Structural Biology Center (SBC) on the University of Kansas West Campus. Schoenen operates within the KU CMLD Center, directed by Professor Thomas E. Prisinzano, which has all of the laboratory space required to support the medicinal chemistry activities of the LDOSR. In addition to the facilities available to the Schoenen team for synthesis and medicinal chemistry, the CMLD Center contains a number of core laboratories which perform specialized functions, and all of these facilities are available for use on the present grant on a shared basis. Schoenen’s office is located adjacent to the CMLDC labs in the SBC building.

**RESEARCH ADMINISTRATION**

**KU- Lawrence Research Administration.** KU-L, KUMC, and the KU-E campuses are united under the leadership of Chancellor Bernadette Gray-Little. The entire research portfolio at the Medical Center is related to the life sciences. While research on the Lawrence campus is more diverse, life sciences research still accounts for nearly 60 percent of all sponsored project expenditures. Because of this shared focus, cross-campus collaborations are widespread and increasing. These collaborations are facilitated by major equipment and services available to researchers on all campuses.

**Sponsored Project Expenditures.** During FY2010, KU’s externally funded sponsored project expenditures for science and engineering research, training, service and other research exceeded $224 million. A new record was achieved in FY2012, at $275 million, including ARRA funding. The comparable figure during FY2014 was $238.8 million, the same amount as in FY2015.

**Collaborative Research Culture.** Major research endeavors often require a community of scholars. The University of Kansas is dedicated to fostering collaborative relationships among researchers at its several campuses, as well as encouraging research partnerships with other institutions. KU has a long and successful record of coordinating researchers and resources through integrative research centers and institutes such as...
the KIDDRC and the Life Span Institute. These centers transcend traditional disciplinary boundaries and allow multiple perspectives and expertise to focus on broad research programs with far-reaching consequences.

**KU Innovation & Collaboration.** The University of Kansas Innovation and Collaboration (KUIC) is a 501(c)(3) with a thirteen-member Board chaired by the Provost and Executive Chancellor of the University of Kansas with the purpose of partnering with corporations and bringing KU innovation to the marketplace. Serving both the Lawrence and Medical Center campuses. KU has a strong tradition of effective technology transfer built on research in such fields as drug development and delivery; education and human development; biosciences, biofuels and bioengineering; information technologies and informatics; and remote sensing. Total staff: 4.

**On-Campus Business Incubators.** In 2010, the Bioscience & Technology Business Center (BTBC) opened its Main Facility Phase I building on KU’s West Campus Research Circle in Lawrence. BTBC is a partnership involving the university, KU Endowment, the City of Lawrence, Douglas County, the Lawrence Chamber and the Kansas Department of Commerce. Phase II opened in 2014, and there is also an expansion facility elsewhere in Lawrence. The BTBC system is designed primarily to assist the development of start-up and emerging companies, as well as foster industry-funded research collaborations with KU faculty. At the Medical Center, the BTBC is located in the renovated Breidenthal Research Building. Among all of its locations, the BTBC hosts 41 tenant companies employing more than 180 people.

**Patenting, Marketing, Licensing.** The product development-focused translational research methods and processes established by IAMI to develop and demonstrate medical innovation technologies are novel and unique in the context of the larger KU research portfolio. To support IAMI in its execution of medical innovation projects, a Memorandum of Understanding (MOU) between IAMI and the University of Kansas Innovation and Collaboration organization (KUIC) was established in August 2014. Specific to medical innovation projects receiving IAMI investment, the MOU defines the roles and responsibilities of KUIC and IAMI in developing and executing patenting, marketing and licensing strategies. Unique to IAMI is its for-profit partner, BioNovus Innovations LLC. A group of Kansas City investors and community leaders recognized the value of this Frontiers core to the region. The investors also recognized the challenges IAMI faced in finding private sector partners with the resources and expertise necessary to further develop, demonstrate and disseminate promising medical innovations de-risked by IAMI. As a result, the investors formed BioNovus Innovations LLC in 2015. Through a preferred partnership agreement, IAMI and BioNovus jointly invest in promising projects with IAMI’s partner granted an exclusive to exercise pre-negotiated licensing terms.

**KU-Lawrence CENTERS AND INSTITUTES**

**Schiefelbusch Institute for Life Span Studies (Life Span Institute)**

The Schiefelbusch Institute for Life Span Studies, located on the KU Lawrence campus, was created in 1990 out of the 67-year-old Kansas Bureau of Child Research. Today it is one of the largest and most highly regarded human development and disabilities research centers in the country. The LSI brings together scientists of diverse disciplines including psychology, psychiatry, speech pathology, sociology, education, biology, pharmacology, physiology and medicine to study human development from its genetic origins through the final stages of life. The LSI supports basic and applied research, treatment and assessment clinics, service coordination and delivery, consultation, and training. The Life Span Institute’s 12 centers have more than 130 programs and projects active at any one time in Kansas and other states, directly serving individuals, families, and communities in underserved Kansas City neighborhoods and rural Kansas counties.

The Life Span Institute, which is directed by Dr. J. Colombo, is integral to Frontiers. The Institute commands the largest external funding support of any research center on the Lawrence campus, a rarity for behavioral sciences centers. The success of the Life Span Institute is a reflection of the campus’ long-time strengths in child development and disability research and intervention, a commitment that spans several academic units,
many clinical and research settings, and three campuses of the University. The Life Span Institute brings together 176 scientists who are affiliated with 20 academic departments to study human development from its genetic origins through the final stages of life. These investigators are supported by 175 research and administrative staff members, including 66 graduate research assistants and 114 student assistants. The Institute has two affiliated multidisciplinary graduate/doctoral programs, as well as several post-doctoral training programs. The Life Span Institute’s 14 centers and Peruvian affiliate currently have 135 active grants that constitute basic and translational research, training, direct services, consultation, and technical assistance. Last year, some 30,500 Kansans also benefited from the Institute’s direct services, training and technical assistance. The Institute’s central office is in the Robert Dole Human Development Center in Lawrence with components at the John T. Stewart Children’s Center and Malott Hall and Wakarusa facility. The Institute also operates in Kansas City at the University of Kansas Medical Center, the Children’s Campus of Kansas City, the University of Kansas Edwards Campus, and at the Life Span Institute in Parsons, Kan. Much of the work of the Institute is accomplished in and directly benefits underserved Kansas City neighborhoods and rural Kansas counties. Several projects are collaborations with researchers in other parts of the state, region, country, and world, and are regional, national, or international in scope. The Life Span Institute attracts more combined federal, state, and private dollars than any other designated research center at the University of Kansas, drawing $32.8 million in sponsored project support in FY 2015.

- **Beach Center on Disability.** Through excellence in research, training, technical assistance and public service in Kansas, the nation and the world, the Beach Center on Disability seeks to make a significant and sustainable difference in the quality of life of families and individuals affected by disability. Research focuses on access to the general curriculum, assistive technology, deaf-blindness, disability policy, employment, family supports and services in early childhood, family quality of life, individual control of funding, positive behavior support and self-determination. Founded in 1988 by KU Distinguished Professors Ann and Rud Turnbull, the Beach Center honors Ross and Marianna Beach for their long-standing efforts on behalf of families affected by disability and was inspired by the Turnbulls’ son, Jay, who had several disabilities.

- The **Center for Biobehavioral Neurosciences in Communication Disorders (BNCD)** was founded in 2002 when the National Institute on Deafness and Other Communication Disorders awarded a core grant to establish the center. The BNCD is a natural outgrowth of the Life Span Institute’s long-standing focus on communication and language development and intervention. The BNCD’s research spans a wide range of issues relevant to the causes and treatment of communication disorders from infancy to old age including studies on infant attention, the genetics of language impairments, language intervention, the decline of working memory in old age as reflected in speech and more precise measures of hearing loss to aid cochlear implant design.

- The **Center for Research on Learning (CRL),** joining the Life Span Institute in 2014, has a long history as an internationally recognized research and development organization noted for creating solutions that dramatically improve quality of life, learning, and performance, especially for those who experience barriers to success. The CRL encompasses six divisions, each with a slightly different research emphasis. Researchers study problems in education and work to place solutions that make a difference into the hands of educators, learners, employers, and policy makers.

- The **Child Language Doctoral Program** was established in 1983 as the first specialized degree program in the emerging field of child language acquisition. The program focuses on the interdisciplinary academic preparation and research training of child language specialists. The internationally recognized faculty brings diverse approaches to the study of how children communicate and speak. The program offers students a wide choice of research tools, facilities and field sites including the Child Language Acquisition Studies Lab that has the largest known archive of transcribed spontaneous samples from a longitudinal study of preschool children diagnosed as specific language impaired (SLI). The Life Span Institute, the Language Acquisition Preschool and the clinical and research facilities of the Speech-Language-Hearing Clinic provide research sites and practica.
The Gerontology Center’s affiliation with the Bureau of Child Research in 1990 paved the way for an extended research agenda of the newly formed Life Span Institute. Center researchers are interested in all areas of aging but are distinguished by seminal research in cognition, communication and aging, long-term health care and housing alternatives and decision making in later life. The Center coordinates a multidisciplinary graduate program that offers both masters and doctoral degrees in gerontology, as well as dual-title doctoral degrees that combine training in gerontology with certain social and behavioral sciences.

The Juniper Gardens Children's Project (JGCP) began in 1964 when citizens from northeast Kansas City, Kansas joined with faculty from the University of Kansas to devise solutions to specific problems in educational achievement and parenting in that low-income community. The JGCP has grown over the years from a small, community-based research initiative housed in the basement of a liquor store to a unique, internationally recognized research center which includes local and national community sites in projects and investigations housed at the Children's Campus of Kansas City, four blocks from where it began. The Children's Campus of Kansas City is a joint community initiative in Kansas City, Kansas—an effort that the JGCP has been supporting for the past decade. The JGCP is particularly recognized for its contributions to the development of effective approaches for accelerating learning and reducing classroom conduct problems in both special and general education. In 1996, the JGCP was awarded the Research Award of the International Council for Exceptional Children in recognition of its outstanding research contributions.

More than 40 years ago, as the Life Span Institute’s research on developmental disabilities took root, efforts began to translate this research into practice through what is now known as the Kansas University Center on Developmental Disabilities (KUCDD). Virtually all of the Life Span Institute’s direct service, technical assistance and post-doctoral, pre- and in-service training are associated with KUCDD. These include clinics to diagnose and treat children with disabilities, a statewide project that provides assistive technology to people with disabilities and their families and training childcare providers and social workers to support individuals with disabilities. In addition, investigators affiliated with the KUCDD conduct research that has state, national and international impact in areas like self-determination, positive behavior supports, inclusive educational practices, early childhood education, community and workplace supports, family systems and supports and other areas critical to the lives of people with developmental disabilities and their families.

Three KUCDD projects should be mentioned in that they function much as LSI centers and exemplify how the KIDDRC has translated its behavioral and biobehavioral research strengths to impact social programs and professional practice:

- **Kansas Institute for Positive Behavior Support (KIPBS).** KIPBS is a rigorous statewide training program for practicing professionals in developmental disability, child welfare, and mental health organizations to learn how to implement positive behavior support for children with serious behavioral problems.

- **The Center for Child Health and Development.** The Center for Child Health and Development (CCHD) at KU Medical Center diagnoses and develops treatment recommendations for children with developmental disabilities. The clinic assists families, teachers, doctors and others who work with these children and recommend the most effective treatment as described below in the Kansas City campus: Other complementary research centers.

- **Assistive Technology for Kansas Project.** The Assistive Technology for Kansas Project planned and oversees a model statewide program to deliver services and equipment to people with disabilities in Kansas with centers in Oakley, Salina, Wichita, Lawrence, and Parsons. Related projects have established an assistive technology loan cooperative, equipment loan bank, equipment consignment and reuse system, and a rehabilitation program for farmers injured in agriculture-related accidents.
As the founding center of the Schiefelbusch Institute for Life Span Studies (Life Span Institute), the University of Kansas Life Span Institute at Parsons has partnered with national, state, regional and community partners to conduct research, develop model service programs and provide training for professionals involved in services to young children, youth and adults with disabilities and their families. Located in a rural community in southeast Kansas, the Parsons LSI includes a component of the Kansas University Center on Excellence in Developmental Disabilities. Current research focuses on individuals with autism, novel intervention strategies for challenging behavior, hearing assessment with individuals who are difficult to test, effects of toxic stress on children and families and maladaptive and challenging behavior. Additionally, the Parsons LSI provides significant service and training across the nation and state of Kansas on assistive technology, early childhood and training for community organizations and agencies serving persons with developmental disabilities.

The Merrill Advanced Studies Center, established in 1990 with an endowment from Virginia Urban Merrill and Fred Merrill, is a catalyst for scholarship on disabilities and policies that shape university research. Merrill conferences and publications establish new directions and build collaborative projects in both science and policy. World-class experts often meet as a group for the first time at Merrill conferences and go on to develop national projects that answer key questions in science. The Center publishes books on topics relevant to developmental disabilities and makes policy papers available online and in print. The Merrill web site at KU has fact sheets and discussions on science and policy for the general public.

The Research and Training Center on Independent Living (RTC/IL) has a 35-year history of conducting disability research, providing training and transferring knowledge to practice. The Center furthers independent living for people with disabilities through scientifically sound, theoretically driven sustainable interventions and measures that lead to effective community living solutions and policy change. Center researchers work closely with consumers and service providers to develop research and products that meet their critical needs. The Center also partners with other universities and agencies to improve the health and participation of people with disabilities.

SWIFT Center was launched in 2012 with a $24 million grant from the U.S. Department of Education Office of Special Education Programs—one of the largest in KU history. SWIFT is a national K-8 technical assistance center that builds school capacity to provide academic and behavioral support to improve outcomes for all students through equity-based inclusion. SWIFT assists districts and state educational agencies to implement its successful model for educating general and special education students together while leveraging existing resources, breaking down administrative silos and improving schoolwide academic outcomes. SWIFT is currently partnered with five state agencies and 17 districts in Maryland, Mississippi, New Hampshire, Oregon and Vermont.

Centro Ann Sullivan del Perú (CASP) is a nonprofit educational institution that serves children and adults with intellectual disabilities, autism and behavioral problems, as well as their families and professionals from Peru and other parts of the world. Under the direction of its founder, Liliana Mayo, Ph.D., CASP is recognized and honored worldwide for its contributions as a model research, demonstration and training center. Mayo has been supported by a steady stream of her KU colleagues who have volunteered as consultants, trainers, administrators and fund raisers; notably, Judith Le Blanc, who has served as CASP Research Director for more than 30 years, and retired Life Span Director Stephen Schroeder and Carolyn Schroeder. CASP has a formal agreement with the Life Span Institute and receives much of its staff education through university faculty from the KU departments of Special Education and Applied Behavioral Science.

Higuchi Biosciences Center. Like the Life Span Institute, the Higuchi Biosciences Center is a designated research center of Centers engaged in biomedical research at the University of Kansas. These include the COBRE in Protein Structure and Function; COBRE in Molecular Analysis of Disease Pathways; Center for Chemical Methodologies and Library Development Legacy; and KU Alzheimer’s Disease Center -
Mitochondrial Genomics and Metabolism Core. The Higuchi Biosciences Center seeks to enhance both the environment for interdisciplinary, basic research and the commercial development of resulting technologies. To those ends, the Center provides research support and administers funds from a variety of sources, including the NIH, NSF, industrial partners, and private foundations. The Higuchi Center is directed by William Picking, Foundation Distinguished Professor of Pharmaceutical Chemistry and lead researcher for the Kansas Vaccine Development Center.

Established in 1989, the Higuchi Biosciences Center (HBC) is a center engaged in biomedical research at the University of Kansas. As a designated research center of the KU Center for Research (KUCR), the Higuchi Biosciences Center seeks to enhance the environment for interdisciplinary, basic research. To that end, the Center provides research support and administers funds from a variety of sources, including the NIH, NSF, industrial partners, and private foundations. The Higuchi Biosciences Center mission is to foster an environment conducive to interdisciplinary, biomedical research. In practical terms, this means:

- Relieving participating researchers of the non-scientific work involved in grant submission and administration, providing funding incentives for multi-investigator, interdisciplinary projects.
- Offering personnel services, including assistance with searches and visa applications.
- Providing laboratory space and opportunities for equipment sharing.
- Promoting translational research in the biomedical sciences.

The HBC includes a Genomics Facility that consists of 1,600 ft² of lab space. Services performed are high-throughput genomics analysis from RNA extraction and quantification to synthesis of labeled cRNA, microarray hybridization, array washing and staining, microarray image scanning and data collection. For downstream bioinformatics data mining, the facility is equipped with a number of commercial and open source software packages for complete multi-dimensional microarray data analysis, including identification of differentially expressed genes, gene clustering, biological pathway analysis, Gene Ontology analysis and gene network construction. In addition, the facility provides full service for real-time quantitative PCR for confirmation of microarray results or stand-alone gene expression analysis. Major equipment in the genomics facility includes a complete Affymetrix GeneChip microarray system, a microfluidics based Agilent 2100 Bioanalyzer and NanoDrop ND-1000 spectrophotometer, an Applied Biosystems 7500 Fast Real-Time PCR System, a Beckman Biomek NX laboratory automation workstation, and an Arcturus PixCell Ile Laser Capture Microdissection (LCM) System. Software packages available include Gene Chip Operating Software (GCOS), Gene Spring, Spotfire Decision Site for Functional Genomics, Gene Traffic, Pathway Assist, and the open source software dChip and GenMAPP.

Other Related Core Research Resource Laboratories

Clinical Pharmacology. The Clinical Pharmacology Core, directed by Dr. Gregory Reed, professor in the Department of Pharmacology, Toxicology and Therapeutics, KUMC, supports clinical proof of concept studies evaluating drug and diagnostic technologies advanced to patients. Located in the Clinical Research Center on the Fairway campus of KUMC, the bioanalytical Core provides GLP bioanalysis support to early phase clinical trials. The bioanalytical core is equipped with: Shimadzu LC-20-Waters Quattro Premier LC-MS/MS, Waters Acquity -Quattro Premier XE UPLC-MS/MS, Shimadzu LC-20 binary gradient HPLC system, with UV, fluorescence, and radiometric detectors, auto sampler, and column oven and Shimadzu VP-Chrom computer-based data acquisition and data processing system; Agilent 6890N gas chromatograph with FID and ECD detectors. The core develops and validates bioanalytical methods to quantify drug and metabolites in biological matrices as well as biochemical-based biomarkers. The core provides design support to early phase clinical trials including biological sample sampling schemes, sample collection, processing, storage and shipment requirements, as well as pharmacokinetic and pharmacodynamics data analysis. Clinical Pharmacology works closely with the BIO Center to seamlessly and efficiently transfer validated bioanalytical methods from animal
to human matrices. Parametric and non-parametric pharmacokinetic data analysis is performed using WINNONLIN™ software.

**Animal Care Unit.** The ACU is comprised of more than 33,000 ft² of dedicated animal and procedure space dispersed in nine buildings across the Lawrence campus. Housing facilities are available for common laboratory animals, including but not limited to rodents, rabbits, fish, reptiles and amphibians. Specialized facilities, including a modified rodent barrier and surgical, ABSL-2 and necropsy suites are available. KU-Lawrence maintains an Assurance (A3339-01) with the NIH Office of Laboratory Animal Welfare (OLAW). It also adheres to standards prescribed in the Public Health Service Policy on Humane Care and Use of Laboratory Animals and the OLAW Guide for the Care and Use of Laboratory Animals for all activities involving laboratory animals. Additionally, KU-Lawrence is a U.S. Department of Agriculture SDA-registered facility (48-R-0002) and complies with provisions of the Animal Welfare Act and Regulations for all activities involving regulated species. The animal care program has maintained full accreditation by the Association for Assessment & Accreditation of Laboratory Animal Care since 1982.

**Department of Environment, Health & Safety - Laboratory Safety Services.** EHS is responsible for managing and monitoring the laboratory safety program efforts at the University of Kansas - Lawrence Campus to prevent and/or minimize occupational and environmental exposure from hazardous materials usage and hazardous activities being conducted in the laboratory environment.

**Instrumentation Design Laboratory.** The IDL is an Analytical Resource Laboratory that provides collaborative support to research scientists in the natural sciences in order to enhance their research through custom instrumentation and laboratory automation. That instrumentation and automation is often based on small computers and workstations. Instrumentation solutions to laboratory problems may be developed as “turnkey” systems in which the IDL develops all hardware and software or as a coordinated project where the IDL both consults with a member of a research group and provides hardware and software modules as needed.

**Kansas Center for Advanced Scientific Computing.** The Kansas Center for Advanced Scientific Computing (KCASC) is a statewide interdisciplinary research infrastructure initially funded in April 1996 by the NSF EPSCoR Cooperative Agreement through the Kansas EPSCoR program. An Origin2400 system is an all-purpose supercomputer and has the capability of performing both shared and distributed memory parallel computing at the same time. Since 1996, the system has served as a major supercomputing resource for state-of-the-art computational researches in sciences, mathematics, and engineering in the State of Kansas and at KU.
CHILDREN’S MERCY KANSAS CITY

Overview  Children’s Mercy Kansas City (CMKC; Figure FR-KL2.11) is the only free-standing children's hospital between St. Louis and Denver and provides comprehensive care for patients from birth to 21. Children’s Mercy consistently is ranked among the leading children’s hospitals in the nation. CMKC is the first hospital in Missouri or Kansas to earn the prestigious Magnet designation for excellence in patient care from the American Nurses Credentialing Center.

Clinical Care
- Medical staff of more than 700 pediatric specialists
- More than 40 pediatric specialties
- First hospital in Missouri or Kansas to receive Magnet designation in 2003 from the American Nurses Credentialing Center for superior nursing quality
- First hospital in the region to receive re-designation in 2007 and again in 2012

Education
- Affiliation with University of Missouri-Kansas City School of Medicine
- Principal teaching hospital for The University of Kansas Medical Center
- More than 400 medical students each year.
- 60 doctors take part yearly in our fellowship programs
- Home of the nation’s first Pediatric Emergency Medicine Fellowship
- Nursing students from dozens of schools in the Kansas City area receive training at Children’s Mercy

Research
- More than 100 physician scientists, basic scientists, nurses, fellows and residents involved in research projects, representing millions of dollars in multi-year awards
- Co-leading the largest nephrology research project in North America
- More than 140 clinical trials on-going at any one time
- The largest Pediatric Clinical Pharmacology program in North American and one of four U54 Centers for Research in Pediatric and Developmental Pharmacology (RPDP) supported by NICHD
- The Center for Pediatric Genomic Medicine, established in 2011 as the first genome center in the world entirely inside a children’s hospital with a focus on the diagnosis of inherited pediatric diseases. One of the 10 leading institutions in the Kansas City Area Life Sciences Institute, which also includes the University of Kansas, Midwest Research Institute, University of Missouri-Kansas City and the Stowers Institute.

CMKC is a 355 bed academic pediatric hospital and medical center located in Kansas City, Missouri that provides comprehensive primary and tertiary specialty care to children from Missouri and Kansas. It is the only pediatric medical center between St. Louis and Denver. Comprehensive care is provided in 50 pediatric subspecialties including Adolescent Medicine, Allergy/Immunology, Developmental and Behavioral Pediatrics,
Cardiology, Clinical Toxicology, Clinical Pharmacology, Craniofacial Reconstructive Surgery, Critical Care, Emergency Medicine, Endocrinology/Metabolism, Gastroenterology, Genetics, Infectious Diseases, Hematology/Oncology, Bone Marrow Transplantation, General Pediatrics, Neonatology, Nephrology/Dialysis, Neurology, Ophthalmology, Otolaryngology, Orthopedics, Pulmonology, Rehabilitation Medicine, Rheumatology, Pediatric Surgery, Pediatric Sleep Clinic, Pediatric Cardiovascular Surgery, Solid Organ Transplantation, Urology, and a Fetal Health Center for the delivery of high-risk pregnancies. The Hospital is the only Level 1 pediatric trauma center in the region, and is the primary pediatric teaching hospital for the University of Missouri - Kansas City (UMKC) School of Medicine. CMKC's primary service area consists of 18 counties, nine each in the states of Missouri and Kansas, with an additional 20 counties in Kansas and 30 counties in Missouri constituting its secondary service area. The area served by outreach clinics includes a further 21 and 22 counties in Kansas and Missouri, respectively, within a maximum three hour drive of the main campus in Kansas City, MO.

**CMKC Ambulatory Care.** Ambulatory pediatric care is predominantly delivered in a 7-story ambulatory building adjacent to and connected to the main hospital; in a specialty clinic facility located at the Children's Mercy Kansas City South Campus in Overland Park (Johnson County), KS; a facility that also has 54 inpatient beds staffed by Hospitalist members of the CMKC pediatric faculty; at Children's Mercy Northland, located in Kansas City, MO (approx. 14 miles from the main campus); and at Children's Mercy Clinics on Broadway (approx. 2 miles from the main campus). Urgent and emergent ambulatory care is provided in the Emergency Department facility located in the main hospital and the suburban urgent care centers. The Emergency Department is staffed 24 hours/day, 365 days/year by board certified pediatric emergency medicine physicians.

Of these beds, 115 are special care beds comprised of pediatric intensive care (PICU; 41) and neonatal intensive care (NICU; 74). During FY 2014, there were 13,649 inpatient admissions with 82,688 total patient-days, including 22,510 NICU patient days and 10,078 PICU patient-days. During this same reporting period there were 471,441 outpatient visits, including 212,330 at the main campus; 98,956 at Children's Mercy South Specialty Clinics in suburban Johnson County, KS; 47,005 at Children's Mercy North Specialty Clinics, 70,204 in the Primary Care Clinics; and 6,609 visits to Outreach Clinics. There were also a total of 162,611 emergency/urgent care visits.

The demographics of the population served by CMKC (from fiscal year 2014) are as follows:

<table>
<thead>
<tr>
<th>Age Range</th>
<th>% Total</th>
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<tbody>
<tr>
<td>Neonate</td>
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<tr>
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<tr>
<td>5 to 9</td>
<td>23.8%</td>
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<tr>
<td>10 to 14</td>
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<tr>
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<td>10.7%</td>
</tr>
<tr>
<td>18+</td>
<td>3.3%</td>
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<tr>
<td>Grand Total</td>
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<table>
<thead>
<tr>
<th>Gender</th>
<th>% of Total</th>
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</thead>
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<tr>
<td>Female</td>
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</tr>
<tr>
<td>Male</td>
<td>52.1%</td>
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<td>Grand Total</td>
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</table>

<table>
<thead>
<tr>
<th>Race</th>
<th>% Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Indian/Alaskan Native</td>
<td>0.3%</td>
</tr>
<tr>
<td>Asian</td>
<td>1.9%</td>
</tr>
<tr>
<td>Black or African American</td>
<td>21.0%</td>
</tr>
<tr>
<td>Caucasian/White</td>
<td>55.2%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>13.5%</td>
</tr>
<tr>
<td>Multiracial</td>
<td>5.1%</td>
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<tr>
<td>Native Hawaiian/Pacific Island</td>
<td>0.3%</td>
</tr>
<tr>
<td>Other</td>
<td>1.8%</td>
</tr>
<tr>
<td>Not Available; Unknown; Declined</td>
<td>1.0%</td>
</tr>
<tr>
<td>Grand Total</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

**RESEARCH ADMINISTRATION**

*Children's Mercy Kansas City Office of Research Integrity* Children's Mercy has a Federalwide Assurance (FWA) with the Department of Health and Human Services, in which we assure Federal officials that any research project, whether it is a chart review or administration of investigational drugs, is conducted in
accordance with Federal regulations. The Office of Research Integrity assists investigators in every step of the research process. The CMKC Institutional Review Board (IRB) is a completely electronic process through MARS, Mercy's Automated Research System. Researchers use the MARS system to gain access and submit IRB submissions for review. Submissions are entered, routed, reviewed and finalized electronically. This tool improves efficiency for the IRB review and investigators.

**CMKC Clinical Research Infrastructure and Assets.** Pediatric Clinical Research Unit (PCRU): Brand new facilities to admit children for research protocols and to accommodate outpatient visits for clinical research opened in January, 2013 in 5,500 ft² located on the ground level of the Hall Inpatient Tower, immediately adjacent and connected to the Division of Clinical Pharmacology and Therapeutic Innovation offices and Developmental Pharmacology and Experimental Therapeutics research laboratory. The facility is a self-contained clinical research nursing unit with accommodations for both inpatient and outpatient studies. It is comprised of three single patient rooms and one three-bed patient room, an ambulatory study room, examination/treatment room, specimen processing laboratory, conference room/library, play room, and secure document storage and offices to accommodate 9 clinical coordinators, as well as an office for the PCRU Medical Director. Recreational items such as games, crafts, TV, Nintendo, and videos are available to entertain children during their stay. In addition, the Child Life staff may assist with constructive activities for children. The facility is equipped with age-appropriate examination equipment, storage space, crash cart, and monitoring equipment. Facilities are available for phlebotomy, urine collection, initial specimen processing, and temporary specimen storage prior to delivery to the laboratory. This unit has been constructed to meet all applicable FDA/ICH guidelines for a phase I study unit and also, fully meets accreditation standards by JCHAO.

**CMKC Clinical/Integrated Pharmacology Infrastructure and Assets.** The Developmental Pharmacology and Experimental Therapeutics Laboratory is a 3,112 ft² space within the Division of Clinical Pharmacology, Toxicology and Therapeutic Innovation that previously served as the NICHD Pediatric Pharmacology Research Unit (PPRU) core laboratory throughout the Network’s existence. The laboratory supports the clinical and basic research programs of the Division of Clinical Pharmacology and Therapeutic Innovation, including pharmacogenetic and analytical (HPLC) support for phase I and phase II clinical studies. In addition, specific areas within the facility are designed for and devoted to cell culture, protein biochemistry and molecular biology for applied research related to the pathogenesis of idiosyncratic drug reactions, ontogeny of drug metabolism,
and pharmacogenetics. In the past two years, research infrastructure has been increased as described in detail below.

**CMKC Analytical Resources.** The analytical facilities of the Division of Clinical Pharmacology, Toxicology and Therapeutic Innovation occupy approximately 1280 square feet in the CMKC Pediatric Research Center and contains several analytical instruments, including two triple quadrupole mass spectrometers (a Waters Xevo TQD and a Waters Xevo TQ-S), a Waters Xevo G2 QToF mass spectrometer, each with Acquity UPLC front end systems, three Agilent HPLC systems, two of which are equipped with fluorescence and uv/vis detectors and the third with a diode array detector, and two POC-One infrared spectrometers for analyzing $^{13}$C$\text{O}_2$ breath test samples.

**CMKC Pharmacogenetics and Pharmacogenomics Resources.** The Pharmacogenetics and Pharmacogenomics Core Laboratories, under the direction of Andrea Gaedigk, Ph.D. and Roger Gaedigk, Ph.D., conduct genotype analysis utilizing a variety of platforms including TaqMan, High-Resolution Melt Curve analysis and traditional PCR-RFLP for SNP detection and long-range PCR to detect major gene arrangements. GeneMapper and simple agarose gel electrophoresis is employed for the detection of length variations and DNA sequencing for a variety of DNA variations. Genotyping panels have been established for many CYP genes, including CYP2D6 (one of the most comprehensive genotyping panels for this highly polymorphic enzyme that is notoriously difficult to accurately genotype), CYP2C9 and CYP2C19, CYP2B6, the CYP3A gene locus, as well as multiple genes in the folate pathway and several drug transporters and receptors. Quantitative multiplex PCR procedures have also been established to determine gene copy number for CYP2D6, SULT1A1 and UGT2B17. For the purposes of the current proposal, the primary genotyping platform will be TaqMan assays using custom-designed OpenArrays. The arrays will be run on a recently obtained QuantStudio 12K. This analysis will be complemented with quantitative multiplex-PCR (analyzed on a 3730 DNA analyzer instrument using GeneMapper) and long-range PCR to aid in the detection and characterization of gene rearrangements and DNA sequencing.

The Division is equipped with standard and real-time PCR instruments, a 3730x DNA sequencer (Applied Biosystems) that serves multiple purposes (including sequencing and copy number assays), and a Kodak DS Image Station 440CF (PC-controlled) for photodocumentation, data analysis and storage. All other necessary equipment, such as centrifuges, electrophoresis and blotting systems, and -20°C and -80°C storage are available to perform the described tests with DNA, RNA and protein isolated from a variety of sources such as blood, tissue and saliva and store specimen appropriately. The unit has nine 96-well PCR instruments, three quantitative real-time PCR cyclers (ABI QuantStudio 12K; ABI 7900HT real time thermocycler; an Eppendorf realplex4 epgradient S Mastercycler and an MJ Research Opticon 2 Q-PCR instrument) as well as two EcoRealTime PCR instruments (Illumina) to facilitate HRM analysis. The laboratory also has a dedicated MiSeq platform that is housed in the Center for Pediatric Genomic Medicine.

**CMKC Center for Pediatric Genomic Medicine.** The Center for Pediatric Genomic Medicine at Children’s Mercy Kansas City was formed in January 2011, moved into approximately 16,000 ft$^2$ of space at the Crown Center office complex, which is immediately adjacent to the Hospital, in the fourth quarter of 2012.

**Genome Center Lab Capabilities.** All sequencing operations are performed in a custom-designed, CLIA-accredited, new (2012), 3105 ft$^2$ genome center with versioned, written protocols. Office space is in a new 3000 ft$^2$ suite for the Center for Pediatric Genomic Medicine. The Center has three HiSeq 2500 sequencers (two of which have the v4 1TB upgrade), one HiSeq 2000, and two MiSeqs.

**Computational and analysis resources.** Dedicated computational resources are located in a new (2012) data center with environmental controls, air conditioning, conditioned power, emergency back-up power and UPS. As of November 2012, the computational resources are a 368-core Intel Xeon X5670/E5-2650 cluster (2TB of DDR3 RAM and 14TB SATA hard drives), a pipeline server (12-core Intel Xeon X5670 with 48GB RAM and 1TB SATA hard drive), Isilon IQ 36000 storage system (454TB usable capacity), tape backup server, Quantum Scalar i500 23U tape backup system, web server (6-core Intel Xeon X5670 with 6GB RAM and 1TB SATA drive), and database server (12-core Intel Xeon X5670 with 48GB RAM and 16TB SATA drives) on which are deployed the
Grindstone LIMS, GATK, GSNAP, Casava, SSAGA, CMH Variant Warehouse, RUNES, and VIKING software systems. Computational resources increase by ~$400,000 annually.

**Genome Center Laboratory Equipment:** The major Center capital equipment items include one Illumina HiSeq 2000 DNA sequencer three Illumina HiSeq 2500 DNA sequencers, two Illumina MiSeqs, two Illumina cBots, one PerkinElmer Sciclone NGS, one Janus NGS Express, and one Janus 8-Tip with Gripper liquid handling robots for sequencing library preparation, qPCR, and hybridization enrichment and washing incorporating Agencourt SPRI magnetic bead separation; a PerkinElmer Chemagic MSMI robot for nucleic acid isolation, a Life Technologies ViiA7 Real-Time PCR System capable of running 96-well and 384-well plates, a Bio-Rad CFX96 real-time PCR detection system, PerkinElmer Lab Chip GX, Agilent Bioanalyzer 2000, Agilent TapeStation 2200, Covaris LE220 96-well plate DNA sonication system, Nanodrop S2000 spectrophotometer, a Qubit 2.0 Flurometer, a PerkinElmer DropSense 96 instrument equipped with cDrop software, two Eppendorf MasterCycler Pro thermal cyclers, four Bio-Rad S1000 thermal cyclers, five vortex mixers, seven minicentrifuges, eight temperature dry baths, 1 digital water bath, one upright -80°C freezer, six -20°C freezers and five 4°C refrigerators, and compute resources.

**CMKC Computational Infrastructure.** CMKC has a 10MBit/s Internet-2, 45MBit/s DS3 (T3) and 100MBit/s SureWest fast internet links for high speed transmission of large data files between CMKC investigators and collaborators. The hospital has site licenses for Grindstone, GATK, GSNAP, HGMD, Microsoft Office, JMP Genomics, Photoshop 7, Illustrator 10.0, Sigma Plot 2000, ChemDraw Office and EndNote X.

**Primary WGS Analysis, file hierarchy and structure.** Primary analysis of HiSeq 2000/2500 WGS and exome and MiSeq targeted panel data, to produce sequence reads, is performed with Illumina Real Time Analysis (RTA) software and CASAVA 1.8.2. Results of primary analysis are stored in the Center sequence archive, in which each sequence run has a single top level directory that stores the sequences and quality scores from that run. After the completion of primary analysis, raw sequence run data (intensity files, BCL files) are discarded. Quality control for each sequence run is achieved through review of sequencing metrics produced by the Illumina sequencing control software. HiSeq 2000/2500 and MiSeq v.2 runs are passed or failed according to a written protocol.

**Tertiary Sequence Analysis Pipeline.** Symptom- and sign-assisted genome analysis (SSAGA) is the centerpiece software developed for analysis. SSAGA is a clinicopathological correlation tool that maps clinical terms (such as SNOMED-CT) to genetic disease terms (e.g. OMIM) to causal gene symbols (e.g. ENTREZ genes). Other STAT-seq software components are as follows: Basecalling uses standard Illumina software. Sequences are aligned to the reference nuclear and mitochondrial genomes [Hg19 and GRCH37 with BWA, ELAND (Illumina) or GSNAP (Genentech), and variants are identified and genotyped with the GATK. Nucleotide variants are annotated with RUNES, our variant characterization pipeline, which incorporates VEP (Variant Effect Predictor), comparisons to NCBI dbSNP, known disease mutations from the HGMD, and additional *in silico* predictions of variant consequences from ENSEMBL and UCSC. RUNES assigns each variant a composite ACMG pathogenicity category and allele frequency from the Variant Warehouse. Interpretation of RUNES-annotated variants is performed with VIKING. For each sample, VIKING (Variant Integration and Knowledge Interpretation in Genomes) displays SSAGA information (patient phenotypes, corresponding genes and diseases), and RUNES-annotated variants from that patient, organized by gene. VIKING allows dynamic sorting, selection and prioritization of displayed variants with a menu of filters. These include inheritance pattern, variant frequency, genotype, and ACMG pathogenicity category. The variant attributes displayed can be modified. The variants displayed can be changed by altering the SSAGA information. The likelihood of each variant being disease causative is manually tagged. VIKING sessions can be saved. Interpreted findings can be exported into a standard report format that includes OMIM and HGVS nomenclature (genome, transcript and protein coordinates), ACMG-guided transcript ID, ACMG pathogenicity category, predicted functional consequence, SSAGA terms, RUNES annotations and VIKING settings for final report generation. Variants (both primary and secondary findings) and their RUNES and SSAGA annotations are de-identified and stored in our Variant Warehouse, which is updated with the results of each sample. To date it contains 19.1 million variants and 1,237 samples.
**Computer Resources.** The Center's computer resources are located within a dedicated data center with environmental controls, 15 tons of air conditioning, conditioned power, hospital emergency back-up power and 45kVa UPS capability. The compute resources comprise a 608-core Linux compute cluster with 6TB of DDR3 RAM and 20TB SATA hard drives (20 x 12-core Intel Xeon X5670, 8 x 16-core Intel Xeon E5-2650 and 12 x 20-core Intel Xeon E5-2660), redundant head nodes (12-core Intel Xeon X5670 with 48GB RAM and 500GB SATA drive), a pipeline server (12-core Intel Xeon X5670 with 96GB RAM and 1TB SATA hard drive), Isilon X400 storage system with 810TB usable capacity, SGI Infinite Storage Gateway disaster recovery and backup appliance with 160TB usable capacity, Spectra Logic T950 tape library with 2.4PB uncompressed usable capacity, redundant web servers (12-core Intel Xeon X5670 with 48GB RAM and 500GB SATA drive), and database server (12-core Intel Xeon X5670 with 96GB RAM and 16TB SATA drives) on which are deployed the LIMS, GATK, GSNAP, CASAVA, SSAGA, CMH variant warehouse, RUNES and VIKING software systems. The data center is adjacent to the room housing the DNA sequencers, which also features environmental controls to maintain ambient temperature at 65 degrees C, conditioned power, hospital emergency back-up power and substantial UPS capability.

**Translational Genetics Research Facility.** The CMKC Translational Genetics Research Facility is directed by Shui Qing Ye, MD, PhD. Dr. Ye has more than 25 years of experience in biomedical research. Previously, he served as the Director of the Gene Expression Profiling Core in the Center of Translational Respiratory Medicine at Johns Hopkins University School of Medicine (2001 to 2005) and as the Director of the Molecular Resource Core in a NIH funded Program Project Grant on Lung Endothelial Pathobiology at the University of Chicago Pritzker School of Medicine (2005 to 2007). Major equipment in the facility includes an Illumina HiSeq 1500 next generation sequencing system; a 7th generation real-time PCR system, ViiaTM 7 Real-Time System (Applied Biosystems), Experion™ System (Bio-Rad) for assessment of RNA and DNA quantity and quality, Epoch Microplate Spectrophotometer(BioTek); an ECIS Z Theta electric cell-substrate impedance sensing (ECIS) instrument and its accessories (Applied BioPhysics) to automate tissue culture research by measuring the impedance of mammalian cells cultured on small electrodes; New Lab Alliance APLC system for the purification of recombinant proteins and cellular protein; TriStar LB 941 (Berthold Technologies) for absorbance, luminescence, and fluorescence detection, Alphaimager (Alpha Innotech) for documenting DNA-, RNA- agarose and protein SDS-PAGE gel images and western blotting results; an Olympus IX 71 fluorescence microscope, Olympus CKX31 inverted and a Leica Dissecting Microscope as well as Sanger sequencing capabilities (Applied Biosystems 3130 sequencer).

The CMKC Research computer resources are located within a dedicated data center with environmental controls, conditioned power, and hospital emergency back-up power. There is one head node with six compute nodes installed in a dedicated rack with room for several more nodes. The compute resources comprise a 96-core cluster with 384GB of DDR3 RAM and 48TB SATA hard drives (6 x dual 8-core Intel Xeon E5-2670 "Sandy Bridge" 2.6GHz processors), Quantum SuperLoader3 2U 16 tape library for backups. Deployed on the cluster are the latest versions of GATK, CASAVA, Bowtie, TopHat, Cufflinks, R withCummeRbund, Python with NumPy and SciPy, BreakDancer, Plink, and Haplovieview software applications.

**CMKC/KUMC Pediatrics Department.** The combined Department of Pediatrics across KUMC and Children’s Mercy Kansas City (CMKC) are highly focused on enhancing innovation, access, and quality in a measurable way through translational research. Both Departments offer annual Departmental Research Grants focused solely on translational research in children. These grants have led not only to larger externally funded studies, but also to innovations in the way we care for our pediatric patients. The IRB reciprocity and other tools that are already in place make it easy for the two sites to collaborate and recruit large groups of children for translational efforts (such as recent grants in Pediatric Diabetes R01 DK100779, and R21 HD081502 and in Pediatric Autism R21 HD076116). Both sites also participate in the PCORI CDRN effort, allowing for integration of our medical records for tools such as patient recruitment, subject size calculations, and engagement of relevant clinics and personnel in translational research efforts.

CMKC and KUMC also have several Centers focused on translational efforts. For example, the Center for Children’s Healthy Lifestyles & Nutrition jointly houses clinical and research programs focused on activity and
nutrition, as well as serving as home to a large community collaborative with over 400 members called Weighing In. This community collaborative helps tie (though our quarterly meetings) scientists to community members in working groups such as pregnancy and breastfeeding, early childhood, healthy schools. As part of a recent strategic planning process, CMKC has also founded a Division focused on Health Services and Outcomes Research, which capitalizes upon the strong clinical programs to strengthen translational research. A Director has been hired and efforts are underway focused on partnerships with inner city faith based organizations focused on health disparities (RC4 MD005738; R01 MH099981) and several health service innovations studies (R01 MH104086, R01 HD076673, R01 DK93592, R34MH107337, R34 MH108393) among others efforts. A world renowned genome center, the first of its kind with a pediatric focus, provides clinical genomic services while simultaneously conducting state-of-the-art genomic research, seeking to become a leader in pediatric genomic translational research (U19 HD077693). The Center for Child Health and Development provides diagnostic evaluation for Autism Spectrum Disorders using “gold standard” research tools. The current CCHD research database has over 6000 Intake records, over 4000 completed Patient Information Forms, over 1300 detailed psychological score measures and 1200 Developmental Pediatrics visits. With Russ Waitman, PhD, the CCHD is in the process of mapping the current database into the Electronic Medical Record (O2), which will result in further integration between the clinical research database and our EMR system and better access for researchers across Frontiers. With Dr. Waitman, the CCHD will continue to develop the database for researchers using the Harvard ontologies developed to provide researchers a concept-based approach to identifying behavioral features of importance and for correlating these with genotypic data.

The joint Departments offer multidisciplinary training programs at all of their sites, focused not only on medical students and residents, but also on graduate students in psychology, exercise physiology, public health and related fields, as well as providing regular trainings to community members through talks, health fairs, and other community events.

**UNIVERSITY OF MISSOURI-KANSAS CITY**

**Overview** The University of Missouri-Kansas City (UMKC, Figure FR-KL2.12) is one of four University of Missouri campuses and is a doctoral research public university offering traditional and interdisciplinary programs serving approximately 15,746 students. The University of Missouri-Kansas City has a broad and inclusive educational mission with specific emphasis in three areas: visual and performing arts, health and life sciences and urban affairs. UMKC’s unique profile includes the College of Arts and Sciences and Schools of Education, Nursing and Health Studies, Management, Medicine, Law, Computing and Engineering, Biological Sciences, Dentistry, Pharmacy and the Conservatory of Music and Dance.

The University’s 11 academic units include Schools of Medicine, Pharmacy, Nursing & Health Studies and Dentistry, all located adjacent to one another on the Health Sciences (Hospital Hill) Campus and are also adjacent to
three of our main clinical partners, The Truman Medical Center, Children’s Mercy Kansas City, and the Center for Behavioral Medicine. In addition, the University is home to the School of Biological Sciences, the School of Computing and Engineering, and the Colleges of Arts and Sciences, all of which have faculty members that maintain active joint appointments, as well as research and programmatic collaborations with each of the Health Professional Schools.

RESEARCH ADMINISTRATION

Office of Research and Economic Development. Research at UMKC is coordinated through the activities of the Office of Research and Economic Development, encompassing the Office of Research Services (ORS), the Office of Research Compliance, the UMKC Innovation Center, the Office of Technology Commercialization, the Institute for Human Development and the Laboratory Animal Research Center (LARC). Annually, the ORS processes approximately 250 awards totaling $35.5 M. Approximately 70% of the award total comes from federal sources for Life and Health Sciences-related research activity.

Office of Research Services. (http://ors.umkc.edu/home) The Office of Research Services provides faculty with pre-award services including proposal and budget development support, application concept review, non-technical and technical review, and application submission support. The Office also provides assistance in finding relevant sponsors for research through an institutional subscription to PIVOT as well as through other more individualized activities and efforts. Once an award is received the post-award staff members assist researchers in setting up spending accounts and provide the back-end support necessary for budget management, compliance with University, federal, and other sponsor requirements as well as timely and accurate reporting. The Office also works seamlessly and in collaboration with the Office of Research Compliance and the Office of Technology Commercialization (http://ors.umkc.edu/otc)

Office of Research Compliance ensures that researchers and their proposed research are in compliance with governmental regulations and university requirements. The Office coordinates our efforts to comply with Animal Care and Use (IACUC), human subject research (Institutional Review Board), Laboratory and Biosafety (Institutional Biosafety Committee), Radiation Safety regulations, and HIPAA accountability and training. Specifically, The UMKC Research Compliance Office provides the following services: helps researchers navigate complex federal and state compliance regulations; reviews and manages conflicts of interest to ensure the researcher’s personal interests do not influence their primary obligations to science, university, colleagues, students, and sponsors; provides for the humane care and use of all animals in research and teaching; oversees research protection as it relates to human participants, recombinant DNA, and biohazardous material; provides oversight to research investigators and serve as liaisons to the review boards and committees; coordinates the radiation safety program; and, offers education and training to faculty and staff.

UMKC LIFE AND HEALTH SCIENCES RESEARCH CENTERS AND INSTITUTES

Center for the Study of Dental and Musculoskeletal Tissues, UMKC-CEMT. The UMKC CEMT is a multidisciplinary and interdisciplinary center that includes investigators from the Schools of Dentistry, Medicine, Nursing, and Computing and Engineering to focus on dental and musculoskeletal health. This UMKC Center of Excellence integrates all investigators, whether basic or clinical, into powerful translational teams to prevent and treat diseases of mineralized tissue which includes teeth, cartilage, bone, and muscle. This goal aligns with the NIH roadmap initiative and focuses on mineralized tissue research with regards to obesity, cancer, osteoporosis, bone trauma, aging, metabolic bone disease, and diseases of oral tissue. Not only can findings be applied to biomaterials and composite research, medical devices, diagnostics, and clinical imaging, but also be expanded to veterinary practice and diagnostics and treatment of animal dental and bone disease.

There are four major objectives for this center;

- Develop a world-class basic science research program in mineralized tissues.
Create an outcomes science platform and clinical trial networks.

Provide education from graduate students and clinicians.

Establish an infrastructure to develop biotechnology and technology transfer.

Partnerships have been forged with the School of Medicine, School of Nursing, School of Computer and Engineering, and the School of Dentistry. This Center brings together and facilitates collaboration not only among faculty from several of UMKC’s life and health sciences schools but also their Kansas City clinical partners. UMKC’s health professions schools are located on Hospital Hill, adjacent to several of the region’s top clinical care facilities. Primary clinical partners include Truman Medical Center, Children’s Mercy Kansas City, and Saint Luke’s Hospital. Together, with the UMKC School of Medicine (SOM) and School of Nursing (SON), they offer a unique patient base that provide rich information for research and clinical applications into diseases of mineralized tissue. Researchers in the School of Nursing provide experience in implementation of clinical findings to practice and assessment of the impact of changes in clinical practice on health outcomes. Bioengineers at the School of Computing and Engineering (SCE) have generated significant numbers of patents and devices in biometrics and the school is developing a program in biomedical engineering that integrates with the health professional schools. The UMKC School of Dentistry is the only dental school in either Missouri or Kansas. The Bone Biology and Biomaterials/Bioengineering research programs are recognized nationally and internationally and have researchers with long histories of competitive federal support for their work. Investigators in Bone Biology include molecular biologists, engineers, protein chemists, and geneticists with expertise in the area of the genomics, proteomics, and transgenics in the study of mineralized tissue. The Biomaterials program includes investigators with international reputations in biomaterials for the repair and regeneration of tissues.  

http://cemt.umkc.edu/default.shtml

Vision Research Center. The goal of the Vision Research Center is to accelerate new discoveries and convert these discoveries into therapies serving those afflicted with these eye diseases. The Vision Research Center’s members from the UMKC Schools of Medicine and Pharmacy and from other affiliated institutions leverage existing resources and established extramurally funded programs in three key areas of research: 1. discovery of novel basic science mechanisms that underlie the function of the normal and diseased visual system and that generate the urgently needed rationale for novel innovative high-impact therapies; 2. development of novel therapies and drugs through translational research resulting from extramural support by the National Institutes of Health and other agencies supporting eye research, from collaborations with companies targeting eye diseases and from formal collaborations with the life science community in the Kansas City area; 3. Development of novel diagnostic strategies and their incorporation in state-of-the-art clinical research building on the VRC’s national leadership status in these areas and fast-tracking outcomes-validated new medicines and therapies.

Shock Trauma Research Center. The Shock Trauma Research Center was founded in 2001 as a UMKC multidisciplinary research center. It includes basic scientists, clinicians, and translational scientists. Laboratories in the Center conduct research into shock, inflammation, and trauma, all of which are critical areas of medical research. Work from the Center enriches the educational and academic programs, especially in surgery and in the basic medical sciences. Trauma, with its sequelae of shock and inflammation, is a leading cause of death among young people. It is in fact the leading cause of death in people under 44 years of age. For this and a variety of other reasons, it is a major urban public health issue. The incidence of trauma in the centers of the largest cities - including Kansas City - is a major national problem. For this reason, the work of the center is especially important in the urban environment, and is a highly appropriate activity for a major urban university. The focus of the Center continues to be on the development of innovative treatment strategies for shock and injury, and for sepsis, two of the most lethal clinical problems today. The Center has received continuous extramural funding for the past 10 years. Scientists in the Center present their work locally, nationally, and internationally, and publish in high quality medical and scientific journals. They have served on national advisory groups and have served in national office in medical and scientific organizations. Dr. Charles Van Way has served as Vice Chair of the Residency Review Committee of the ACGME, and
continues to serve as President of the A.S.P.E.N. Rhoades Research Foundation.

Collaborative for Excellence in Behavioral Health Research and Practice (The Collaborative) is located in the UMKC School of Nursing and Health Studies (SoNHS). The Collaborative is a group of professionals working to advance health and wellness by bringing behavioral health research to practice and by supporting people, organizations and systems through change processes. The Collaborative accomplishes this through a variety of projects in collaboration with local, state and federal partners. Members of the Collaborative lead or partner on a range of federally and locally funded projects, including the Centers for Disease Control and Prevention (CDC) funded Capacity Building Provider Network National Resource Center, which coordinates the CDC’s flagship program of 21 grantees that train health departments, community-based organizations and healthcare organizations to deliver high-impact HIV prevention strategies; the Substance Abuse and Mental Health Services Administration (SAMHSA) funded Addiction Technology Transfer Center (ATTC) National Office, which coordinates SAMHSA’s network of 14 ATTC centers that identify and promote evidence-based practices for addiction treatment, and helps to integrate addiction treatment into healthcare settings; the SAMHSA-funded Mid-America ATTC Regional Center, which serves Iowa, Kansas, Missouri, and Nebraska by developing and conducting online and in-person trainings and assists states and healthcare systems to implement evidence-based addiction treatments; and the SAMHSA funded UMKC SBIRT grant that provides health and behavioral health students and professionals with training to screen and intervene with patients who use alcohol and drugs.

Center for Health Insights (http://chi.umkc.edu/). The UMKC Center for Health Insights (CHI) provides biomedical researchers with investigators to accelerate their research. The CHI supports the UMKC REDCap research instance, Ingenuity for biological pathways analysis, the UMKC/Truman Medical Center i2b2 installation and the UMKC Insights High Performance Computing Platform, which includes a national de-identified data set derived from electronic health records. The CHI also innovates through our portable motion capture platform, our development of novel web resources to enhance information about patient context and initiatives related to the “Internet of Things”.

Institute for Human Development (http://www.ihd.umkc.edu/). The UMKC Institute for Human Development (IHD), a University Center for Excellence in Developmental Disabilities, is an Applied Research and Interdisciplinary Training Center for Human Services. IHD exemplifies the University’s goals by practicing engaged scholarship supporting research to practice so that people, agencies, and the community can benefit from the application of new knowledge and practices generated by the university.

IHD conducts and collaborates on a wide variety of applied research projects to develop, implement, and demonstrate as well as evaluate new ideas and promising practices that support healthy, inclusive communities. Through our interdisciplinary university training we infuse best practices into the curriculum of graduate and undergraduate students in a wide range of professional disciplines. Through community services and supports, IHD assists individuals, community and state agencies, and university faculty to build the capacity of their programs through needs assessments, technical assistance, grant development, demonstrations, and program evaluation. IHD is also a vital information link through the dissemination of products and the establishment of information resource centers. These resource centers become vital assets to the community as demonstrations of research to practice.

IHD focuses its work on seven broad priority need areas: health and wellness promotion; early childhood and youth; individual advocacy and family support; adult community living; aging and developmental disabilities; interdisciplinary university training; and policy, program development, and quality assurance. Every project at IHD falls into one of these categories. While the projects may change, the priority areas stay constant and serve to guide the larger vision of IHD.

IHD partners with university, community, state, and federal level organizations. IHD generates over $9 million in extramural funding through demonstration programs and leverages an estimated $20 million for other community agencies. 37% of IHD’s funding was from Federal sources, 39% from state, and 24% from local
and university funds. In the past year, projects and initiatives continue to focus on youth, families, and adults with developmental disabilities, as well as underserved populations (i.e. low-income minority youth and urban Latino communities).

**Mid America Heart Institute.** The Mid America Heart Institute is a vertically-integrated entity residing within Saint Luke’s Hospital, winner of the 2003 Malcolm Baldridge Award for Quality, and one of the 2 primary teaching facilities for the University of Missouri - Kansas City. In addition to its cutting-edge clinical services, MAHI created the Cardiovascular Research Center over 30 years ago to manage and analyze clinical data. A unique feature of MAHI is the commitment to translating findings into clinical practice. We have successfully pilot-tested and disseminated personalized consent forms and screening programs for depression and diabetes. The commitment of the health system to innovate and participate in research to further improve care means that our trainees will have extraordinary access to patients across a broad spectrum of disease and throughout a broad continuum of care. In Outcomes Research, the ‘laboratory’ refers to the data resources from which important clinical questions can be answered and the clinical environment in which novel interventions can be implemented and pilot tested. We hold an extraordinary array of unique databases in such areas as National Quality Databases, Multi-Center Outcomes Databases, Clinical Trial Databases which are used for clinical outcomes research. Importantly, each of these databases is actively used by investigators, enabling efficient use and extension of these data to support clinically important projects of our trainees.

- **Outcomes Research Center, Mid-America Heart Institute** houses the Cardiovascular Outcomes T32 (NHLBI 5T32HL110837) and is one of the leading centers in cardiovascular outcomes research in the United States. Many of the current methods used nationally for quantifying and analyzing patient-centered health status outcomes were designed by faculty in this Center. Members of this group have developed new techniques for performance measurement and have applied methods of cost-effectiveness and decision analysis to novel cardiovascular technologies. The Outcomes Research Center has a strong record of interdisciplinary collaboration between cardiologists, nephrologists, internists, nurses, economists, psychologists, and pharmacists from both UMKC and KU. This Center provides critical support to training efforts in interdisciplinary outcomes research and precision medicine.

The cardiovascular research program not only mentors and collaborates with researchers throughout Frontiers, other CTSA and internationally (China’s National Center for Cardiovascular Disease, Australia and Europe), but it has a strong commitment to training the next generation of translational scientists. In particular, our T32 in Cardiovascular Quality and Outcomes Research has become a leading training center for young investigators interested in the terminal phase of translational research. Beyond our own accomplished faculty, we create collaborations for our trainees with leading outcomes researchers at Yale (Harlan Krumholz), Duke (Eric Peterson, Lesley Curry, Adrian Hernandez), and the Universities of Colorado (John Rumsfeld, Fred Masoudi, Larry Allen) and Michigan (Brahmajee Nallamothu, Rodney Hayward). Trainees are able to exploit existing data from >30 clinical trials and registries led by MAHI/UMKC faculty and the national registries of the AHA and ACC (for which MAHI/UMKC is one of 3 analytic centers, along with Yale and Duke, for the ACC NCDR registries). In addition, our trainees are able to participate in the newly-established Saint Luke’s Center for Healthcare Innovation, which support novel interventions to achieve the triple aim of healthcare. These resources thus support access to the latest analytic approaches (supported by 12 biostatisticians at MAHI alone), deep experience in the increasingly important analysis and interpretation of patient-reported outcomes measure and in the challenges and evaluation of implementation research. One hundred percent of our trainees have remained in academia, either as clinical trainees or as Assistant Professors with a research emphasis.

**UMKC RESEARCH CORE FACILITIES**

**Laboratory Research Animal Center.** The UMKC Laboratory Animal Research Center is an AAALAC-accredited facility located in the ground floor of our Health Sciences Building on Hospital Hill. The facility is
carefully climate-controlled, secured and remotely monitored for safety and security. The facility is equipped to house rats, mice, rabbits, and zebra fish. There are separate clean- and dirty-side cage washing and sterilization facilities as well as multiple housing rooms, a quarantine area, a cross-breeding and fostering facility and operation as well as well as procedure rooms. The LARC is staffed by well-trained and competent employees including a licensed veterinarian. Usage rates are published on our website and use is available to our faculty as well as those of our affiliate organizations. The facility is inspected semi-annually by members of the IACUC as well as annually by AAALAC and the USDA. For rates and a full listing of available equipment and service see our web site: http://ors.umkc.edu/office-of-research-services/larc

Proteomics and Mass Spectrometry. The Proteomics Core lab is equipped with state of the art mass spectrometers and routinely assists faculty investigators and regional corporate biotech/agritech interests, acquiring MS data to support translational and basic research, grant development, student learning objectives, quality control, and molecular verification tasks. Assistance with experimental design, sample preparation, and data interpretation are provided. Recently, the facility began an instrument upgrade strategy in order to expand our capabilities and services to include the newest available methods for systems biology research and human disease biomarker discovery. http://sbs.umkc.edu/research_proteomics.cfm.

Confocal and Microscopy Facility. Located in the UMKC School of Dentistry, this university core is available to all researchers. The goal is to support the research programs of a diverse group of NIH funded users located in the UMKC Schools of Dentistry and Nursing as well members of the UMKC Center of Excellence in the Study of Dental and Musculoskeletal Tissues (CEMT), NIH funded investigators, and other researchers at UMKC. This confocal microscopy core resource is also available to the greater academic and commercial community in the Kansas City area. The core is capable of accommodating a wide range of high-resolution microscopy project applications and fluorophores. The UMKC School of Medicine also supports a Confocal Imaging Center providing access to staff supported, state-of-the-art confocal imaging equipment for UMKC researchers and scientists from affiliated research institutions in need of advanced high-end microscopy imaging support on the Hospital Hill Campus and the region.

Musculoskeletal Structure/Property Characterization Core. The mission of the Musculoskeletal Structure/Property Characterization Core is to develop methods to improve the quality of life for people who have experienced loss of oral and craniofacial tissues because of age, cancer or trauma. Effective collaborations between the basic science investigators and clinical researchers promotes the translation of the fundamental laboratory results into techniques, procedures and materials that can be used to replace tissues that have been damaged or destroyed by disease, injury or age. Specific initial aims will be to develop a "lab bench-to-clinic" research effort featuring the integrated practice of discovery, application, and clinical assessment. The Musculoskeletal Structure/Property Characterization Core laboratories are located on the 3rd floor of dental school building and provide a wide range of analytical techniques for research and training in life science and biomaterials / bioengineering fields. The laboratories are open for use by UMKC students, faculty and those of our partner institutions.
http://dentistry.umkc.edu/Department_Organizations/crisp/index.shtml

Cryo-Electron Microscopy Facility. The cryoEM laboratory consists of a JEOL 1200 EX II transmission electron microscope, equipped with a cryo-shield and a Gatan cryo-sample holder, as well as the room-temperature specimen rod used for negatively-stained specimens. Users have access to a rotary evaporator and plasma discharge stations for initial substrate preparation and cleaning. A manual freeze-plunger is available for preparation of cryoEM samples of particulate specimens, rapidly frozen in liquid ethane. A liquid nitrogen dewar is used for storing cryoEM specimens prior to use in the electron microscope.
http://sbs.umkc.edu/research_em.cfm

High Field NMR Facility. The High Field NMR Facility at MKC is equipped with a state of the art Oxford AS 600/51 spectrometer equipped with cryo and RT probes for high-resolution structural determinations. The facility is equipped through the affiliated Protein Interaction and Dynamics core to assist researchers with isotopic labeling, purification and characterization of target peptides and proteins as well as other biophysical
properties determinations relevant to NMR analysis including isothermal titration calorimetry, circular-dichroism, dynamic light scattering, surface plasmon resonance, analytical ultracentrifugation, and microcalorimetry. http://sbs.umkc.edu/research_nmr.cfm

**X-Ray Crystallography Facility.** UMKC is a member of the Southeast Regional Collaborative Access Team operating two beam-lines at the Advance Photon Source at the Argonne National Laboratories. The UMKC Crystallography Laboratory is also equipped to assist researcher with protein crystallization, crystallization and preliminary screening of samples for signature protein diffraction with in-house instrumentation prior to beam-line analysis. http://sbs.umkc.edu/research_xray.cfm

**Libraries.** The University Libraries at UMKC consists of three libraries: the Health Sciences Library, the Miller Nichols Library and the Dental Library. This library system provides the researchers at UMKC many important resources including: over 250 multi-disciplinary databases, including Alt Health Watch (complimentary medicine) Medline, BIOSYS, Web of Science, Scopus, Embase, and International Pharmaceutical Abstracts; online books from respective publishers like ScienceDirect, Wiley InterScience, and McGrawHill; and, online journals from leading publishers, including the American Chemical Society, Nature Publishers, and Springer. If a needed document is not found in the Libraries’ collection, the highly trained staff can obtain almost any document, usually in just a couple of days or less. In addition, the librarians at the University Libraries offer all researchers specialized liaison services, from one-on-one consultations at the start of a research project, to assistance with data management plans, open access compliance assistance, copyright help and archiving.

**UMKC CLINICAL PARTNERS**

Truman Medical Centers (http://trumed.org/) is Kansas City’s essential, two acute-care safety net hospital health system. The TMC Health System includes TMC Hospital Hill, TMC Lakewood, TMC Behavioral Health, the Jackson County Health Department and a number of primary care practices throughout Eastern Jackson County. TMC is also the primary teaching hospital for the University of Missouri-Kansas City Schools of health sciences.

**Truman Medical Center Hospital Hill.** TMC Hospital Hill provides a wide array of outpatient medical services. It is perhaps best known for its emergency and trauma services. TMC Hospital Hill has the busiest adult emergency room in the Kansas City metropolitan area with more than 50,000 visits a year. TMC Hospital Hill is also noted for Bariatrics, Asthma, Diabetes, Ophthalmology, high risk-obstetrics, and women’s health.

**Truman Medical Center Lakewood.** Primary Care, Family Medicine and Geriatrics are among the core services at TMC Lakewood. TMC Lakewood has 112 acute care beds and 212 long-term care beds. It is a primary care hospital offering a full range of therapeutic, diagnostic and rehabilitative services and more than 74,000 people receive their primary care at TMC Lakewood each year.

**Saint Luke’s Hospital of Kansas City.** As part of the Saint Luke’s Health Systems, a 10-hospital locally owned and operated, not-for-profit, faith-based system, Saint Luke’s Hospital of Kansas City has served the health care needs of the region for more than 130 years. Saint Luke’s provides tertiary and quaternary services including: Level I Trauma Center; Level III Neonatal Intensive Care Nursery; comprehensive cardiac treatment in the Mid America Heart Institute; center for women and children; Cancer Institute; Regional Arthritis Center; Sexual Assault Treatment Center; Children's S.P.O.T. (a developmental preschool speech and hearing program); heart, kidney, and liver transplantation programs; and the Saint Luke’s Marion Bloch Neuroscience Institute.

**Children’s Mercy Kansas City.** The Children’s Mercy Kansas City have been providing exclusive medical service to children for more than 100 years. Children’s Mercy Kansas City today provides the highest level of medical care, technology, services, equipment and facilities all tailored to meet the intricate needs of its pediatric patients. Children’s Mercy is the only Level I Pediatric Trauma Center in the region. Physicians representing more than 40 pediatric specialties care for children who come from a 150-county region in
western Missouri and eastern Kansas. The hospital is nationally recognized in: Cardiac Surgery, Transplantation, Nephrology, Neonatology and more.

**Center for Behavioral Medicine.** The Center for Behavioral Medicine is an agency for the Department of Mental Health located on Hospital Hill and provides comprehensive psychiatric care to patients from Kansas City and the seven surrounding counties. CBM serves as the University of Missouri-Kansas City’s Department of Psychiatry, fulfilling academic and research needs. CBM offers services in alcoholism, drug, family, group and individual counseling, crisis intervention, group psychiatric therapy, and suicide prevention as well as hospital inpatient care, mental health aftercare and psychiatric care. The hospital also offers treatment to mentally ill patients with substance abuse problems.

**The Kansas City Veterans Administration Medical Center.** The Kansas City VAMC is one of eight medical centers in VISN 15. The mission of the KC VAMC is to provide high quality, comprehensive primary and tertiary healthcare to veterans in our service area, and to provide selected specialty care services to referred veterans. KC VAMC also provides education and training to healthcare professionals and performs research that benefits veterans. The KC VAMC offers residency training in all major medical and surgical specialties and subspecialties. Associated Health Training is offered in nursing, psychology, audiology, social work, dietetics, pharmacy, chaplaincy, health care administration and optometry.

**Research Medical Center.** Research Medical Center was founded more than 120 years ago and today is one of the crown jewels of the HCA Midwest Health System, with a new lobby and admitting areas, a renovated and expanded Cancer Center and Women’s Care Unit, new private patient rooms, and an expanded emergency room. The 22,000-square foot Cancer Center is a comfortable outpatient facility and a dedicated inpatient oncology unit. The Liver and Pancreas Institute is the first unit in the Midwest to provide specialized care to patients who suffer liver, pancreas and biliary cancers. The Transplant Institute has received national recognition for best outcomes in kidney-pancreas transplants.  www.researchmedicalcenter.com

**FRONTIERS AFFILIATE INSTITUTIONS**

**KANSAS CITY UNIVERSITY OF MEDICINE AND BIO SCIENCES**

The Kansas City University of Medicine and Biosciences (KCU) campus houses a private, post-baccalaureate, not-for-profit institution of higher education (Figure FR-KL2.13). Founded in 1916, KCU is one of the oldest of 145 medical schools in the United States, and is the oldest in Kansas City, Missouri. The location of the university campus in the heart of the downtown district of Kansas City, Missouri provides access to a rich, multi-cultural community that can be
recruited for studies focusing on health outcomes.

**RESEARCH ADMINISTRATION**

**Office of Research and Sponsored Programs.** The growth of research infrastructure and culture at KCU has been remarkable over the last three years. A focus of the university strategic plan has been on fostering an environment supportive of research. Dr. Jeffrey Joyce was hired as Vice-President for the Office of Research and Sponsored Programs approximately three years ago. Dr. Joyce has enhanced the intellectual environment with opportunities for faculty to discuss and share ideas creatively to support the research endeavor at KCU. Science Fridays and the University Lecture Series occur throughout the year, and provide a rich scientific environment that is strongly supportive of research, and therefore, the success of this partnership with KUMC.

Some of the existing research support capacity has been enhanced, and a significant increase in funding from federal research grant awards has occurred. The Office of Research and Sponsored Programs (ORSP) also provides pre and post award support for research grants as well as compliance oversight by the KCU Manager of Research Compliance who is charged with promoting and supporting ethical research at KCU. Mechanisms devoted to increase the practice and quality of ethical research include education and training via on-line modules, small-group presentations, and one-on-one contacts. Some of this training is mandatory, and must be completed prior to beginning the research, and must be updated annually. In particular, all investigators and personnel participating in human subjects or animal research are required to complete the appropriate basic education program developed by the Collaborative Institutional Training Initiative (CITI). The ORSP provides a fully functioning Institutional Review Board (IRB) and an Institutional Animal Care and Use Committee (IACUC). Members of these committees must complete mandatory CITI training. In addition, committee members must also participate in on-going training during committee meetings. KCU has a fully operational animal laboratory facility located on campus, and has submitted an application for OLAW approval. The ORSP is also responsible for the Conflict of Interest program which assures and monitors investigator compliance with institutional policy on financial conflict of interest.

**Biological Safety.** KCU operates a Biological Safety Program and has an Institutional Biosafety Committee (IBC) to review all research activities involving recombinant DNA or the deliberate infection of experimental animals, as required by the NIH Guidelines for Research Involving Recombinant DNA Molecules, and by university policy. A mandatory, web-based Biosafety Training Program for both investigators and their laboratory personnel is required. Approved programs are subject to annual continuing review, and all laboratories of IBC-approved programs are inspected by our biological safety officer (BSO). IBC committee members must also participate in mandatory training modules.

**PHYSICAL INFRASTRUCTURE**

**Office Space.** Office space provided for research faculty members is fully equipped with desks, chairs, file cabinets, bookshelves, and computer stations with laptop computers, desk jet and laser printers, and scanners. Those designated spaces have multiple high speed T1 access to the internet through the site: www.KCUMB.edu. The Ethernet connection allows for continuous access to the Internet and connection to the University Library. Faculty can perform literature and database searches directly from their offices. KCU is fully interconnected via a Novell Local Area Network. The university also provides file sharing, networked printing, and e-mail access. Research faculty have easy access to many regularly updated word processing, graphics, statistical, and data analyses programs as needed. (ex. IBM SPSS Statistics 22). Faculty can access a variety of medical applications loaded at the workstation and file server level. Other services provided by the IT department include computer application training, helpdesk services, distance education, and 24-hour on-call IT staff availability for emergencies. The PI’s lab is equipped with a desktop computer, with redundancy back up storage for large data-sets, and another laser printer.
Library. The Library reference service offers assistance with research, teaching, and other information needs by performing literature searches in MEDLINE (PubMed), MD Consult, OVID, EBM Reviews (OVID), ScienceDirect, OSTMed.DR, Natural Standard, ERIC, Google Scholar, EBSCO, and Gale databases. Other databases are also available for information requests and include: Access Medicine, Access Pediatrics, Access Surgery, CDC, USA.gov, Clinical Pharmacology, John Hopkins ABX Guide, Journal Citation Reports, Medical Letter, First Consult, Up-to-date, MedlinePlus, New Bank, Springer Images, and Ulrich’s Periodical Index. Reference questions or search requests are provided for KCU faculty and clinical community faculty without charge. Interlibrary Loan service augments the holdings of the D’Angelo Library by providing access to other national and international library collections.

KCU is invested in the success of our research faculty, and will provide resources in the form of logistical support such as administrative management, oversight, and best practices training and financial support such as protected faculty time for research associated with this partnership. The facilities and other resources available to research faculty and their research teams will include everything needed to successfully undertake, support, and complete this research partnership.

COMMUNITY PROGRAM

Score 1 for Health. The University has access to unique and diverse patient populations as a result of our affiliations with several area hospitals and clinics that provide our student rotations for third and fourth year medical student training. Score 1 for Health is another program located on the campus of KCU. This program has been providing free in-school health screening to children (K-5th) for more than fifteen years. Targeting elementary schools that enroll 50% or more of their students in the free lunch program, Score 1 screens approximately 14,000 students annually, and to date has screened over 100,000 students. KCU clinical faculty and medical students conduct these screenings, along with the Score 1 for Health registered nurses, allied health professionals and nursing students from schools in the Kansas City metro area. These screenings include height and weight assessments including calculation of BMI, hearing tests, blood pressure tests, dental checks and a head-to-toe physical assessment. An annual assessment of the student screening data is conducted and a corresponding report is produced.

TRUMAN MEDICAL CENTERS

Truman Medical Centers (http://trumed.org/) is Kansas City’s essential, two acute-care safety net hospital health system. The TMC Health System includes TMC Hospital Hill, TMC Lakewood, TMC Behavioral Health, the Jackson County Health Department and a number of primary care practices throughout Eastern Jackson County. TMC is also the primary teaching hospital for the University of Missouri-Kansas City Schools of health sciences.

- Truman Medical Center Hospital Hill TMC Hospital Hill provides a wide array of outpatient medical services. It is perhaps best known for its emergency and trauma services. TMC Hospital Hill has the busiest adult emergency room in the Kansas City metropolitan area with more than 50,000 visits a year. TMC Hospital Hill is also noted for Bariatrics, Asthma, Diabetes, Ophthalmology, high risk-obstetrics, and women’s health.

- Truman Medical Center Lakewood Primary Care, Family Medicine and Geriatrics are among the core services at TMC Lakewood. TMC Lakewood has 112 acute care beds and 212 long-term care beds. It is a primary care hospital offering a full range of therapeutic, diagnostic and rehabilitative services and more than 74,000 people receive their primary care at TMC Lakewood each year.
SAINT LUKE’S HOSPITAL

As part of the Saint Luke’s Health Systems, a 10-hospital locally owned and operated, not-for-profit, faith-based system, Saint Luke's Hospital of Kansas City has served the health care needs of the region for more than 130 years. Saint Luke’s provides tertiary and quaternary services including: Level I Trauma Center; Level III Neonatal Intensive Care Nursery; comprehensive cardiac treatment in the Mid America Heart Institute; center for women and children; Cancer Institute; Regional Arthritis Center; Sexual Assault Treatment Center; Children's S.P.O.T. (a developmental preschool speech and hearing program); heart, kidney, and liver transplantation programs; and the Saint Luke's Marion Bloch Neuroscience Institute. The hospital is the primary teaching hospital for the University of Missouri-Kansas City School of Medicine, which includes a physician residency program. The Saint Luke’s health system boasts a network of more than 600 physicians representing over 60 medical subspecialties. In 2014, the Saint Luke’s Central Office of Research Administration reported 131 active studies, 2,659 patient enrolled in studies, 174 publications, and 243 abstracts/presentations.

SWOPE HEALTH SERVICES

Swope is a patient-centered medical home that provides primary health care and behavioral health services in Kansas City. Swope Health Services mission is to improve the health and wellness of the community by delivering accessible, quality, comprehensive patient care. Today, Swope Health Services provides care for more than 40,000 patients in western Missouri and eastern Kansas.

The PCI program in Frontiers Hub Research Capacity component uses the Swope Health Center to increase enrollment in clinical trials to include their largely minority, underserved population. The PCI program has dedicated research space at Swope that includes 2215 sq ft of space that includes 10 offices and 3 workstations. The space enhances access to the patient population served at Swope and provides the space to accommodate over 2400 research assessments annually. Currently, there are three smoking cessation projects including two R01 funded projects led by Drs. Nollen (DA031815) and Cox (DA035796) and a PCORI-funded project (AD-1310-08709) led by Dr. Nollen. Additionally, the satellite presence created opportunities for the KU AD Center to participate in an NIA funded multi-site trial of aspirin in reducing clinical events in older adults.

CENTER FOR PRACTICAL BIOETHICS

The Center for Practical Bioethics is a nonprofit, free-standing and independent organization nationally recognized for its work in practical bioethics. For more than 30 years, the Center has helped patients and their families, healthcare professionals, policymakers and corporate leaders grapple with difficult issues in healthcare and research involving patients. The Center does not wait to be called upon. Their vision and mission requires them to be proactive — to call attention to ethical issues and to develop programs, policies and publications that address them. Through this unique approach, the Center puts “practical bioethics” into action. A dedicated Board of Directors and staff representing multiple disciplines and fields of expertise, as well as individuals and organizations throughout the nation committed to advancing ethical practices and policies in health and healthcare, support the Center.

PAIN KC: For the past three years, Frontiers staff has facilitated a community group of people living with chronic pain called PAINS KC. This group is a grassroots response to the IOM Report calling for action to address the widespread public health problem of chronic pain. The group meets in the Clinical Research Center facility monthly and includes patients, family members and caregivers. This venue is particularly appreciated by the community for its easy access for wheelchairs and those with mobility limitations as well as ample, nearby parking and public transportation.
To the research community:

We are celebrating continued research success at the University of Kansas Medical Center Research Institute, and we thank you for your interest in learning more about us.

This annual report, in addition to summarizing the scope of basic and clinical research and other sponsored research activity at our institution, describes some of our key strengths. At KU Medical Center, our researchers are among the nation's best, and we are competitive on a national stage.

KU Medical Center is one of just 21 medical centers in the country to have a nationally-designated Alzheimer's Disease Center, a National Cancer Institute-designated Cancer Center and a Clinical and Translational Science Award from the National Institutes of Health. Our researchers have been among the nation's leaders in obtaining funding from the relatively new Patient-Centered Outcomes Research Institute.

But beyond our success in obtaining federal funding, conducting cutting-edge clinical trials and in advancing basic science research, we are most proud of our work that has an impact on the lives of patients.

From looking at new chemical compounds in the laboratory that hold promise in the fight against conditions like sickle cell disease to new ideas to fight Alzheimer's disease with diet and exercise, our investigators are advancing medical knowledge every day.

We hope you enjoy this report, and that you learn a few things you may not have already known about our research activity.

Sincerely,

Richard Barohn, M.D.
Vice Chancellor for Research
KU Medical Center Research Institute
The University of Kansas Medical Center

Jamie Caldwell
Executive Director, KU Medical Center Research Institute
Associate Vice Chancellor for Research Administration
The University of Kansas Medical Center
Capitalizing on new funding sources

Researchers at the University of Kansas Medical Center have been successful in obtaining grants from the Patient-Centered Outcomes Research Institute, an independent nonprofit organization supported in part by the Affordable Care Act. KU Medical Center was notified of three awards totaling more than $10 million for three new projects: a new electronic medical record data network, a new clinical trial to evaluate four drugs for the treatment of pain associated with neuropathy and a new trial to examine the effectiveness of long-term nicotine replacement therapy for patients with chronic obstructive pulmonary disease. Another large project in October received $10 million to focus on fighting obesity in rural areas.
"One of our primary missions at KU Medical Center is to improve the health of all Kansans, with a special emphasis on those who are living in underserved areas.”

Fighting obesity in rural areas

A research team at the University of Kansas Medical Center is using a $10 million funding award by the Patient-Centered Outcomes Research Institute (PCORI) to study the comparative effectiveness of obesity treatment options in rural communities.

The study was one of 46 proposals PCORI approved for funding in September 2014 to advance the field of comparative effectiveness research (CER) and provide patients, health care providers and other clinical decision makers with information that will help them make better-informed choices.

Christie Befort, Ph.D., associate professor of preventive medicine and public health, will lead the research project at KU. The study is one of two obesity-focused studies that PCORI selected to explore ways to reduce disparities in health care and outcomes for individuals who are disproportionately affected by obesity.
Nearly 20 percent of the population in the United States lives in rural communities. Rural residents suffer disproportionately from obesity and have less access to effective weight loss programs.

Befort’s study will evaluate different approaches for treating obesity in primary care settings. Her three-arm study will compare the traditional, fee-for-service model with models that coordinate services either in the context of a patient-centered medical home or through a telephone-delivered disease management program.

The study calls for one of the three treatment approaches to be delivered at 36 primary care practices located in Kansas, Nebraska, Wisconsin and Iowa. Patients’ weight loss at 24 months will be used to measure the effectiveness of the different approaches. Approximately 1,400 patients will participate.

The project, the Midwestern Collaborative for Treating Obesity in Rural Primary Care, will last five years. Befort worked with a patient advisory panel to shape the treatment approaches and also engaged with rural primary care providers, insurers, the American Academy of Family Physicians, the National Committee for Quality Assurance and state health departments.

The study is one of two obesity-focused studies that PCORI selected from 490 submissions that responded fully to all of the funding announcements PCORI issued in February 2014. They were selected through a highly competitive review process in which patients, clinicians and other stakeholders joined clinical scientists to evaluate the proposals. Applications were assessed for scientific merit, how well they will engage patients and other stakeholders, and their methodological rigor among other criteria.

“One of our primary missions at KU Medical Center is to improve the health of all Kansans, with a special emphasis on those who are living in underserved areas,” said Douglas Girod, M.D., executive vice chancellor of KU Medical Center. “This award and the research that comes out of it will go a long way in helping rural residents in our state live healthier and longer lives.”
Leading the fight against Alzheimer’s disease

The KU Alzheimer’s Disease Center is one of just 29 national Alzheimer’s Disease Centers designated and funded by the National Institute on Aging. Each center has its own unique area of emphasis. The KU center focuses on mitochondrial genomics, metabolism and neuroimaging. Collaborative studies and clinical trials draw upon the expertise of scientists from many different disciplines as they work together to promote healthy brain aging and find strategies to prevent Alzheimer’s disease.
“If, by any chance, I can be a small part of this study, I will feel as if I could be of help to my mother, all those who came before her and the millions who will come after her.”

A key area of focus for the Alzheimer’s Disease Center at the University of Kansas Medical Center is on prevention of disease.

The center’s leaders, Jeffrey Burns, M.D., and Russell Swerdlow, M.D., both professors of neurology at KU Medical Center, focus on exercise and brain metabolism as ways to potentially stave off the disease.

Burns often points out that even if researchers could find a way to delay the onset of the disease by five years, they could cut the prevalence of the disease in half.

In 2014, scientists at the center participated in several studies, including a national study to determine whether a new antibody treatment can prevent the onset of memory problems before they arise.

The national study, called the “Anti-Amyloid Treatment in Asymptomatic Alzheimer’s” study - or the A4 study - will seek to enroll 1,000 adults.
between the ages of 65 to 85 who may be at higher risk for developing the disease, but who have no symptoms. The study will take place at trial sites across the United States, Canada and Australia.

The development of amyloid plaques in the brain has been linked to the development of Alzheimer’s disease. The study will seek to determine whether a drug treatment can slow memory loss associated with the buildup of the plaques.

“Our Alzheimer’s Disease Center is a national leader in research into the prevention of Alzheimer’s disease,” Burns said. “Our participation in this study complements our other work, including studies where we are trying to determine the role exercise can play in reducing the buildup of these plaques in the brain.”

The center frequently works with patients and volunteers in clinical studies, many of whom volunteer for repeat studies. Joann Bell, of Olathe, Kan., volunteered to participate in the new A4 study in 2014. Though she herself shows no signs of Alzheimer’s, Bell served as the primary caregiver for her mother, who struggled with the disease for years.

“If, by any chance, I can be a small part of this study, I will feel as if I could be of help to my mother, all those who came before her and the millions who will come after her,” Bell said.

The study is one of a range of different efforts ongoing at the KU Alzheimer’s Disease Center, which has been conducting new Alzheimer’s trials and other research efforts since being awarded a five-year, $6 million grant from the National Institute on Aging in 2011.
Basic science research helps form the bedrock of medical knowledge. At the University of Kansas Medical Center, our scientists are working on a wide array of projects to expand the basis for further clinical study. One such study, conducted by Kenneth Peterson, Ph.D., professor and vice chairman of the Department of Biochemistry and Molecular Biology, led to a new discovery that could lead to new treatments for sickle cell disease, along with many other blood disorders. Peterson collaborated with the High Throughput Screening Laboratory on the KU campus in Lawrence to help make the discovery.
"If we can find an existing drug or new compound that can treat these disorders in a cost-effective way, it would be a great scientific and medical achievement."

Discovering chemical compounds today to fight diseases tomorrow

A University of Kansas School of Medicine scientist discovered chemical compounds that may lead to a new treatment for sickle cell disease and other genetic blood disorders.

Kenneth Peterson, Ph.D., a professor and vice chair of the Department of Biochemistry and Molecular Biology at KU Medical Center, working with researchers at the High Throughput Screening Laboratory on the KU campus in Lawrence, has come up with a list of compounds that have the potential to turn on fetal hemoglobin, which can help negate the effects of sickle cell disease, Cooley's anemia and some forms of beta thalassemia.

Sickle cell disease is caused by a mutated version of the beta-globin gene that helps make hemoglobin - a protein that carries oxygen in red blood cells. The mutated gene causes red blood cells to form into a crescent shape, which block capillaries and
Kenneth Peterson, Ph.D.

causes them to break apart easily, causing severe pain, anemia, organ damage and stroke. More than 100,000 people have sickle cell disease in the United States.

Peterson says a lot of gene therapy research has focused on ways to fix the mutated gene to prevent sickle cell disease in the future. However, this approach requires technologies that are not generally available and are cost-prohibitive. He says inexpensive treatments are needed now.

"There are millions of people in the world with sickle cell and other genetic blood diseases, particularly in Third World countries" Peterson says. "If we can find an existing drug or new compound that can treat these disorders in a cost-effective way, it would be a great scientific and medical achievement."

Peterson says they have never been a comprehensive screen for compounds for genetic red blood disorders before this simply because the tools to do it haven't been available. He says one major hurdle was cleared when he was able to derive mouse cells containing the entire human beta-globin locus from genetically modified mice. Those cells were then used in a screen at the KU High Throughput Screening Lab in Lawrence.

"What we were searching for were compounds that that would turn on a fetal form of hemoglobin, which would counteract the symptoms associated with the mutated gene," Peterson says.

The initial screen found 232 base compounds that could fit those criteria. Peterson says they eventually narrowed it down to the seven most promising compounds. Those seven compounds were re-screened with a human cell line, and the results were replicated.

Peterson says the next step is to test the seven compounds in mice and to work with medicinal chemists at KU to make sure the compounds are safe for humans.

"This is a great example of what kinds of breakthroughs can occur when researchers on our two campuses work together, and demonstrates the importance of basic research as a driver for discovery of new medical treatments," Peterson says.
"We're looking forward to helping to lead the national conversation about ways to advance scientific knowledge faster by creating better studies and analyzing data more."

The KU Medical Center-led Great Plains Collaborative Network received an $8.6 million dollar grant to continue its work on establishing a network of medical centers in the Midwest to connect electronic medical record systems and building tools that can use patient data to answer specific research questions. The grant came from the Patient-Centered Outcomes Research Institute (PCORI), an independent organization authorized by the U.S. Congress in 2010 as part of the Patient Protection and Affordable Care Act.

L. Russell Waitman, Ph.D., director of medical informatics and assistant vice chancellor for Enterprise Analytics at KU Medical Center, is the principal investigator on the project. Waitman says grant will allow Great Plains Collaborative Network to build relationships with other institutions and broaden the scope of its work.

"We're looking forward to helping to lead the national conversation about ways to advance scientific knowledge faster by creating better studies and analyzing data more," Waitman said.

The network is building a data set from electronic medical records that will be used to contribute to new research in the fields of breast cancer, obesity and amyotrophic lateral sclerosis (also known as ALS, or Lou Gehrig's disease).
Young clinical researchers at the beginning of their careers at the University of Kansas Medical Center can often struggle to find financial support for their projects.

Sometimes, a boost from a career development program from KU Medical Center's Clinical and Translational Science Award (CTSA) grant can help propel promising researchers to bigger grants. Megha Ramaswamy, Ph.D., M.P.H., associate professor of preventive medicine and public health, participated in that program and is using a $1.35 million grant from the National Cancer Institute to examine ways to lower the rates of cervical cancer among incarcerated women.

Ramaswamy has done extensive research into why cervical cancer rates are four to five times higher among women in jails or prisons than in women who aren't incarcerated.

"It's pretty treatable if women get Pap screenings once every three years. Doctors can detect cancerous cells, and then women can get treated," Ramaswamy says.

Ramaswamy and her collaborators conducted an earlier research study that attempted to understand incarcerated women's experiences with Pap tests and follow-up.

"The findings of that study showed that these women indeed had incredible deficits in knowledge. They also had problems with self-efficacy and confidence navigating the system. In many cases, they also lacked money, transportation and social support," she says.

The new study will follow 100 incarcerated women in Wyandotte County and 100 women in Jackson County for three years. The researchers will test whether a 10-hour interactive session conducted over a weeklong period in jail will help women increase their reproductive health knowledge and lead to positive changes in health behaviors.

Ramaswamy says that while it may seem like a simple solution, she and her team will also work over three years to tease out the complex set of factors related to the women's health behaviors.

After following the study participants that long, Ramaswamy said that they will be able to help answer key questions that still remain about sexual and reproductive health care for women with criminal justice histories, which is relatively understudied in medical research, she says.

This project is supported by a grant from the National Institutes of Health, 1R01CA1811047, and a Clinical and Translational Science grant from the National Center for Advancing Translational Sciences awarded to KU Medical Center for Frontiers, KL1TR000061.
FY 2013/14 - 2014/15
Extramural Awards Summary

In fiscal year 2014/15, extramural awards from all sources (including KU Endowment funds) totaled just over $108 million, about a 6 percent decrease from last year's totals.

Figure 1
FY 2014 and FY 2015 Extramural Award Summary

Table 1
Research Activities for FY 2013/14 - FY 2014/15

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<tr>
<th></th>
<th>FY 2013/14 ($)</th>
<th>FY 2014/15 ($)</th>
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FY 2005 - 2015
Awards by School

Figure 4. School of Medicine - KC Awards for FY 2005 - FY 2015 (Million $)

Figure 5. School of Medicine - Wichita Awards for FY 2005 - FY 2015 (Million $)

Figure 6. School of Health Professions Awards for FY 2005 - FY 2015 (Million $)

Figure 7. School of Nursing Awards for FY 2005 - FY 2015 (Million $)
# FY 2013/14
Awards by Funding Agency Type

<table>
<thead>
<tr>
<th>Department</th>
<th>National Institutes of Health*</th>
<th>Other Federal Agencies‡</th>
<th>State of Kansas</th>
<th>Private Awards / Other Sources‡</th>
<th>Private Clinical Trials‡</th>
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*Including clinical trials and indirect grants

‡Other federal agencies - DoD, NSF, FDA, Private/non-federal/foundations - American Heart Association, American Cancer Society, Pew Scholars/Searle Scholars, Patient Centered Outcomes Research Institute or "PCORI," Private clinical trials - industry sponsored.
## FY 2013/14
### Awards by Funding Agency Type

<table>
<thead>
<tr>
<th>Department</th>
<th>National Institutes of Health*</th>
<th>Other Federal Agencies†</th>
<th>State of Kansas</th>
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<th>Private Clinical Trials‡</th>
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*Including clinical trials and indirect grants
†Other federal agencies - DoH, NSF, FDA, Private/non-federal/foundations - American Heart Association, American Cancer Society, Pew Scholars/Searle Scholars, Patient Centered Outcomes Research Institute or "PCORI". Private clinical trials - Industry sponsored.
# FY 2013/14

## Awards by Funding Agency Type

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<th>Other Federal Agencies†</th>
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<th>Private Awards / Other Sources‡</th>
<th>Private Clinical Trials‡</th>
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*Including clinical trials and indirect grants
†Other federal agencies - DoD, NSF, FDA; Private/non-federals/foundations - American Heart Association, American Cancer Society, Pew Scholars/Searle Scholars, Patient Centered Outcomes Research Institute or "PCORI"; Private clinical trials - industry sponsored.
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<tr>
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<th>National Institutes of Health*</th>
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<th>Private Awards / Other Sources†</th>
<th>Private Clinical Trials†</th>
<th>Total</th>
<th># of Awards</th>
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| School of Health Professions | $1,269,977 | $143,808 | $120,236 | $1,834,021 | | | 11 |
| Dietetics & Nutrition | $1,167,756 | | $120,236 | $1,287,992 | | | 4 |
| Hearing & Speech | | | $20,000 | | | $20,000 | 1 |
| Occupational Therapy | | $85,308 | | | | $85,308 | 3 |
| Physical Therapy Rehabilitation Sciences | $102,221 | | $38,500 | | | $140,721 | 3 |

| School of Medicine | $52,836,852 | $10,122,541 | $18,082,500 | $92,707,133 | | | 780 |
| - Kansas City Campus | $51,957,491 | $9,196,667 | $17,706,294 | $9,714,078 | $89,788,341 | | 711 |
| Administration | $128,468 | $3,000 | | | | $131,468 | 3 |
| Basic Science Departments | $25,566,767 | $820,622 | $228,696 | $6,233,359 | | $32,849,444 | 119 |
| Anatomy & Cell Biology | $7,927,185 | | $140,691 | $387,315 | | $8,453,191 | 14 |
| Biochemistry | $1,465,747 | | $83,265 | | $160,000 | | $1,709,012 | 13 |
| Biostatistics | $286,173 | | $4,740 | | $324,640 | | $615,553 | 4 |
| Cancer Biology | $389,194 | | $453,834 | | $861,750 | | $1,704,778 | 10 |
| Health Policy & Management | | | | | $118,024 | | $118,024 | 1 |
| Microbiology, Molecular Genetics & Immunology | $3,827,418 | | | | $170,736 | | $3,998,154 | 12 |

*Including clinical trials and indirect grants
†Other federal agencies - DoD, NSF, FDA, Private nonlinear foundations - American Heart Association, American Cancer Society, Pew Scholars/Searle Scholars, Patient Centered Outcomes Research Institute or "PCORI" Private clinical trials - industry sponsored.
<table>
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<th>Department</th>
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<th>Other Federal Agencies†</th>
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*Including clinical trials and Indirect grants
†Other federal agencies - DoD, NSF, FDA, Private/non-federal/foundations - American Heart Association, American Cancer Society, Pew Scholars/Searle Scholars, Patient Centered Outcomes Research Institute or "PCORI" Private clinical trials - industry sponsored
## FY 2014/15
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<th>Other Federal Agencies†</th>
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<td>$1,390,218</td>
<td>$29,863,493</td>
<td>$10,523,553</td>
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</table>

*Including clinical trials and indirect grants
†Other federal agencies - DoD, NSF FDA; Private/non-federal/foundations - American Heart Association, American Cancer Society, Pew Scholars/Searle Scholars, Patient Centered Outcomes Research Institute or "PCORI" Private clinical trials - industry sponsored.
## Departments with Highest Total Award Dollars

In fiscal year 2015, 20 departments, centers and institutes earned at least $1 million in total award funding, led by the departments of internal medicine, neurology and anatomy and cell biology.

<table>
<thead>
<tr>
<th>FY 2014 Grants</th>
<th>FY 2014 Clinical Trials</th>
<th>FY 2014 Total</th>
<th>Unit (Department, Center, or Institute)</th>
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<tbody>
<tr>
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<td>$1,722,924</td>
<td>Center for Child Health &amp; Development</td>
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<tr>
<td>$3,485,679</td>
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<td>$6,411,590</td>
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<td>School of Nursing</td>
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<tr>
<td>$2,349,814</td>
<td>$2,349,814</td>
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<td>Kansas Intellectual &amp; Developmental Disabilities Research Center</td>
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<td>$4,238,227</td>
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<td>Microbiology, Molecular Genetics &amp; Immunology</td>
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<td>Molecular and Integrative Physiology</td>
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<td>$4,554,663</td>
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<td>Pharmacology, Toxicology &amp; Therapeutics</td>
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<td>$12,997,259</td>
<td>Internal Medicine</td>
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<td>$1,403,818</td>
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<td>Orthopedic Surgery - Wichita</td>
</tr>
<tr>
<td>$2,640,000</td>
<td>$2,640,000</td>
<td></td>
<td>Research Administration</td>
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<table>
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<th>FY 2015 Grants</th>
<th>FY 2015 Clinical Trials</th>
<th>FY 2015 Total</th>
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<td>$1,031,406</td>
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<td>$1,054,558</td>
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<td>$1,167,756</td>
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<td>$1,181</td>
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<td>$1,560,022</td>
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<td>$1,704,778</td>
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<td>$2,895,020</td>
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<tr>
<td>$3,494,882</td>
<td>$3,494,882</td>
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<tr>
<td>$3,998,154</td>
<td>$3,998,154</td>
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<tr>
<td>$4,682,853</td>
<td>$4,682,853</td>
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<td>$5,471,094</td>
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<td>$8,455,191</td>
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<td>$1,403,818</td>
<td>$1,403,818</td>
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<tr>
<td>$2,640,000</td>
<td>$2,640,000</td>
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</table>
Grants and Clinical Trials Managed by the Research Institute

In fiscal year 2015, 23 departments, centers and institutes earned grants and 15 departments, centers and institutes participated in clinical trials.

<table>
<thead>
<tr>
<th>FY 2014</th>
<th>FY 2015</th>
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</thead>
<tbody>
<tr>
<td>Grants</td>
<td>Clinical Trials</td>
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<td>11</td>
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<td>12</td>
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</tr>
<tr>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>11</td>
<td></td>
</tr>
<tr>
<td>All Other Units</td>
<td>103</td>
</tr>
</tbody>
</table>

*All other units include but not limited to the following: Laboratory Animal Resources, Library, Police, Emergency Room, Project EAGLE, Radiation Oncology, Radiology, Alternative Medicine, Surgery Plastic, Pharmacy, KU Alzheimer's Disease Center, Telemedicine, Biostatistics, Anesthesiology, Bioinformatics and Cardiovascular.
Extramural Expenditures
Summary and Expenditures by Funding Source

Total extramural expenditures for FY 2015 were $114 million, an increase of almost 5 percent from the last fiscal year. (Note: These amounts include funds on deposit with the KU Medical Center RI and KU Medical Center, but do not include amounts from other institutions.)

Figure 9.
Total Extramural Expenditures, FY 2005 - 2015 (Million $)

Figure 10.
Federal Funds as a Percent of Total Extramural Expenditures, FY 2005 - FY 2015

Expenditures are separated into four major categories by sponsor: federal, state, industry and other private sponsors. The table shows trends in these data going back 10 years.

Table 6
Total Extramural Expenditures by Funding Source, FY 2005-FY 2015 (Thousand $)

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Federal Government</th>
<th>State &amp; Local Government</th>
<th>Industry</th>
<th>Not-for-Profit &amp; Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>59,176</td>
<td>34</td>
<td>5,273</td>
<td>7,606</td>
<td>72,089</td>
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<tr>
<td>2006</td>
<td>58,785</td>
<td>126</td>
<td>5,452</td>
<td>10,201</td>
<td>74,563</td>
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<tr>
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<td>60,653</td>
<td>94</td>
<td>5,532</td>
<td>14,109</td>
<td>80,388</td>
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<tr>
<td>2008</td>
<td>62,765</td>
<td>592</td>
<td>5,019</td>
<td>16,033</td>
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<tr>
<td>2009</td>
<td>67,420</td>
<td>316</td>
<td>4,190</td>
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<td>97,167</td>
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<tr>
<td>2011</td>
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<td>913</td>
<td>4,938</td>
<td>20,213</td>
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<tr>
<td>2012</td>
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<td>1,182</td>
<td>4,841</td>
<td>24,768</td>
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<tr>
<td>2013</td>
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<td>909</td>
<td>8,288</td>
<td>28,522</td>
<td>113,453</td>
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<td>68,772</td>
<td>1,024</td>
<td>8,807</td>
<td>30,104</td>
<td>108,709</td>
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<tr>
<td>2015</td>
<td>68,116</td>
<td>832</td>
<td>8,170</td>
<td>36,927</td>
<td>114,045</td>
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</table>
Principle Investigators with Highest Total Award Dollars

In fiscal year 2015, 20 principal investigators were awarded more than $1 million in total award dollars. These investigators are listed below.

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<th>FY 2015</th>
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<td>$4.55M</td>
<td>$3.84M</td>
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<td>$2.9M</td>
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<td>$2.64M</td>
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<tr>
<td>$2.15M</td>
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<td>$1.77M</td>
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<td>$1.4M</td>
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<td>$1.37M</td>
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</tr>
<tr>
<td>$1.09M</td>
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</tbody>
</table>
NIH Rankings

In the 2013/14 federal fiscal year:

- The School of Health Professions ranked 17th in the country with $1.5 million in NIH funding from five awards.
- The School of Medicine ranked 60th in the country with $51.2 million in NIH funding from 118 awards.
- The School of Nursing ranked 53rd in the country with $560,000 in NIH funding from one award.

<table>
<thead>
<tr>
<th>School of Health Professions</th>
<th>Total # of NIH Awards</th>
<th>Total NIH $ Awarded (Millions)</th>
<th>School Rank (All Institutions)</th>
</tr>
</thead>
<tbody>
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<td>7</td>
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<tr>
<td>2011</td>
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</table>

<table>
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<th>Total # of NIH Awards</th>
<th>Total NIH $ Awarded (Millions)</th>
<th>School Rank (All Institutions)</th>
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<tr>
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<tr>
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</tr>
<tr>
<td>2011</td>
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<tr>
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<tr>
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</table>

<table>
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<th>Total # of NIH Awards</th>
<th>Total NIH $ Awarded (Millions)</th>
<th>School Rank (All Institutions)</th>
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<td>1.31</td>
<td>31</td>
</tr>
<tr>
<td>2011</td>
<td>3</td>
<td>0.69</td>
<td>48</td>
</tr>
<tr>
<td>2012</td>
<td>1</td>
<td>0.39</td>
<td>58</td>
</tr>
<tr>
<td>2013</td>
<td>1</td>
<td>0.62</td>
<td>47</td>
</tr>
<tr>
<td>2014</td>
<td>1</td>
<td>0.56</td>
<td>53</td>
</tr>
</tbody>
</table>

Notes: American Recovery and Reinvestment Act awards are not included. Award counts, total dollars, and ranks are generated from data downloaded via the NIH RePORT tool (report.nih.gov). For the School of Medicine, award data matches that used by the Blue Ridge Institute for Medical Research in producing their ranks of U.S. Medical Schools.
OVERALL: FACILITIES AND RESOURCES

UNIVERSITY OF KANSAS MEDICAL CENTER

Overview. The University of Kansas School of Medicine is a public medical school located on the University of Kansas Medical Center campuses in Kansas City, Kansas, Salina, Kansas, and Wichita, Kansas. The Kansas City campus is co-located with the independent University of Kansas Hospital.

Founded in 1905, the University of Kansas Medical Center (KUMC) now spans 50 acres within metropolitan Kansas City and includes extensive research and clinical facilities. (Figure FR-O.1.) KUMC has the ultimate objective of improving the quality and availability of health care in Kansas and the greater Kansas City area by providing research in the health sciences, educational programs for health care professionals, and clinical services for patients. The University of Kansas Hospital is a tertiary care facility serving patients from across the region (Kansas, Missouri, Oklahoma, Arkansas, and Nebraska). The KU Hospital has patient satisfaction ratings well above national means and is a nationally recognized biomedical research center with many academic programs ranking among the best in the nation.

KUMC Clinical Facilities and Outreach. KU Hospital is equipped with over 500 beds and staffed to care for the approximately 25,000 inpatients admitted and approximately 550,000 outpatients each year. It is designated as Level 1 Trauma Center which serves over 350,000 outpatients annually, offering a variety of specialized treatments to provide comprehensive care to its patients. Among the specialized services are those offered through the Center for Advanced Heart Care, the Mid-America Radiation Center, the KU Cancer Center, the Bloch Cancer Care Pavilion, the Hoglund Brain Imaging Center, the Asher Comprehensive Spine Center, the Burnett Burn Center, the Sutherland Institute, the Epilepsy Center, the Diabetes Education and Research Center, the Senior Citizens Health Center, the Family Practice Clinic, and other sites within the hospital itself.

Physician practices represent more than 200 specialty areas, including kidney transplant surgery, renal dialysis, treatment of polycystic kidney disease, the only liver transplant program in the region, sterile environments for bone marrow transplant patients and other patients whose immune systems are not functioning properly, a state-of-the-art facility for delicate facial and body reconstruction surgery services, hyperbaric oxygen therapy, comprehensive cardiology care, arthritis clinics with immunology specialists, medical and surgical treatments for epilepsy, specialized neurology programs for the treatment of multiple sclerosis and headaches as well as Parkinson’s and Alzheimer’s disease, and comprehensive gynecologic and obstetrics services for problem pregnancies with an intensive care nursery for
premature and sick newborns. Additionally, comprehensive rehabilitation services and psychiatric services are offered on both an inpatient and outpatient basis.

**University of Kansas Hospital.** University of Kansas Hospital (Figure FR-O.2) in Kansas City, KS is ranked nationally in 11 adult specialties. It was also high-performing in 1 adult specialty. University of Kansas Hospital is a 713-bed general medical and surgical facility with 27,380 admissions in the most recent year reported. It performed 10,124 annual inpatient and 8,743 outpatient surgeries. Its emergency room had 47,771 visits. University of Kansas Hospital is a teaching hospital. It is also accredited by the Commission on Accreditation of Rehabilitation Facilities (CARF).

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Gender</th>
<th>Race</th>
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<tbody>
<tr>
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<td>Male</td>
<td>American Indian or Alaskan Native</td>
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<tr>
<td>10-17 years old</td>
<td>Female</td>
<td>Asian</td>
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<td>85 and older</td>
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<td></td>
</tr>
<tr>
<td>Grand Total</td>
<td></td>
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</tbody>
</table>

**KUMC RESEARCH ENVIRONMENT**

The research enterprise at KUMC has expanded recently, with the construction of a 5-floor, 200,000 sq.ft. research building, and newly renovated space for the Kidney Institute and KU Cancer Center. Excellent support facilities exist, including an outstanding Transgenic and Gene-Targeting Institutional Facility (TGIF), a Biotechnology Support Facility (next generation DNA sequencing, RNA-Seq, microarray, and bioinformatics), and two Laboratory Animal Resources Facilities. The medical center also provides a number of other shared resource facilities for electron microscopy, histology, flow cytometry, proteomics and mass spectrometry, biostatistics, and drug development. Users of the biomedical research cores will have access to the following institutional cores and shared resource facilities located on the KUMC or KU-Lawrence campus. This rich and
supportive research environment is also home to a number of research centers and institutes as well as research support services.

**RESEARCH ADMINISTRATION**

**KUMC Research Institute** Established in 1992, the KUMC Research Institute (RI) serves as the recipient of all grants and contracts to and with KUMC and assists with the research activities of KUMC faculty. Frontiers’ Regulatory Knowledge Support is housed within the RI, a private, not-for-profit 501(c)(3) corporation. The RI fosters individual partnerships between KUMC researchers and the private sector, enhances revenue to researchers and the University through the transfer of research discoveries and other information to the private sector, and facilitates a cooperative and profitable interaction between KUMC and corporations throughout Kansas, the greater Kansas City Metropolitan area, domestically and internationally. The Research Institute employs more than 50 staff members. Research Institute divisions are: Sponsored Programs Administration; Clinical Research Administration unit; Office of Legal Services; and Financial Services.

The KUMC RI is led by Jamie Caldwell (Executive Director) and Dr. Richard Barohn (President) (Figure FR-O.3). Table FR-O.2 displays the most recent statistics for research income from various sources to KUMC through the Research Institute.

- **RI Sponsored Programs Administration (SPA).** The primary responsibility of SPA is to facilitate the research-related activities of all Schools within KUMC and to serve as a resource for the research faculty during all aspects of their research. SPA assists faculty and staff in acquiring extramural support in research, education and service projects and is responsible for post award administration of contracts and grants awarded to KUMC to ensure that these projects are conducted in compliance with federal and state regulations, university policies and commitments specified in grants, contracts and other agreements with external sponsors.

- **RI Office of Legal Affairs.** The KUMC RI, located within a few minute drive from the main KUMC campus, is in a building across the street from the KU Clinical Research Center (Figure FR-O.4). The KUMC RI encourages relationships with the corporate sector and has participated in a wide variety of written agreements related to pre-clinical and clinical research. The Office of Legal Affairs will either review the contract provided by the company or initiate a contract based on the standard Research Institute Clinical Trials Agreement. The Research Institute negotiates master agreements with companies who place multiple clinical trials at the Research Institute. The Office of Legal Affairs provides rapid turn-around times on contract completion as well as consultation regarding any other legal issues related to research. Services include reviewing and negotiating:

  - Clinical Trial Agreements
Confidential Disclosure Agreements
Fee-for-Service Agreements
Grant Agreements (Federal and Privately Funded)
License Agreements
Material Transfer Agreements
Sponsored Research Agreements
Subcontract Agreements

RI Clinical Research Administration (CRA) Clinical Research Administration is the central liaison between the funding agency, Institutional Review Board and principal investigators at KUMC. The CRA markets KUMC to potential research sponsors, receives and manages protocol initiation, and provides ongoing administrative support to ensure timely and cost-effective completion of clinical trials. Clinical Research Administration services include:

Pre-Initiation
- Attend, if requested by study staff, site evaluation visits to answer institutional questions on study processing and activation time
- Serve as centralized contact between sponsors and the study staff for all clinical trial, regulatory, administrative, and budget and contract work at the University of Kansas Medical Center
- Provide protocol development support for investigators
- Prepare consent form for investigator's review
- Secure Human Subjects Committee approval of protocol and consent form
- File regulatory documents required by FDA and sponsor
- Prepare and negotiate trial budgets
- Request pricing for hospital and clinical services
- Review and negotiate clinical trial and data use agreements
- Notify investigator and sponsor of final HSC approval
- Prepare and submit initial IND documents, amendment and annual progress reports for IND

Post-Initiation
- Secure HSC approval of protocol revisions and revised consent forms
- Obtain HSC approval for print or media advertising
- Process internal adverse events and IND safety reports for HSC submission and approval
- Provide status reports of each investigator's trials as requested
- Submit reports to HSC for annual re-certification of trials
- Coordinate ongoing communication between sponsor and investigator
- Revise and negotiate budget and clinical trial agreements

**Study Closure**
- Process study closure for trial termination
- Complete reconciliation documents for trial account closure

**Quality Improvement for Clinical Research**
- In conjunction with the Office of Compliance, conduct quality improvement visits [QIV]

**Education Opportunities**
- Host and organize Clinical Trial Education Lecture (CTEL) series on a monthly basis
- Provide training workshops (CTEC) for investigators and study coordinators
- Meet with physicians and study coordinators to review Research Institute services
- Provide new study coordinator/research nurse orientation
- Facilitate coordinator certification, networking and educational opportunities

**KUMC Office of Compliance.** The major responsibility of this office is to assure the highest standards of excellence and integrity in all its research endeavors, and to promote ethical conduct of research through proactive mechanisms such as education and outreach; established policies and procedures for institutional and individual accountability; assessment, monitoring, auditing and reporting; and institutional oversight committees.

- **KUMC Human Research Protection Program.** In 2004, KUMC developed a comprehensive Human Research Protection Program (HRPP) that is designed to ensure the rights, safety and welfare of all subjects recruited or enrolled in research projects, regardless of funding source. The program supports weekly IRB meetings on the Kansas City Campus and monthly meetings on the Wichita campus. AAHRPP accreditation has been maintained since 2007. The program oversees the institutional review process and coordinates ancillary reviews with radiation safety, biosafety, HIPAA, conflicts of interest, and data security. To support efficient review, the IRB application identifies not only key elements necessary for IRB review but also captures information that supports the ancillary reviews. Streamlining of compliance functions occurs through cross-membership on the various committees and a parallel review process.

**KUMC Grants and Awards.** In fiscal year 2015, extramural expenditures for KU Medical Center totaled $108 million. Of that amount NIH expenditures were more than $57 million. Among our successful grants and contracts to date we include:
- Frontiers Clinical and Translational Sciences Award (2011), $20 million, NIH
- Alzheimer’s Disease Research Center (2016, second renewal), $8.75 million, NIH
- NCI-Designated Cancer Center, $7.5 million (NIH)
- Midwestern Collaborative for Treating Obesity in Rural Primary Care, $10 million (PCORI)
- Greater Plains Collaborative, $15.6 million (PCORI; 2 contracts)
- Kansas IDeA Network for Biomedical Research Excellence: $19 million, NIH
- Kansas Intellectual and Developmental Disabilities Research Center: $5.5 million NICHD
**Frontiers Research Gateway.** The Frontiers Research Gateway is a web-based resource to provide all Frontiers investigators with helpful tips and information to enable them to conduct their research. The webpages provide information ranging from generating research ideas to seeking extra-mural funding to executing research projects. Divided into four sections—Study Development, Study Initiation, Conducting a Study, and Study Close-Out—the Gateway walks investigators through the overall research process and breaks down that process with detailed steps. Those steps are supplemented with specific information on how Frontiers can help. The Research Gateway was developed by the Frontiers Administration team in 2013 with input from investigators who shared their experiences in navigating the research process and with the Frontiers website team. The webpages of the Gateway contain many useful links that researchers frequently need and find useful. ([www.frontiersresearch.org/frontiers/research-gateway](http://www.frontiersresearch.org/frontiers/research-gateway))

**Frontiers IRB Reciprocity.** In 2013, Frontiers partner institutions, including University of Kansas Medical Center, University of Missouri–Kansas City, Children’s Mercy Kansas City, and University of Medicine and Biociences entered into an IRB reciprocity agreement. Typically a research project involving partners from these institutions will only need one IRB review. Detailed instructions on how to initiate an IRB application with reciprocity are found on the Frontiers website ([http://frontiersresearch.org/frontiers/IRB-reciprocity](http://frontiersresearch.org/frontiers/IRB-reciprocity)). We have gained considerable experience by creating and participating in IRB consortia that positions the Frontiers program to deliver efficient implementation for regional and national multi-center trials. Frontiers institutions developed and implemented regional IRB reciprocal processes across all our affiliated institutions early in the third year of our initial CTSA funding. When our PCORnet GPC was funded we leveraged this regional experience to establish reliance agreements at 12 GPC sites. Our experience with using single IRB models includes central IRBs, deferred reciprocal models, and shared review models. We are members of IRBShare, and most recently we were invited to participate in the pilot phase of the NCATS IRB Reliance Initiative (NIRI). Efficiencies gained through single IRB models like IRB reciprocity are further enhanced and complemented by our experiences with streamlined approaches for master agreements and budgets (e.g., NeuroNEXT, StrokeNet, Neonatal Research Network), our PCORnet CDRN sub-awards, and multiple master agreements with external sponsors. We have a great deal of experience both leading multicenter trials involving CTSA hubs and other sites and being a part of such trials led by others.

**KUMC Electronic IRB submissions.** Since 2013, all proposals to the KUMC IRB are submitted through our electronic IRB system (eIRB) using Huron’s Click IRB7. Our eIRB automates all aspects of submission, routing, review and approval for the entire lifecycle of the project. The system supports compliance by serving as the repository for all IRB-approved documents and by tracking human subjects training and current conflict of interest disclosures. For research conducted under a central IRB or other reliance mechanism, eIRB delivers a truncated application process that allows investigators to register their study and upload the approval of the reviewing IRB.

**KU Health System and Research Institute Steering Committee and Sub-Committees.** In an effort to improve communications and processes across the KU Health System and the Research Enterprise, a collaborative group has been created to improve clinical and translational research that occurs in the KU Hospital setting. This process was started by Dr. Barohn after he became Vice Chancellor for Research. He asked Dr. Ator, the KU Hospital Chief Information Officer to co-chair the steering committee. The steering committee and workgroups are composed of members from KUMC, KU Hospital, and KU Physicians, Inc. A number of workgroups meet regularly and report to the steering committee chaired by Drs. Barohn and Ator. Drs. Barohn and Ator then report final recommendations to the Executive Vice chancellor, Dr. Girod, and the Hospital CEO, Mr. Page for endorsement.

**Full Steering Committee**

Greg Ator (Steering Committee co-chair) Joseph McGuirk
Rick Barohn (Steering Committee co-chair) Tamara McMahon
Research Revenue Cycle / Research Clinical System Operations (Inpatient/Outpatient Research) The purpose of this subcommittee is to improve efficiencies in patient billing and invoicing by determining whether this was research versus routine or standard of care.

Workgroup Support:  Shawn Fapp
Jamie Caldwell (co-chair) Chris Mackay
Colette Lasack (co-chair) Dinesh pal Mudaranthakam
Greg Ator Seamus Murphy
Angie Ballew Caroline Murray
Ethan Carter Ted Noravong
Carol Cleek Marilyn Rymer
Kelly Daniels Debra Seyfried
Rolina Everett Reta Studnicka
Dhanunjaya Lakkireddy Peter Tadros
Barbara MacArthur Sue Welborn

Personnel & Access to O2 / Consent Form/Patient Identification
Workgroup Support: Kelly Robertson Theresa Jackson
Peter Griffith (co-chair) Bart Lindsley
Greg Ator (co-chair) Joe McGuirk
Hobs Apell Seamus Murphy
Sandra Bergquist-Beringer
Marge Bott
Jamie Caldwell
Melinda Clark
Carol Cleek
Mazen Dimachkie (co-chair)
Rolina Everett
Susie Farkas
Ensley Fleming (ECG)
Laura Herbelin
Angella Herrman
Brad House II

Caroline Murray
Dineshpal Mudaranthakam
Trish Palmer
David Robbins
Debra Seyfried
Bob Spaniol
Reta Studnicka
Karen Tevault
Sue Thomas
Sue Welborn
Steve Williamson (co-chair)
Jennifer Wilson

Recruiting Subjects via the Electronic Medical Record (EMR) The purpose of this subcommittee is to determine the best method of identifying study participants using the electronic medical record.

Workgroup Support: Debra Brogden
Matt Mayo
Tamara McMahon (co-chair)
Joe McGuirk
Dineshpal Mudaranthakam (co-chair)
Kieran Pemberton
Bhargav Adagarla
Kevin Smilor
Hobs Apell
Carol Smith
Greg Ator
Bob Spaniol
Susie Farkas
Terry Tsue
Peter Griffith
Jeff Wright
Brad House

Frontiers Affiliate Regulatory Committee Comprised of regulatory representatives and officials from Frontiers partners and affiliates, this consortium-wide group was established to address regulatory hurdles affecting Frontiers research. The Committee divided into smaller groups to address specific issues: IRB Reciprocity Subcommittee, RB Forms Subcommittee, Conflict of Interest Subcommittee, and Training Subcommittee. These groups held numerous meetings over many months, resulting in Frontiers-wide regulatory efficiencies, including IRB reciprocity among KUMC, KU-Wichita, Children’s Mercy, Truman Medical Centers, University of Missouri-Kansas City, and St. Luke’s Health System.

 PHYSICAL INFRASTRUCTURE

The Hemenway Life Sciences Innovation Center (2007; Figure FR-O.5) is a $58-million, 200,000 ft² facility that houses 300 people and more than 125 research projects focusing on cancer, liver disease, reproductive and developmental sciences, neuroscience, diabetes and proteomics. This serves as home to all KIDDRC cores at KUMC, and nearly all members of Themes 3 and 4.
The Wahl/Hixon Research Complex (2011) is a $26.4-million renovation of an existing building that will create new space devoted entirely to cancer research.

The Health Education Building (groundbreaking 2015) will be a new 171,000 ft² facility that will become the face of the KU Medical Center campus to accommodate modern learning and facilitate the education of a greater number of physicians, nurses and allied health care professionals to address critical health care worker shortages in Kansas.

The University of Kansas Hospital is building an additional hospital tower north of the main campus. The 300,000 ft² Cambridge North Tower will expand access to healthcare in Kansas City and be home to highly specialized surgical services for oncology, neurosciences and otolaryngology. Cambridge North is expected to be completed in late 2017.

University of Kansas Information Technology at the University of Kansas Medical Center, Information Resources (IR) provides researchers and faculty with critical technology infrastructure, as well as technical services and support. Recent technology improvements and relevant services include:

- KUMC made several large commitments to ensure a robust and secure network and storage including: a $3.4M Network Infrastructure Upgrade to bring 1GB bandwidth to all desktops, improve wireless coverage throughout the campus; a $2.5M Research and Employee File-Level Storage Expansion, providing long-term storage via expandable one-petabyte NAS with additional backend storage for backups; and, $2.4M for Information Security Architecture Improvements.
- Acellion Secure File Transfer service allows researchers to securely send and receive large files from colleagues at KUMC and/or external recipients.
- Proofpoint secure email is an encrypted messaging system that works seamlessly with the Medical Center's existing email system. Secure email gateways encrypt email as it leaves the University's private networks and heads out onto the Internet.
- The Barracuda Spam Firewall system has been expanded to further reduce SPAM e-mail messages, virus attachments, and phishing attacks aimed at compromising our researchers.
- SharePoint is a browser-based collaboration platform that includes document management, workflow management, and social networking.
- Researchers can securely collaborate in real-time with both video (Polycom) and web (Adobe Connect) conferencing.
- IT policies and procedures are being reviewed and updated to ensure that our research mission is well protected and situated to remain competitive in the marketplace.
- Portable electronic device theft tracking and recovery options have been expanded to ensure that our research data is protected while at rest, while in transit, and if lost or stolen.

KUMC Department of Biostatistics. The Department of Biostatistics occupies 6834 ft² of contiguous office space at the University of Kansas Medical Center located on the ground and 5th floors of the Robinson building as well as the 5th floor of the adjacent Wescoe building. This includes 20 lockable offices, two
conference rooms and cubical spaces that can house up to 26 staff/students. The Department of Biostatistics personnel consists of 13 biostatistics faculty members, 2 teaching associates, 4 research analysts, 4 information specialist personnel, 1 project manager, 2 administrators, and 1 administrative assistant.

**KUMC BERD Computer Resources**

**Hardware.** Shared high speed workstation with dual Xeon 3.40 GHz processor, 8 GB of SDRAM, over 500GB of high speed storage, digital tape backup, and a DVD read/write drive. 34 HP Intel Core i5 CPU @ 3.40 GHz processor, 16 GB of SDRAM, over 800GB of high speed storage; 4 HP Intel Core i7 CPU @ 3.60 GHz processor with 32 GB of SDRAM along with 1 TB hard drive.

**Networking/Internet and Servers** HP PowerEdge 4600 file server with a 3.6GHz Xeon CPU, 8GB of DDR SDRAM, six 18GB SCSI Hard Drives in a RAID 5 configuration, 200GB digital tape backup system. Internet Explorer 11; Microsoft Outlook email; Internet 2 access through KUMC’s LAN. The Department also has 14 windows 2008 R2 virtual servers - with dual Xeon processors, 8 GB SDRAM and over 240 GB of storage area ; 5 windows 2012 R2 virtual servers - with dual Xeon processors, 16 GB SDRAM and over 320 GB of storage area; 1 SUSE Linux server Quad core processor, 8 GB SDRAM. A HP PowerVault tape backup is also located in the server room along with a cooling system to maintain optimal conditions for optimal server performance. Tape backups are performed daily on modified data and full tape backups are performed weekly and stored off-site for 9 weeks.

**Statistical, Mathematical and Database Software** SAS, Minitab, S-PLUS, SPSS, STATA, WinNonlin, Nquery, Mathcad, SigmaPlot, Excel, Access, MySQL, Oracle, PLSQL, MS Visual Studio, SQL server, Postgresql, R, RStudio, Shinyr.

**KUMC Velos eResearch** Velos eResearch supports patient recruitment, patient scheduling, study monitoring, project planning, study design, protocol compliance, budget, invoicing, and milestone management, data safety monitoring, adverse event reporting, system integration and study execution.

Velos was designed from the ground up to support both study administration and clinical data management. This type of design is fundamental to Velos’ customer service abilities to solve customers’ research, information and coordination challenges. Key features are:

**STUDY ADMINISTRATION**
- Protocol management
- Patient scheduling
- Regulatory reporting
- Adverse event management and reporting
- Budgeting, milestones, invoice, and payment/receipts processing
- Management of research organizations, personnel, and collaborators

**CLINICAL DATA MANAGEMENT**
- Patient profiling
- Longitudinal, patient-level information collection and analysis
- Study-specific data collection and analysis
- Workflow configuration
- Integration with internal and third party information systems

Some other notable strengths of Velos eResearch are:
- An advanced, carefully considered commercially available clinical research information system.
Velos was designed to provide off-the-shelf support for all of study administration, clinical data management, adverse event reporting, and integration with internal and third party cancer center systems through one integrally-designed system.

- The ability to add, modify, and apply study- and customer-specific data dictionaries with minimal technical involvement.
- HL7 compliance. Velos already has dozens of working laboratory, medical record, and device interfaces that are already in production.
- Compliance with industry standards (such as CFR11) and a commitment to supporting standards that foster higher collaboration. Velos is active in and supportive of government initiatives intended to foster greater collaboration among researchers (example FDA funded studies).
- Patient-level of study-level system architecture. Most research systems were primarily designed for research sponsors and focus on the needs of single studies. The system architecture to support research sites well is quite different and must consider both patient- and study-level views and also integrate the two.
- Advanced technology and security features to support multi-institutional, cooperative trials, community-based research and patient self-reporting, in a single environment.

Through these capabilities, Velos helps effect a paradigm shift from the current sponsor-centric clinical research information model to one that is investigator-centric. In doing so, Velos believes it can help its customers, and the research community in general, unleash tremendous improvements in research productivity, collaboration, and, ultimately, patient care.

**KUMC Division of Medical Informatics and Office of Enterprise Analytics (TICS).** The Division of Medical Informatics (MI) provides capabilities and expertise for clinical investigators and other health professionals in software engineering, data warehousing, data management and administration of clinical trial and electronic data capture systems. MI works with internal and external partners for consultation, training and access to tools enabling research data collection. MI tools and resources include:

- **HERON:** The Healthcare Enterprise Repository for Ontological Narration (HERON) is a method to integrate clinical and biomedical data for translational research. The MI team has distributed the open-source HERON framework to collaborators using the i2b2 (Informatics for Integrating Biology and the Bedside) software and have leveraged other open source environments to increase data transparency and reusability.

- **REDCap:** REDCap is used by more than 700 institutions in over 60 countries and has become a dominant tool for electronic data capture for research studies at most academic medical centers in the United States.

The Office of Enterprise Analytics (EA) provides business intelligence and other analytical support for planning and decision-making at KUMC, and serves as the source for official data.

EA manages and develops online reports within a QlikView environment, distributed to departments and upper management via a secure Access Point. Currently, EA offers reports on finance, payroll, commitments, and extramural research (summary and detail reports, research efforts), as well as reports designed for executives at the Medical Center (e.g. All Sources/All Spends). The EA staff possesses enhanced skills in data mining, analysis, and reporting, with backgrounds in academics, data management, finance and accounting, and application development.

Together, the Division of Medical Informatics and the Office of Enterprise Analytics occupy a total of 4,228 ft² on the third floor of the Student Center: Medical Informatics occupies 2,276 ft²; Enterprise Analytics occupies 1,055 ft²; and both departments share 897 ft².
KUMC CENTERS AND INSTITUTES

FEDERALLY FUNDED CENTERS

The University of Kansas Cancer Center. The University of Kansas Cancer Center earned National Cancer Institute (NCI) designation in June 2012 (P30 CA168524). KU Cancer Center operates as a matrix organization and includes: the University of Kansas Medical Center (KUMC) campuses in Kansas City, Wichita and Salina, the University of Kansas in Lawrence (KU-Lawrence) and its School of Pharmacy, The University of Kansas Hospital, the Stowers Institute for Medical Research, and Children’s Mercy.

Currently, there are 345 KU Cancer Center members in four research programs: Cancer Biology, Cancer Control & Population Health, Drug Discovery, Delivery, and Experimental Therapeutics, and Cancer Prevention & Survivorship. These scientists use more than 85,000 ft² of laboratory space across campus and an additional 22,000 ft² of office space. The total KUMC research laboratory space is more than 400,000 ft².

Our KU Cancer Center researchers grew federal funding 28% in fiscal year 2015, competing successfully against other prominent research institutions. KU Cancer Center researchers currently have more than 600 published papers, 75 NCI-funded studies and $69.8 million in extramural funding from government, private and national philanthropic organizations.

KU Cancer Center provides financial and administrative support for six shared resources: Biospecimen, Biostatistics and Informatics, Lead Development & Optimization, Transgenic and Gene-Targeting, Health Communications Research, and Clinical Pharmacology. These shared resources are fully equipped to provide KU Cancer Center investigators with access to state-of-the-art research technology, equipment, and technical support that would otherwise be too difficult or expensive for individual investigators or programs to develop. KU Cancer Center shared resources occupy more than 20,000 ft² of space located in a number of facilities on the KUMC campus, the KU Lawrence west campus, The University of Kansas Hospital’s Westwood campus, and the University of Kansas Clinical Research Center.

KUMC Alzheimer’s Disease Center. The NIA-funded University of Kansas Alzheimer’s Disease Center (KU ADC) (P30 AG035982) spans the KUMC and Lawrence campuses. The ADC occupies about 10,000 ft² in the Clinical Research Unit, the Hemenway building, and the Higuchi Biosciences building (Lawrence), and employs 10 faculty and 30 other support staff, has the programmatic goal of supporting, facilitating, and enhancing research that provides insight in AD and brain aging. This is accomplished by providing access to consultation, human subjects, data, biospecimens, and technical services. Its main thematic goal is to advance our understanding of how brain bioenergetics change during AD and aging. The KU ADC actively encourages local, national, and international investigators to utilize its resources. KU ADC currently supports over 20 funded investigator-initiated studies and participates in 4 national multisite trials sponsored by the Alzheimer Disease Cooperative Study. The ADC’s Clinical Core follows 400 subjects (200 nondemented and 200 MCI / AD participants) with annual evaluations and assists investigators in recruiting these well-characterized participants into investigator-initiated studies. The KU ADC is also integrated with the Memory Care Clinic, the region’s tertiary referral center for memory disorders with around 4000 annual patient visits.

The ADC interacts with the Frontiers CTSA program through use of the Clinical Research Center clinical trials unit to support clinical trials in AD. The ADC also actively collaborates with the Frontiers Pilot Studies Core by co-funding of dual-interest pilot projects of mutual interest to both centers.

Kansas PKD Research and Translation Core Center. The mission of our PKD Center is to promote research leading to a better understanding of PKD through the discovery of therapy targets and development of clinical trials to improve patient outcomes. The National Institute of Diabetes and Digestive and Kidney Diseases at the NIH awarded the Kansas PKD Center a five-year Center Grant (P30 DK106912) that provides $5.4 million in funding to support our innovative biomedical research cores and a robust pilot and feasibility program. The PKD Center is comprised of four cores: Gene Targeting, Epigenetics, Biomarkers, and Clinical Research.
KUMC Kansas Intellectual and Developmental Disabilities Research Center. The Kansas Intellectual and Developmental Disabilities Research Center (KIDDRC) has been funded by the National Institute of Health and Human Development for the past 45 years (as P30 HD002528). Our recent renewal application (now U54 HD090216) scored well (23) and was recommended for funding for its 50-54th year to the NICHD Advisory Council in August 2016. Throughout its history, the KIDDRC has played a major role in elucidating the causes, prevention and treatment of intellectual disabilities and related secondary conditions. The center brings together researchers from the KU-Lawrence and Kansas University Medical Center campuses, as well as from the Juniper Gardens Children’s Project at the Children’s Campus of Kansas City. For more than four decades, the KIDDRC has served as a model of interdisciplinary collaboration across campuses and disciplines. More than 80 percent of KIDDRC investigators collaborate with one another on funded projects, and half of these represent collaborations across the three Center sites. Many KIDDRC investigators collaborate with investigators at other IDDRCs at Vanderbilt, UNC-Chapel Hill, the University of Washington, the University of Wisconsin, Washington University in St. Louis and Johns Hopkins University/ Kennedy Krieger Center. Core support services and facilities include: design and implementation of measurement tools for behavioral research; experimental design and analysis; bioinformatics; genomics expression analysis; histology and biological image acquisition and analysis; digital video acquisition and editing; and 3-D image manipulation and model output. The KIDDRC will have four cores: Clinical Translational Core (CTC), Preclinical Models Core (PMC), Clinical Outcomes/Biobehavioral Technology Core (CBC), and a Research Design and Analysis Core (RDAC).

KUMC Theo and Alfred M. Landon Center on Aging. In 1986, the Kansas Legislature approved a new appropriation to start an interdisciplinary Center on Aging at the KUMC campus to provide state-of-the-art educational, clinical and research facilities for faculty and the older adult patients they serve. In 1998, the legislature invested in a new building and committed a new state base line item. With the help of then-U.S. Sen. Nancy Kassebaum, a further $4 million federal grant paved the way for the 52,000 sq ft complex building that stands at 36th Avenue and Rainbow on the medical center campus. Named for Sen. Kassebaum's parents, the Theo and Alfred M. Landon Center on Aging includes: a Geriatric Medicine Clinic providing both primary care and consultative services facilities for researchers to study important aging-related issues such as prevention and treatment of disability, patterns of healthcare delivery and cognitive function; coursework for the next generation of healthcare providers to learn from faculty about the care of older adults in state-of-the-art classrooms; an optimal location for community participants to engage in a variety of outreach programs from fitness and exercise to elder law clinics and brownbag presentations. The Center on Aging research mission is to encourage, promote, and carry out research that is relevant to older adults in Kansas and around the country. Our goal is to build aging-relevant research programs, including collaborations within the University of Kansas Medical Center, and in the wider metropolitan community. Research since 2011 has focused on advancing the understanding of motor function through interdisciplinary research and education, primarily with regard to people with multiple sclerosis and Parkinson's disease. Research resources include cognitive testing laboratories and a human performance laboratory dedicated to advancing the understanding of motor function through interdisciplinary research and education. The primary focus of the human performance laboratory is the study of age related changes in mobility, which includes the study of healthy elderly as well as those with age related pathologies. Human Performance Laboratory - a gait and balance assessment laboratory with state-of-the-art equipment for biomechanical and kinematic studies in neurological disorders. Major equipment includes six high speed digital cameras (Motion Analysis Inc.) six high speed digital cameras for upper extremity assessment (Vicon Motion Systems), Delsys wireless EMG systems, four AMTI 1000 force platforms, a Cybex 6000 Testing and Rehabilitation System, Biodex Rehabilitation Treadmill, GaitRite mat, an overhead harness system, Opal wireless inertial sensors, and a customized treadmill device for postural response testing. Data collection from the wireless inertial sensor system is synchronized with data collection from the motion capture system. Beyond the main laboratory space, three additional spaces house graduate student research offices, an electronics/design shop and equipment storage.
Center activities are carried out in partnership with other academic units of KUMC, including the schools of Medicine, Allied Health, and Nursing and with affiliated institutions, such as area geriatric care centers, VA Medical Centers, the Wichita branch of the School of Medicine, the University of Kansas in Lawrence, state agencies, and service organizations. Research protocols undertaken at the Center by KUMC faculty address a variety of problems related to aging, ranging from social concerns to cellular biology.

**KUMC RESEARCH INSTITUTES**

**KUMC Kidney Institute.** The Kidney Institute is a world-class, internationally recognized research center comprised of 44 doctoral level faculty investigators representing eight School of Medicine departments, including Internal Medicine, Molecular and Integrative Physiology, Biochemistry and Molecular Biology, Anatomy and Cell Biology, Pathology and Laboratory Medicine, and Pharmacology, Toxicology and Therapeutics, and two from the School of Health Professions (Clinical Laboratory Sciences and Dietetics and Nutrition). The Kidney Institute also has interactions with the NCI-Designated KU Cancer Center and Liver Center, and collaborates with other nearby entities including the Department of Molecular Biosciences at KU-Lawrence, the KC Veterans Administration Hospital, Children’s Mercy Kansas City, UMKC and the Stowers Institute for Medical Research, all in Kansas City or nearby. Kidney Institute investigators occupy open-access laboratory space on two floors of Wahl Hall East and West, providing clinician-scientists and basic-scientists opportunities to closely interact on joint research projects and clinical trials. The Kidney Institute is active in training the next-generation of professionals through the T32 nephrology fellowship program (NIDDK T32DK071496) and weekly salt & water conferences, the nephrology fellows' journal club and Sullivan conferences. The Kidney Institute is home to the Kansas PKD Research and Translation Core, a P30 grant from the NIDDK (P30 DK106912). Research strengths in the Kidney Institute include polycystic kidney disease, glomerular development and disease, bone-kidney interactions, renal transport physiology, and health outcomes research.

**KUMC KU Diabetes Institute.** The KU Diabetes Institute was formed in 2007. It is a virtual Institute comprising diabetes researchers at the University of Kansas Medical Center (with campuses in Kansas City, Wichita, and Salina) and the University of Kansas-Lawrence engaged in a wide range of basic science, clinical and translational research projects centering around diabetes and its complications. The clinical arm of the KU Diabetes Institute is the Cray Diabetes Center. The KU Diabetes Institute supports the fundamental role of basic research, data collection, and outcomes research in order to improve the lives of people with diabetes.

**KUMC Cardiovascular Research Institute.** The Cardiovascular Research Institute (CVRI) provides an integrative framework for cardiovascular research conducted at the University of Kansas Medical Center and the University of Kansas Hospital. The CVRI connects investigators from a wide spectrum of cardiovascular research that includes cellular and molecular investigation, physiological experimentation in whole animals, investigator-initiated clinical research, population studies, large multicenter clinical trials, and translational research that brings discoveries from the bench to the bedside. In addition to pursuing excellence in science and innovation, training the future generation of scientists and physicians remains one of our primary goals.

**KUMC Institute for Neurological Discoveries.** The Institute for Neurological Discoveries, a regional resource for advancing neuroscience research based at KU Medical Center, focuses on team-based scientific discovery. The IND unites over 120 basic and clinical neuroscientists in different disciplines from nine institutions to work collaboratively as teams. Its mission is to work with patients and the community to identify and advance research in neuroscience therapies. Goals include: to find cures for neurodegenerative disorders, seek ways to repair the injured brain, and identify lifestyles that promote brain health. The Institute focuses on six specific neurological disease areas, selected because of their prevalence, personal and economic impact, and because they represent areas of exceptional strength: Brain Injury and Repair, Neuromuscular and Movement Disorders, Neurodegenerative Disorders, Hearing and Equilibrium Disorders, Women’s Pain Division, and Cognitive and Behavioral Health.
KUMC Institute for Reproductive Health and Regenerative Medicine. Research at the Institute for Reproductive Health and Regenerative Medicine (IRHRM) was established to focus on fertility and infertility, developmental origins of health and disease, and epigenetics and stem cell biology. The IRHRM is organized into three centers with overlapping research interests: the Center for Epigenetics and Stem Cell Biology (CESCB), the Center for Reproductive Sciences (CRS), and the Center for the Developmental Origins of Health and Adult Disease (CDOHAD). The research efforts of the centers include basic, translational, and clinical research. Furthermore, the centers are highly interactive. Programs in faculty development, postdoctoral training, and graduate education are key activities of the Institute and its membership.

KUMC CENTERS

KUMC Center for Child Health and Development. The CCHD began at KU Medical Center in 1958 as the Children’s Rehabilitation Unit (CRU). Throughout its 58-year history, the CCHD has been a distinct Center at the University of Kansas, with a history of interdisciplinary training that even predated University Affiliated Facilities. The CCHD is also a key component of the Kansas Center for Autism Research and Training (K-CART) which is a Center in the Schiefelbusch Institute for Life Span Studies (LSI) and is administratively under the KUMC Executive Vice Chancellor. The mission of the Center for Child Health and Development (CCHD) is to advance the health, development, and well-being of children at risk or who have developmental disabilities and supporting their families through the provision of: (1) exemplary clinical service; (2) interdisciplinary leadership training; (3) outreach training and technical assistance and (4) collaborative academic research. The Center for Child Health and Development provides diagnostic evaluation for Autism Spectrum Disorders using “gold standard” research tools. The current CCHD research database has over 6000 Intake records, over 4000 completed Patient Information Forms, over 1300 detailed psychological score measures and 1200 Developmental Pediatrics visits. With Russ Waitman (Informatics), the CCHD is in the process of mapping the current database into the Electronic Medical Record (O2), which will result in further integration between the clinical research database and our EMR system and better access for researchers across Frontiers. With Dr. Waitman, the CCHD will continue to develop the database for researchers using the Harvard ontologies developed to provide researchers a concept-based approach to identifying behavioral features of importance and for correlating these with genotypic data.

The CCHD contributes to the Frontiers Clinical and Translational research mission through a variety of activities and faculty contributions. The CCHD was one of the initial pilot clinics in the Frontiers Recruitment Registry and provided feedback to Frontiers regarding recruitment and consent procedures. Dr. Jamison, Clinical Associate Professor at CCHD, was an initial member of the Frontiers Recruitment Registry Request Committee (RRRC) and now serves as chair.

KUMC/CMKC Center for Children’s Healthy Lifestyles & Nutrition. The Center for Children’s Healthy Lifestyles & Nutrition represents an extension of the committed collaboration in the area of pediatric obesity research between two neighboring institutions who serve the health needs of children across the bi-state region of Missouri and Kansas. Supported by a state-of-the-art facility, researchers at the University of Kansas Medical Center and the Children’s Mercy Kansas City lead a wide range of childhood obesity treatment and prevention initiatives designed to benefit children, families and communities. The Center jointly houses clinical and research programs focused on activity and nutrition, as well as serving as home to a large community collaborative with over 400 members called Weighing In. This community collaborative helps tie (though our quarterly meetings) scientists to community members in working groups such as pregnancy and breastfeeding, early childhood, and healthy schools. The Center is poised to serve as a leader for pediatric obesity research in the Midwest and as a centralized resource for community members, academic and business leaders who are interested in arresting the current rates of childhood obesity and moving forward to ensure the healthy lifestyles and nutrition of all children.

KU Center for Telemedicine & Telehealth (KUCTT). The KUCTT provides the citizens of Kansas the best available health care while providing Kansas’ health professionals the best available health information and education, and is a recognized world leader in telehealth services and research. With a faculty of four and six
staff, KUCTT has provided more than 45,000 consults across 60 specialties from 1991 to present. KUCTT’s network connects some of the most clinically underserved communities, effectively enhancing Kansas’ quality of healthcare. Urban and rural telehealth partners include schools, area health education centers, hospitals, early intervention satellite sites, community health clinics, mental health facilities, and other venues. KUCTT is one of the most active outpatient telehealth programs in the country across secure room-based, PC-based, and mobile telemedicine platforms. KUCTT has been an integral piece of several national and international collaborations that have demonstrated the potential of telehealth across the lifespan to eliminate distance as a barrier to healthcare.

KUCTT also assists faculty with telemedicine and telehealth research across rural and urban settings. The community engaged research approach includes health services research, cost analyses, health communication research, patient/family outcomes research, and implementation research. Pre- and post-doctoral research trainees have participated across disciplines (e.g., medicine, nursing, health professions, psychology, health communication, health services administration). KUCTT is spearheading new models of patient-centered services, including home-based, mobile televideo services for homebound patients and their caregivers. In addition to clinical telemedicine, KUCTT also leads the institution’s replication and evaluation of the capacity building telementoring approach, Project ECHO (Extension of Community Healthcare Outcomes).

KUCTT assists researchers throughout the planning, implementation, and evaluation of telemedicine and telehealth projects, following community-engagement best practices. This includes: 1. Project development and application for funding (e.g., NIH, HRSA, SAMHSA, PCORI, and non-federal foundations); 2. Technology selection to fit project goals; 3. Project implementation, including ongoing evaluation and technical support consistent with telemedicine research best practices; 4. Project evaluation including telemedicine-specific domains; and 5. Results dissemination to participating communities as well as to national audiences through KUCTT’s federally funded Heartland Telehealth Resource Center. KUCTT also supports student research, ranging from semester-long participation in ongoing KUCTT research to independent student projects, including completion of Masters’ thesis and dissertation projects. The KUCTT Director and related Center faculty provide ongoing mentorship to support student completion of research tasks as well as numerous opportunities for presentations, publications, and grant submissions.

**KUMC Hoglund Brain Imaging Center.** The Hoglund Brain Imaging Center (HBIC) is under the direction of William Brooks, PhD. The HBIC is located at the KU SOM campus. It occupies a free-standing 11,500 square foot building and brings a combination of neuroimaging technologies and neuroscientists under one roof. It is supported through philanthropic, state, and federal monies. Center activities are primarily focused on research studies at basic and clinical translational levels. A major goal of the HBIC is to integrate structural and functional approaches for the assessment of the brain in both health and disease. It houses a 3T Siemens Skyra MRI system capable of high resolution structural and functional MRI, MR spectroscopy, and diffusion and perfusion imaging. Complementing this human system is a 9.4T Varian MRI system for animal studies. The HBIC also provides whole-cortex child and adult magnetoencephalography (MEG) and high-density electroencephalography and fetal magnetoencephalography and magnetocardiography.

**The Heartland Center for Mitochondrial Medicine (HCMM).** The HCMM was established in 2014. It evolved through a series of meetings arranged between regional investigator stakeholders pursuing energy metabolism research. Russell Swerdlow, MD was elected the Director and Mission and Vision statements prepared. Quarterly general meetings of HCMM investigators are held at KUMC, with sub-committees meeting more regularly as needed. A current sub-committee is now meeting monthly to arrange a regional Mitochondrial Medicine Symposium to be held on May 2nd and 3rd, 2016, with Dr. Douglas Wallace as our keynote speaker. This symposium is being held with support from the KU ADC, KCUMB, the KU-L Higuchi Biosciences Center, and industry support we have procured from Seahorse Biosciences.

The HCMM mission is to organize investigators with thematic interests in mitochondria and bioenergetics, and through this effort create a supportive and interdisciplinary environment that encourages a team-science approach and facilitates energy metabolism-related research. As envisioned, the HCMM will be a national/ international leader known for cutting-edge, interdisciplinary research programs that advance basic science,
translational, and clinical research that focuses on mitochondrial dysfunction, disorders, and medicine. We will develop and sustain cross-disciplinary research programs that help us better understand the fundamental role of energy metabolism in biological systems and in disease. Specific vision statements are as follows:

- We will develop and sustain interdisciplinary innovative translational research programs that identify energy metabolism-related therapeutic targets, as well as novel therapeutic approaches that emphasize manipulations of mitochondria and energy metabolism pathways.
- We will develop and test next generation mitochondria and bioenergetics-based treatments that improve the lives of persons with defective or deficient energy metabolism.

**JUNTOS Center for Advancing Latino Health.** Over the past 8 years, KUMC has invested in the development of a dedicated center to address health disparities in the Latino community called the JUNTOS Center for Advancing Latino Health. The JUNTOS Center for Advancing Latino Health is focused on building community-based participatory research (CBPR) programs that translate research findings toward the elimination of health disparities and building healthier communities. JUNTOS involves a tight collaboration between highly successful teams at KUMC and a number of time-honored regional and national institutions.

A diverse, multidisciplinary team has collaborated on NIH clinical trials, smoking cessation with Latinos, evaluation of mobile health interventions, pharmaco-therapy trials with underserved smokers, and evaluation of cultural and psychosocial aspects of tobacco use. Dr. Cupertino, Director of JUNTOS, has led federally and privately supported research, and has devoted efforts over the past 8 years to developing the JUNTOS community infrastructure to support clinical intervention research, primarily addressing tobacco use. Dr. Cupertino completed a NIH K01 (CA136993) focused on advancing understanding of smoking among Latino immigrants and pilot tested a novel intervention to enhance smoking cessation treatment for Latinos.

**Center for American Indian Community Health (CAICH).** The CAICH was funded in 2010 through a National Institute on Minority Health and Health Disparities Exploratory Center of Excellence (P20) grant (PIs: Daley/Greiner). CAICH began as the Program in American Indian Community Health in 2006, since which time member investigators have brought in nearly $30 million in externally-funded grants focused on the AI community. CAICH is led by Dr. Christine Daley and conducts studies focused primarily on cancer prevention and control, including smoking cessation, weight loss, breast cancer screening, colorectal cancer screening, community education about cancer research and clinical trials, and health beliefs and behaviors. CAICH also has three Community Advisory Boards (CABs). We have an Executive CAB (7 members) who meets monthly to provide insight on day-to-day activities within the center, a longitudinal CAB (approximately 40 members) who meets quarterly, and a nationwide College and University (CU)CAB who meet regularly via social media. CAICH provides monthly cultural trainings and monthly in-service trainings focused on research methods and content. It has 6 Cores or shared resources, including an Administrative Core led by Dr. Christine Daley (PI) to help with grant administration; a Methods Core led by Dr. Byron Gajewski, a co-investigator on this application, to help with biostatistics and informatics needs; an Education Core, led by Dr. Won Choi, with paid graduate assistants and an educational pipeline; an Environmental Health Core led by Dr. Charles Barnes of the Children’s Mercy Kansas City in Kansas City, MO; a Law and Policy Core., that provides oversight of all appropriate approvals and ethical research questions through a Cultural Review and Monitoring Committee that is part of the KUMC Human Subjects Committee; and a Community Outreach Core that assists with recruitment, advertisement, and dissemination efforts, as well as overall community engagement.

**KUMC Liver Center.** The primary mission of the liver center is to be a multidisciplinary intellectual focus for liver researchers by bringing the Basic Science, Translational Science, Clinical Research, Pathology, Radiology, Clinical Hepatology, and Surgery communities together. The liver center is a research center and its focus is on research. It aims to collaborate closely with the clinical care components of the Liver community, the Liver Treatment Center and the Center for Transplantation in a mutually supportive relationship that will allow both clinical and research aspects of the liver enterprise to reach their full potential.
KUMC Midwest Stem Cell Therapy Center. The Midwest Stem Cell Therapy Center (MSCTC) was created by the Kansas Legislature in the 2013 session, with a state appropriation. The MSCTC helped establish a systematic mechanism for Kansans to receive adult stem cell therapy in the state and region and served as a coordinated center to translate basic stem cell research findings into clinical applications. The MSCTC faculty and staff include physicians, scientists, and trainees representing the fields of adult stem cell biology, neurology, oncology, hematology, cardiac and vascular, endocrine, and other sub-specialties. These individuals represent several local and regional institutions, enabling the formation of a stem cell network of knowledge and information. This synergy among various institutions also fosters productive collaborations that may result in faster translation of basic science discoveries into the clinic. The MSCTC houses an FDA-registered GMP facility with the demonstrated capability to provide clinical grade adult stem cells for use in clinical trials. Several clinical trials with adult stem cells are in the start-up phase within KUMC and external research collaborations are being discussed. In addition, cutting edge molecular stem cell research is being conducted by MSCTC scientists. These ongoing studies involve induced pluripotent stem cells, regulation of cellular differentiation, cord blood cells, as well as various transcription factors and other molecular pathways in adult stem cells. For patients interested in stem cell studies going on around the country, there is a set of "ready-made" searches that automatically search ClinicalTrials.gov for the latest studies. In addition, the MSCTC is planning to expand the training of postdoctoral fellows in basic research in adult stem cell biology, as well as clinicians in adult stem cell-related topics.

COMMUNITY RESOURCES

The Kansas Patients and Providers Engaged in Prevention Research (KPPEPR) Network. The Kansas Patients and Providers Engaged in Prevention Research (KPPEPR) Network is a collaborative of patients and professionals from geographically diverse communities across Kansas. All KPPEPR Network members are primary care patients, providers, public health and/or agency professionals involved directly in health-related activity on a daily basis. The network is led by an Executive Director, Anthony Wellever, at the University of Kansas Medical Center (KUMC), where an additional group of senior research faculty (Drs. Allen Greiner, Kim Kimminau, Edward Ellerbeck, Christie Befort and Joseph LeMaster) provide support and technical assistance on all projects. The network is further supported by the Frontiers translational science program and its Community Partnership for Health initiative. Over the past 15 years, the KPPEPR Network has relied on collaborative involvement of over 60 primary care practices, thousands of patients and scores of public health and other health service agencies.

Prior projects have utilized patient and physician surveys, office assessments, direct observation of primary care, key informant interviews, and qualitative data collection methods. Nearly all of these projects have been initiated by academic researcher faculty at KUMC. The projects have resulted in a host of scientific publications and abstracts since Drs. Greiner and Ellerbeck became involved in 1999. The KPPEPR Network has been utilized to study the delivery of preventive services in physician’s offices, including colorectal cancer screening, counseling on diet and physical activity and smoking cessation counseling. In 2004 and 2005, KPPEPR practices participated in a NIH-funded study to examine the impact of disease management on smoking cessation in rural primary care practices. This study recruited 50 rural clinics, 63 health care providers, and 750 participants for a 2-year trial using motivational interviewing for smoking cessation (CA101963). Several NIH and HRSA funded intervention studies followed over of the next four years. In 3 other separate studies (HS14857, CA121016, HL87643) 68 rural clinics and 1,340 participants were recruited and delivered health related interventions via phone and telemedicine. Most recently, in 2015 KPPEPR became the primary network for a $10 million dollar PCORI funded intervention (Befort, PI) to study the comparative effectiveness of 3 practice change strategies for weight loss among rural primary care patients.

The KPPEPR Network has utilized several unique research methodologies over the years. These include home visit data collections by research assistants, hospital and primary care practice interventions and the involvement of medical students in research activities and intervention delivery. In 2014, KPPEPR leaders,
began a network reorganization to systematically involve patients, and an interdisciplinary group of health care providers and public health professionals as network leaders and active participants. The intention of these changes is to begin conducting projects that are instigated at the behest of patients and providers, rather than as conceptualized by full time researchers. The reorganization should result in a shared decision-making process whereby all parties have an equal voice and are valued as contributors throughout the research process. By reorienting the network to more fully serve the needs of patients and “on the ground” service providers, KPPEPR is poised to make significant contributions to evolving health care reform and new research initiatives such as the Federal Patient Centered Outcomes Research Institute, which seek to answer health research questions with immediate application for improving patient oriented outcomes.

**K-State Research and Extension.** K-State Research and Extension is a statewide network of educators sharing unbiased, research-based information and expertise on issues important to Kansas. It has established local, state, regional, national, and international partnerships. It is dedicated to a safe, sustainable, competitive food and fiber system and to strong, healthy communities, families, and youth through integrated research, analysis and education. With more than 125 years of research and 100 years of extension, K-State Research and Extension has been improving the quality of life and standard of living for Kansans for a century. This integrated system connects the university to every county through locally based educators who serve as sources of objective information. In partnership with the Community Engagement function, researchers are working to collaborate with K-State Extension agents to increase enrollment in clinical trials, participation in community health initiatives and to encourage enrollment in Frontiers’ patient registry, “Pioneers.”

**The American Academy of Family Physicians National Research Network (AAFP NRN) and MOSAIC Center of Excellence.** The American Academy of Family Physicians National Research Network (AAFP NRN) and MOSAIC Center of Excellence was established in 1999 to conduct, support, promote, and advocate for primary care research in practice-based settings.

The AAFP NRN assists in realizing overall strategies for achieving improved primary care for the nation. These include: supporting initiatives in advancing the Patient Centered Medical Home, promoting an ongoing effort for practice change through improved use of technology, education and communication; assisting our members to achieve financial success through optimal practice management; involving family physicians in targeted public health activities; and increasing member and patient awareness of resources through educational programs.

Within the American Academy of Family Medicine National Research Network (based locally in Leawood, KS) we have 1 of 8 national centers of excellence in practice-based research (Kimminau, P30 HS21647) that provide access for Frontiers investigators to nine regional and three national PBRNs that include primary care, dental, pharmacy, and dietetics research networks.

The AAFP NRN is working to gain a broader perspective from the patients’ point of view as it relates to the focus of family medicine and family medicine research. This perspective will provide better insights into the concerns and needs of patients and further help us to understand and improve the patient/physician relationship. AAFP members work with the patient/family dynamic every day. Engaging patients in their own care is the foundation of what family medicine does. Including the patients’ view throughout our research processes is a key component if we are striving for improvements in health care and health outcomes. Getting their perspective throughout the various phases will provide us with insights into health concerns, important areas for research and benefits to the patient, and ultimately improved care.

**Center for Excellence in Health Communication to Underserved Populations (CEHCUP).** Health disparities constitute a major problem for the United States. More focused research, as well as advanced training for communicators (be they journalists, advertising or public relations practitioners) is needed. The William Allen White School of Journalism and Mass Communications has established the Center for Excellence in Health Communication to Underserved Populations on the KU-Lawrence campus to promote dedicated student training as well as collaborative research and service to the community to address health disparities in the state of Kansas and abroad.
CEHCUP has three major roles:

- Educate and train undergraduate and graduate students in journalism and strategic communication about health communication practices to underserved populations and CBPR-driven approaches.
- Function as a research hub to facilitate interdisciplinary, multidisciplinary and cross-disciplinary research into communication practices for health campaigns addressing underserved populations.
- Provide support, assistance and know-how for community-based organizations that want to engage in health promotion or disease prevention activities.

KUMC Office of Rural Health Education. KUMC Office of Rural Health Education partners with health care providers, Kansas employers, and stakeholders to increase access to quality health care for the people of rural and urban underserved Kansas. We do this by advancing the health care workforce through recruitment, retention, research and education. Let us help you find Kansas health care jobs, loan forgiveness and repayment options, temporary coverage for medical professionals, committed providers for your hospital or clinic, and more.

KCK Community Health Council. KCK Community Health Council (CHC) exists to improve health and health care for the people of Wyandotte County. We believe that residents have the ability, and an inherent right, to provide leadership in the shaping of physical spaces and public policies which impact their health. CHC’s responsibility is to ensure the collective experiences and expertise of Wyandotte County residents are represented in matters of health design and policy, as well as identify and maximize opportunities for collaboration, planning and implementation of effective community health improvement initiatives.

CHC is a non-profit, 501 (c) (3) community health collaborative of hospitals, safety net clinics, federally-qualified health clinics (FQHCs), mental health providers, public health departments, academic research institutions and health care funding organizations. CHC member institutions support the work of the organization on a pre-determined pledge that is renewed each fiscal year.

The University of Kansas Cancer Center has been selected for National Cancer Institute (NCI) designation. NCI designation enhances the long-standing relationship of the Cancer Center with the Midwest Cancer Alliance, providing opportunities to expand research and link discoveries made in the lab at the University of Kansas to the MCA network of hospitals and health care organizations and enhance the quality and delivery of cancer care at all levels. KPPEPR (Kansas Patients and Providers Engaged in Prevention Research) is a practice-based research network that is also part of the MCA.

All MCA-member medical professionals have access to second opinion and consultation services with multi-disciplinary cancer experts, conferences and other networking events, outreach programs, patient navigation support, communication materials, web resources, and continuing education programs. For the convenience of our affiliated medical professionals, the MCA provides many of these services at member locations, thanks to technology like Interactive Televideo (ITV).

Genesis Health Care Network, Garden City, Kansas (Finney County, KS). The Genesis Health Care Clinic Network is the operator of the largest rural primary care network serving Hispanics and refugees in Kansas. Serving over 9,500 patients annually through six clinics throughout southwest Kansas, with more than 90 percent of these individuals below the 200% poverty level and as the leading ambulatory “safety-net” care provider for these underserved individuals and families in the region, Genesis recognizes the importance of health care and social services for clients. The flagship Genesis clinic, in Garden City, rests in a region where 5 large counties now have majority minority populations. Meat packing, and feedlot growth over the past 30 years has led to an influx of Latinos and refugees from across the globe. The incredible diversity in the region has shaped Genesis. All programs -- dental and medical clinics, oral health screening and education, social services such as the food bank, clothing room, emergency assistance, citizenship classes, immunizations, early literacy, health education and outreach -- are designed to improve the lives and health status of individuals and families.
KUMC faculty began collaborative work with Genesis over 14 years ago. Dr. Kimminau, while Vice President of Research at the Kansas Health Institute in 2002, conducted the Minority Health Disparities in Kansas project and completed focus groups and health assessments at Genesis clinics. For over 12 years, we have placed medical students in the Genesis Garden City Clinic for a six-week summer practice/research experience. We worked with Genesis to recruit smokers from the clinic for the NCI-funded KanQuit smoking cessation study (PI, Ellerbeck) in 2005-2007. We partnered with Genesis and other primary care clinics on the tablet computer delivered Healthy Living colorectal cancer screening program in 2007 (NCI, PI, Engelman). In 2009, we began working with Genesis to deliver state of the art telmedicine smoking cessation counseling services in the Connect to Quit study (NHLBI, PI, Richter). The past six years the Genesis network has been a subcontracted primary partner in the NCI-funded Community Networks Program Center to reduce cancer disparities (U54 CA154253, PI, Greiner). Through this we worked with Genesis to develop a Community Health Worker program that is now self-sustaining. We have new partnership funding from CMS to conduct health promotion across the region. We expect our research partnership with Genesis to continue and to allow work on vulnerable and understudied rural populations.

**Institute for Community Engagement (ICE).** ICE is the KUMC outreach and service delivery infrastructure that spans over 100 staff across five departments (Area Health Education Centers, Center for Telemedicine & Telehealth, Continuing Education, Rural Health, and Research & Scholarship). ICE coordinates outreach across the School of Medicine, School of Nursing, and School of Health Professions and there is a strong interprofessional focus across activities. Collectively, the Institute departments and its extensive internal and external partners provide needs-driven educational and clinical services that span the entire state and reach into each of Kansas’ 105 counties. The Institute’s mission is to "improve the health of Kansans through communication, collaboration, and statewide partnerships." The mission spans enhancing student education, strengthening the health care workforce, researching to improve health, advancing health care access, and serving communities. The Institute works closely with KU Hospital to advance integration and health system models. ICE’s departments and partners work with and help CPH facilitate community engaged research from concept to proposal implementation, including site/practice recruitment and retention, training, as well as reporting findings back to communities.

**KU Center for Telehealth and Telemedicine (KUCTT).** Using the range of telehealth technologies, KUCTT provides Kansans access to the best available health care while providing Kansas’ health care professionals access to the best available health information and education. Kansas is the ideal state for telemedicine, with half of its population in two population centers and the other half located throughout 88 rural counties. From the very first consult in 1991 to present day, the KUCTT continues to expand its clinical services for children and across the lifespan. With more than 40,000 consults across 60 specialties from 1991 to present, KUCTT is a leader in the telemedicine field. The existing network connects some of the most clinically underserved communities, effectively enhancing Kansas’ quality of healthcare. Urban and rural telehealth partners include schools, area health education centers, hospitals, early intervention satellite sites, community health clinics, mental health facilities, and other venues. KUCTT is one of the most active outpatient telemedicine programs in the country, with over 4,000 clinical consults per year across secure room-based, PC-based, and mobile telemedicine platforms. KUCTT also oversees the federally funded Heartland Regional Telehealth Center, spanning telehealth services across Kansas, Missouri, and Oklahoma.

**Area Health Education Centers (AHECs).** The AHECs are academic-community partnerships that train health care providers at sites and in programs that are responsive to state and local needs around health topics. The AHECs enhance the quality and accessibility of health care services in Kansas through partnerships with communities, health care professionals and organizations, educational institutions and other interested individuals and agencies. The three offices are geographically distributed across the East (Pittsburg, KS office), West (Hays, KS office), and Northeast (Lawrence, KS office). Rural Kansas has a diverse underserved population, with high poverty in southeast rural areas, a population faced with economic challenges related to downturns in farming and oil in central and northwest Kansas, and a new immigrant population associated with meat packing and other industries in southwest Kansas. The AHECs have a strong
local presence in each of these regions to meet needs unique to the area. AHECs link the resources of university health science centers with local planning, educational, research, and clinical resources. This network of health-related institutions provides multidisciplinary educational services to students, faculty and local practitioners, ultimately improving health care delivery in medically underserved areas. From 2009-2011, the AHECs completed 468 education/training initiatives with 1,980 sessions and processed 29,792 continuing education enrollments from every county in Kansas. The AHECs have leveraged their strong rural relationships to support recruitment and retention of rural practices in previous rural primary care research related to epilepsy, pediatric cancer, smoking cessation, and other topics.

**KUMC Continuing Education and Professional Development (CE/PD.)** CE/PD’s goal is to develop and deliver education that makes a positive difference in practice and patient outcomes. CE/PD provides continuing education directly related to the top practice concerns of Kansas’ primary care providers, and provides interprofessional education with a growing emphasis on team-based medicine. CE/PD is nationally accredited by the Accreditation Council for Continuing Medical Education and the American Nurses Credentialing Center. CE/PD is the largest provider of continuing medical education in Kansas. In FY 12, CE/PD offered 81 courses, conferences or event series with an enrollment of 4,706. In addition, they supported 1,629 grand round sessions at KUMC, including broadcast via televideo of a number of sessions to metropolitan and rural sites across Kansas. Of note, CE/PD has accredited one of the most attended regional pediatric obesity conferences for the last decade, in addition to numerous grand rounds around obesity. CE has spearheaded two statewide initiatives that utilized training and performance improvement methodologies similar to the proposal in order to support adoption of national evidence-based guidelines in our rural and frontier communities. In particular, televideo technology supported team-based performance improvement activities and shared team learning because teams were geographically distributed across the states. One performance improvement initiative resulted in increased practice adoption of diabetes management practices and the second, while ongoing, is promising related to system-wide adoption of best practices in sepsis management.

**Department of Family Medicine.** This growing department is housed within three separate areas of the KU Medical Center complex. The research division, under Dr. Greiner’s direction, occupies a 2400 square foot office suite within the KUMC Endowment Building. The Division has seven full time faculty investigators and over twenty staff with experience in health disparities research and community outreach. The Department now ranks within the top ten family medicine departments in the U.S. in NIH funding. Two research division faculty members maintain clinical practices and each of the other five members is experienced in partnering with organizations and agencies to improve health. All research division staff have been hired with the intent of building a translational health disparities program studying prevention, social determinants, cancer and chronic diseases. These staff have expertise in health informatics, community based participatory research, minority participant recruitment, and biospecimen collection. The research division has been the primary home for the community engagement program within the KUMC Clinical and Translational Science Award, *Frontiers,* for over five years. The clinical portion of the Department of Family Medicine resides on the entire first floor of the recently completed medical office building. A large suite of faculty offices and educational program offices is housed separately in the Delp Building. This area also provides additional conference room and small classroom space for meetings and training sessions.

**Wyandotte County Safety-Net Clinic Coalition.** The Wyandotte County Safety-Net Clinic Coalition is a group of clinics serving low income individuals in Wyandotte County. The group has collaborated with multiple KUMC investigators on NIH funded projects over the last fifteen years. It includes two federally qualified community health center clinics run out of the Swope Health Services central location in Kansas City, Missouri. The clinics provide the vast majority of health care needs for the uninsured population of Kansas City, Kansas. This population segment is predominately minority with a rapidly growing Latino component. The coalition meets monthly and is currently working on collaborative programs to test the impact of community health workers on patient outcomes. The group has a shared patient database and referrals system. A number of local physicians and community leaders regularly attend coalition meetings and contribute to joint projects. The coalition works closely with the Wyandotte County Community Health Council. Swope Health Services has been extensively
involved with coalition activities and has moved their largest Kansas City, KS clinic to a new location to facilitate expansion of services. Swope Parkway Health Center, Kansas City, Missouri is a federally qualified community health center with Pediatric, OB/GYN, General Medicine, Ophthalmology, Mental and Behavioral Health, and Community Outreach clinics. The Center also has a full service on-site pharmacy. Services are provided to patients with Medicare, Medicaid, and to the uninsured on a sliding scale fee schedule. Swope Central had 16,324 total visits and 7,138 unique patient visits in 2004. Swope Wyandotte Clinic, Kansas City, Kansas is a satellite office for Swope Central and serves as the primary federally qualified community health center in Kansas City, Kansas. The Clinic has recently moved into new office space and has expanded services. Services are provided to patients with Medicare, Medicaid, and to the uninsured on a sliding scale fee schedule. Swope Quindaro Clinic Kansas City, Kansas is a satellite office for Swope Central and serves a very low income section of the urban core in Kansas City, Kansas. Services are provided to patients with Medicare, Medicaid, and to the uninsured on a sliding scale fee schedule. Duchesne Clinic Kansas City, Kansas is a clinic operated by the Sisters of Charity of Leavenworth, a non-profit health care services organization that also runs several hospitals in the plains and western plains regions of the United States. The clinic only sees patients who have no insurance coverage. Southwest Boulevard Family Health Care Kansas City, Kansas is a full service primary care clinic. The clinic serves patients with Medicare, Medicaid, private insurance, and those with no insurance on a sliding scale fee schedule. The Wyandotte County – Kansas City, Kansas Unified Government Health Department operates Pediatrics, OB/GYN, Family Planning, Immunization, and STD clinics for those with Medicare, Medicaid, and the uninsured. Dr. Greiner serves as the health department’s medical officer.

**Kansas City CARE Clinic.** The KC CARE Clinic was formed in 1971 as a private 501(c)(3) organization to promote health and wellness by providing quality care, access, research, and education to the underserved and all people in our community. The clinic provides health care services in general medicine, HIV prevention and primary care, behavioral health, and dentistry with a full-time staff of 105 as well as over 1,200 volunteers. Full- and part-time staff includes two full-time physicians, six nurses, five nurse practitioners, 22 case managers, six behavioral health providers, seven community health workers, one dentist, one dental assistant, and seven prevention specialists. In 2014, 8,000 patients received primary care, mental and/or dental services at two clinic locations, both in underserved areas of the city. KC Care maintains relationships with many academic institutions in the area, allowing medical students from KUMC, KCU, UMKC, and other schools to gain experience in the clinic under professional supervision.

**Silver City Health Center.** Silver City Health Center offers affordable, high-quality primary care, in-depth clinical evaluation, and a range of program-specific health services to English and Spanish-speaking residents of Wyandotte and Johnson counties. The Center provides primary health care and health education resource access to individuals without insurance, as well as to those with government or private health insurance coverage. Located in the Argentine community of Kansas City, Kan., the center employs skilled health care professionals from the KU Schools of Health Professions, Medicine and Nursing.

**Haskell Indian Nations University.** Haskell Indian Nations University (HINU) is the premiere tribal university in the United States, offering quality education to Native American students. Haskell’s student population averages about 1000 per semester, and all students are members of federally recognized tribes. Haskell’s faculty and staff is predominantly native. Haskell offers Associate and Bachelor’s degrees. Haskell’s historic campus is centrally located in Lawrence, KS in what is known as Kaw Valley. The mission of Haskell Indian Nations University is to build the leadership capacity of their students by serving as the leading institution of academic excellence, cultural and intellectual prominence, and holistic education to address the needs of Indigenous communities.

**Mid-America All Indian Center.** The Mid-America All-Indian Center serves as a cultural center and museum dedicated to educating people about and preserving the heritage of the American Indian.
Heart of American Indian Center. The mission of the Kansas City Indian Center is to encourage social, educational, and economic advancement of the American Indian community by promoting traditional and cultural values.

The Kansas City Indian Center (Heart of America Indian Center), a 501(c)(3) non-profit corporation, has been serving the Kansas City’s American Indian population since 1971.

Today the Center remains dedicated to the following goals:

- provide health, welfare and cultural services to American Indian individuals and families of our community;
- promote fellowship among the American Indian people of all tribes living in the Kansas City Area;
- stimulate the natural integration of the American Indian into the community;
- encourage artistic and vocational pursuits by American Indian people; and
- preserve and foster traditional American Indian cultural values.

Services Available - Emergency Services for Low-Income American Indians, including Food Pantry and Holiday Baskets, emergency telephone calls to Reservation or Nation and referrals to additional services; and the Morningstar Substance Abuse Outpatient and Prevention Program.

Mexican Consulate. JUNTOS, Drs. Paula Cupertino and Allen Greiner collaborate with the Mexican Consulate and the Ventanilla de Salud program in Southwest Kansas. They provide health fairs, screening services and health assessments of individuals seeking services from the Consulate and thereby keep a high level of surveillance on this vulnerable population’s health status.

ALS Mid-America Chapter. Leading the fight to treat and cure ALS through global research and nationwide advocacy while also empowering people with Lou Gehrig’s Disease and their families to live fuller lives by providing them with compassionate care and support.

Muscular Dystrophy Association. The Muscular Dystrophy Association (MDA) is an American organization which combats muscular dystrophy and diseases of the nervous system and muscular system in general by funding research, providing medical and community services, and educating health professionals and the general public. The organization was founded in 1950 by a group of concerned parents of children with muscular dystrophy.

Leukemia/Lymphoma Society. The Leukemia & Lymphoma Society (LLS) is the world’s largest voluntary health agency dedicated to blood cancer. The LLS mission: Cure leukemia, lymphoma, Hodgkin’s disease and myeloma, and improve the quality of life of patients and their families. LLS funds lifesaving blood cancer research around the world and provides free information and support services.

Community Living Opportunities. Community Living Opportunities, Inc. (CLO) is a non-profit community organization that provides community living, day habilitation, in-home support and targeted case management services for over 300 people with developmental disabilities and employs more than 400 staff members. It was formed in 1977 as an alternative to state institutions and became one of the pioneers in providing community-based services to people with developmental disabilities. Their services include targeted case management, residential services, which includes family-teaching and extended family-teaching homes, day services, behavioral consultation, children’s services, health care services, training and staff certification and organizational behavior management consulting. CLO operates seven group homes in Johnson County, Kansas (the metropolitan Kansas City area) and seven group homes in Douglas County, Kansas (Lawrence). CLO’s Early Childhood Autism Program (ECAP) provides in-home, intensive early intervention for 22 children with autism.

Cottonwood, Inc. Cottonwood Inc. is a not-for-profit community organization that provides services to people with developmental disabilities in Douglas and Jefferson County, Kansas. In their dual role as community
service provider and the Community Developmental Disabilities Organization, Cottonwood is the single point of referral for people with developmental disabilities seeking services. Cottonwood provides services and support to people with developmental disabilities in their living and work environments in the community. Residential services encompass group living, supported living, semi-independent living, and recreation/leisure activities. Support Services include medical care, mental health care, advocacy, habilitative therapies, financial entitlements, transportation, employment, housing, recreation, and adult education. Employment services and work services assist people to obtain and maintain jobs in the Cottonwood Work Services Department and in the community. Cottonwood’s residential services include 48 living arrangements. Cottonwood promotes persons with developmental disabilities as qualified workers to employers, while offering incentives to employers for their cooperation in supported employment. Life enrichment services offer enhancement of job, social, cultural, and leisure skills. Transition services include helping the Lawrence School district provide for a smooth transition from school to adult living for students with disabilities. Cottonwood provides direct or indirect services to over 650 people, ranging in age from 18 to more than 60 years old. Finally, Cottonwood helps fund the Early Childhood Coordinating Council in Jefferson County for families with children in need of early intervention.

Kansas Association for the Medically Underserved (KAMU) is the primary care association for the state of Kansas, and consists of a network of 40 primary care and 13 dental clinics that provide health services to low-income and uninsured people throughout the state. KAMU serves as a connecting point for clinicians working in safety net clinics and participates in extensive workforce development programs. Recently, KUMC faculty assisted KAMU in designing a dental hub model for delivering dental care to counties and communities that either lack sufficient dentists and dental hygienists to meet their need or who have no dental providers at all. Funding to support the development of the dental hub represents a collaborative effort on the part of health philanthropies who wanted trusted, academic expertise from KUMC investigators during the design phase to ensure that the model would permit effective delivery of dental care services to those most in need.

Communities Creating Opportunity. Communities Creating Opportunity (CCO) is a longstanding organization in Kansas City that arose from the work of the Kansas City Organization Project (KCOP). KCOP began in 1977 with religious and community leaders to respond to the rapid racial transition and financial changes in the city’s Southeast neighborhoods. As black families moved into these communities in the mid-70’s, white families moved out in droves. Subsequently, real estate values dropped, lending in the area froze, and insurance rates skyrocketed. Increases in poverty and crime rates followed. KCOP provided community residents with the organizational tools and leadership training to address these trends and enhance their communities. In 1984, KCOP became Kansas City Church Community Organization to reflect its congregation and neighborhood-based model of community organizing. While continuing in its tradition of faith-based community organizing, CCO adopted a new name in 2007, Communities Creating Opportunity, to include all religious traditions and other community partners. The well-recognized acronym, CCO, continues as the organization’s principal signature. Over the past ten years the group has been heavily involved in health equity work. The organization received funding to conduct “hotspot” mapping projects with Truman Medical Center and KUMC in an effort to identify unmet health care need. More recently CCO received funding from the Kansas Health Foundation to study how social factors influence health outcomes in Wyandotte County. KUMC researchers have worked with CCO leaders on data analysis and grant submissions for over five years.

Mid-America Regional Coalition (MARC). MARC is a regional nonprofit group of city and county governments that works to bridge governmental divides created by a state line and various city and county borders across metropolitan Kansas City. It is the metropolitan planning organization for the bistate Kansas City region. Directed by a Board of Directors made up of local elected officials, and serves nine counties and 119 cities. They provide a forum for the region to work together to advance social, economic and environmental progress. MARC is funded by federal, state and private grants, local contributions and earned income. A major portion of their budget is passed through to local governments and other agencies for programs and services. The organization developed a health policy agenda in 2009. Most recently MARC has
become the home base of a regional community health worker collaborative initiative. This group meets monthly and works to support and help expand the activities of lay health workers through Kansas City. Various Frontiers researchers have worked with MARC to organize and build capacity for health improvement and biocience in the region.

**El Centro.** *El Centro* began in 1976 with a small amount of funding from the Archdiocese of Kansas City in Kansas. Church leaders and a group of energetic and caring community members saw a need for an organization to address the needs and concerns of Kansas City, Kansas’ rapidly growing Latino population. With in-migration accelerating, *El Centro de Servicios para Hispanos* was born.

El Centro has grown from a single location to three locations in Kansas City, Kansas and Olathe, serving more than 12,000 individuals and families per year. Our programming has evolved from our first program for elders – the Senior Day Program – to include The Academy for Children – a dual-language Pre-K program, workshops on money-management and homeownership, health education and healthy living outreach through our Promotores de Salud (Health Promoters) volunteers, health navigation and intervention, and our policy and advocacy efforts for issues of special interest to our community. The organization launched a community health worker program in 2008 and has been a close partners of KUMC’s JUNTOS, Center for Advancing Latino Health. *El Centro* has also assisted in recruiting participants in research and has partnered with KUMC researchers in the Department of Family Medicine and with the Alzheimer’s Disease Center.

**Johnson County Department of Health and Environment.** Since 1943, the Johnson County Health Department has been the official public health agency for the County, with the Board of County Commissioners serving as the Board of Health. In March 2012, the Health Department merged with the Johnson County Environmental Department to become the Johnson County Department of Health and Environment (JCDHE). The Director is Lougene Marsh and the Deputy Director is James Joerke. JCDHE is comprised of six divisions: Business Operations, Childcare Licensing, Community Health, Environmental, Health Services, and Strategic Planning. There are approximately 150 department employees. In June 2014, JCDHE became the first accredited health department in Kansas.

Services include: immunizations, communicable disease surveillance, TB testing, refugee health testing, prenatal, WIC, reproductive health, STD screening, HIV testing, child care facilities’ licensure, health education classes, workshops & trainings, injury prevention activities (Safe Kids Johnson County), chronic disease risk reduction activities, community wellness activities. Programs include: Outreach Nurse, Public Health Emergency Program, Targeted Case Management, ‘Making a Difference’, Air Quality, Household Hazardous Waste, Solid Waste Management, On-site Sewage Treatment, Ozone Reduction and Pool Inspections. Services are provided at three sites, 11875 S. Sunset and 11811 S. Sunset in Olathe and 6000 Lamar in Mission.

Dr. J. LeMaster, family physician at KUMC, serves as the medical director for JCDHE. His position facilitates research activities to engage residents seeking services to also participate in community based research. Most recently, researchers in family medicine conducted a comprehensive assessment of micro-food deserts in Johnson County to inform local policymakers, and the team collaborated with JCDHE’s WIC and immunization programs to interview residents about food insecurity, access and need.

**Johnson County Developmental Supports.** Johnson County Developmental Supports (JCDS) was established in 1972 as an agency of Johnson County (Kansas) government to provide community-based services for people with developmental disabilities. JCDS is headed by a seven-member governing board composed of parents, community advocates and professionals who are appointed by the Johnson County Board of County Commissioners. An executive director and a staff of 260 trained professionals lead daily operations. JCDS programs and services are partially funded on a contractual basis with the Kansas Department of Social and Rehabilitation Services. Additional funding sources include a county tax levy, state
block grants, subcontract income, contracts with companies for workers, private grants and donations. JCDS provides office space, Internet access, and some clerical support for MRRC investigators working on site. Today, as a Community Service Provider (CSP), JCDS directly serves nearly 500 people daily. Through a person-centered planning process and within available resources, services are shaped to fit individual needs, preferences, goals, abilities and interests. Some examples of available services include Residential Supports (ranging from a few hours of support for those living independently to live-in, around-the-clock care), Day Supports (facility-based or community-based employment opportunities for paid work, or other activities including volunteer work), Alternative Supports (professional resources for nursing, occupational therapy and assistive technology), Behavior Supports (applied methods to maximize adaptive behavior) and Case Management.

In addition to being a service provider in Johnson County, JCDS has another, equally important role: that of Community Developmental Disabilities Organization (CDDO). As CDDO, JCDS provides a single point of contact and entry for all of Johnson County, Kansas and maintains a county-wide service needs list for those waiting for certain services. Johnson County Developmental Supports accomplishes its direct service mission by developing, linking, and monitoring services, supports, and resources for approximately 700 people. In addition, JCDS works with over 360 affiliates who are agencies and individual service providers to assist access to quality, cost-effective services.

COMMUNITY ENTREPRENEURSHIP RESOURCES

The Bioscience & Technology Business Center at the University of Kansas Medical Center The Bioscience and Technology Business Center (BTBC) was a unique creation in 2006 by the City of Lawrence (City), Douglas County (County), the University of Kansas (KU) and the Lawrence Chamber of Commerce (Chamber). Its missions are to create, grow, recruit, and retain bioscience and technology companies from within the region and spun out from the University and build a sustainable economic development infrastructure and tax base for the region.

Beyond the unique BTBC stakeholder structure and strategic partnerships, the BTBC has developed a dynamic and successful environment for innovation and entrepreneurship, and an engine for creating and accelerating high-tech and bioscience businesses. These successes have been accomplished through:

- Startups based on research and technology from KU and the KU Medical Center;
- State-of-the-art BTBC facilities with advanced amenities such as gigabit fiber internet;
- BTBC resources including business services and the expansive BTBC network;
- Competitive incentive packages to worthy companies starting new business operations; and
- Strong coordination with KUIC in accessing KUMC academic and technology resources for BTBCMC companies.

BTBC will continue to build and leverage its assets and other resources for further development of its footprint at KUMC and KUMC’s relationships and value to the region’s economy.

Digital Sandbox KC provides proof-of-concept resources to support early-stage commercialization processes including access to technology, business and market experts and funding for early stage market validation, prototyping and beta testing services.

Kansas City Area Life Sciences Institute (KCALSI). As a nonprofit institute with a goal to stimulate and coordinate regional life sciences initiatives, KCALSI is:

- Fostering relationships between the academic and private sector life sciences communities
Assisting scientific collaborative research efforts through identifying funding opportunities, proposal review facilitation, resource allocation, and maintaining accountability

Raising awareness of the life sciences and the value it brings to people, the region and institutions

Assisting in life sciences advocacy efforts at the local, state, and national levels

Providing support to economic development and technology transfer & commercialization organizations.

KUMC CORE FACILITIES

KU Clinical Research Center (Figure FR-O.6). Designed unlike any other research facility in the country, the 82,400-square-foot building, which was donated by the Hall Family Foundation, has been remodeled with state-of-the-art features and a more efficient use of space, resources and manpower to best accommodate patients and researchers:

- Easily accessible outpatient exam and treatment rooms, office space and specimen collection laboratories
- A pavilion for gatherings and community events
- Clinical research functions combined into one location

The Clinical Research Center is home to the Clinical and Translational Science Unit (see next) and the NIA-designated Alzheimer’s Disease Center (described above).

Clinical and Translational Science Unit (CTSU). The Clinical and Translational Science Unit (CTSU) provides state-of-the-art space for researchers to see patients who are enrolled in clinical trials. The CTSU is staffed by experienced registered nurses and medical assistants who provide routine care, complex protocol procedures and help record research data in study flow sheets. The space features an exercise physiology laboratory and a commercial-quality metabolic kitchen.

The CTSU does this through:

1) **Physical infrastructure** and resources to support all aspects of research from patient involvement to complex multidisciplinary, multi-institutional collaborations.

2) A **team-based environment** with established methods and processes to stimulate collaborative research and support increasingly complex trials.

3) **Training opportunities** for the translational science workforce in an integrated, continuous-learning environment.

4) The CTSU currently supports 137 approved protocols: 86 investigator-initiated and 51 industry-sponsored studies. In 2015 we had 4887 participant visits to the CTSU (non-unique), up 140% over our first year in 2011 (n=2055) and a 60% increase over the 2014 (n=3061 participants). We attribute this recent growth (Figure FR-O.7) to the increasing user-base as investigators have adapted to our new location in the Clinical Research
Center. Currently, the CTSU’s 137 protocols are directed by 68 different PIs from 27 different KUMC departments and centers. Additionally, we support PIs from various campuses in the region including the University of Missouri-Kansas City (Dr. Lundgren), KU-Wichita (Drs. Collins and Redmond in Preventive Medicine), KU-Lawrence (Dr. Storkel, Life Span Institute) and a local physician (Dietz) with the Kansas City CARE Clinic. Our increasing user base from regional institutions underscores our usefulness to a broad and varied research base and the unifying, collaborative mission of the CTSU as a site for team science.

**CTSU Infrastructure:** The CTSU (25,000 ft²) is housed on the third floor of the KU Clinical Research Center. The Clinical Research Center is a unique regional resource supported by the Johnson County Education and Research Triangle (JCERT) initiative, a 1/8th cent sales tax passed in 2008 to create economic stimulus through new facilities for clinical research, animal health, engineering, business, science and technology. This new, 75,000 ft² facility is located near the KU campus with easy access for all HICTR network institution investigators and research participants.

- **Clinic Space:** The CTSU contains 17 clinic rooms, 2 cognitive testing rooms, and open workspaces for up to 5 visiting study coordinators (Figure FR-O.8).
- **Infusion Center:** The CTSU’s infusion center has 11 infusion bays supported by two nursing stations and activity in the center has steadily grown. We have supported seven phase 1 first-in-human studies (Pompe’s disease, Fabry’s, myotonic dystrophy, multiple sclerosis, and pancreatitis). The center also supports research infusions (480 infusions in 2015) and intensive and complex metabolic research assessments such as hyperinsulinemic-euglycemic clamps (n=70).
- **Overnight Stay Unit / Sleep Lab:** The Overnight Stay Unit (1,200 ft²) consists of 3 dedicated rooms supported by a nursing station. The unit also is a fully functional sleep lab supporting both clinical and research sleep studies when research overnight stays are not scheduled. We have supported 42 overnight stays since moving into the new building.
- **Bionutrition Unit:** The CTSU’s bionutrition unit includes an 830 ft² metabolic kitchen and a 600 ft² demonstration kitchen. The kitchen is fully equipped to provide meals required by study protocols, including regular, therapeutic, modified, and calculated and weighed research meals.
○ **Exercise Physiology Laboratory**: The CTSU’s dedicated Exercise Physiology Lab contains two metabolic carts (ParvoMedics TrueOne 2400), treadmills, bicycle ergometer, and electrocardiogram. The CTSU has a Dual Energy X-ray Absorptiometry (iDEXA, GE Healthcare) for detailed body composition assessments. The exercise physiology laboratory is currently supporting 17 studies and in 2015 conducted 84 treadmill tests and 179 DEXA scans.

○ **Clinical Laboratories**: The CTSU has a sample processing lab that contains a glucose analyzer (YSI STAT Plus), refrigerated centrifuge (Heraeus Labofuge 400 R), and a three –80 degree freezers (Thermo Electron Forma). The Clinical Research Center also has a state-of-the-art Bioanalytical Lab equipped with two Waters UPLC-Xevo TQ-S LC-MS/MS systems.

**CTSU Team-based Environment**: The CTSU adheres to (and develops as needed) high-quality methods and processes to support complex trials and procedures. This infrastructure and expertise enables investigators to avoid developing these costly resources on their own and provides them with the team-based environment essential to performing these complex studies.

○ **Research Nursing Team**: The CTSU team is composed of an administrative director, nurse manager, 6 research nurses and a medical assistant. This flexible team provides staffing for any needed assessments, phlebotomy, complex procedures, overnight stays, and processing of lab samples.

○ **Research Coordinators**: The CTSU maintains a pool of research coordinators who can conduct all aspects of research coordination. The pool is currently composed of 2 full time coordinators and 2 part time coordinators (CTSU research nurses “flex” between the research nursing team and coordination, as needed). The coordinators have supported a total of 48 trials (28 different PIs) since 2011 and are currently supporting 20 trials (from 14 different PIs).

○ **“CTSU without Walls” Program**: The CTSU offers a CTSU without Walls program to increase access to CTSU resources by supporting research outside the structured unit. Deployable research nurses are available to assist investigators with 1) drawing blood; 2) performing IV infusions; 3) collecting and processing specimens; 4) administering study drugs; 5) monitoring for adverse events; and 6) performing other protocol procedures such as oral glucose tolerance tests.

○ **Investigational Pharmacy**: The Investigational Pharmacy (1200 ft²) is located on the second floor of the Clinical Research Center and is staffed with a director and two pharmacists. The Investigational Pharmacy stores, handles, and prepares all the study drugs and infusions for CTSU protocols.

○ **Medical Monitoring**: The CTSU offers medical monitoring as needed for studies needing clinical oversight. Medical monitoring includes two nurse practitioners and a physician who are available to monitor procedures such as treadmill exercise testing or infusions, perform physical exams, and provide AE assessments when needed. This service lowers barriers to conduct complex, intensive procedures such as exercise testing in high risk patients.

**PCI Clinical Research Satellites.** The CTSU maintains 3 satellite spaces on the main KUMC campus. This enables participants or researchers who need basic support offsite to conduct research visits and access to some of the resources of the CTSU.

○ **Swope Health Services Satellite**: The PCI program also has a site at the Swope Health Center in Kansas City, MO, a safety-net clinic that enhances access to a largely minority, underserved research population. Swope is a patient-centered medical home that provides primary health care and behavioral health services in Kansas City. Swope Health Services mission is to improve the health and wellness of the community by delivering accessible, quality, comprehensive patient care. Today, Swope Health Services provides care for more than 40,000 patients in western Missouri and eastern Kansas. The PCI program has dedicated research space at Swope that includes 2215 sq ft of space that includes 10 offices and 3 workstations. The space enhances access to the patient population served at Swope and provides the space to accommodate over 2400 research
assessments annually. Currently, there are three smoking cessation projects including two R01 funded projects led by Drs. Nollen (DA031815) and Cox (DA035796) and a PCORI-funded project (AD-1310-08709) led by Dr. Nollen. Additionally, the satellite presence created opportunities for the KU AD Center to participate in an NIA funded multi-site trial of aspirin in reducing clinical events in older adults.

- **Delp Satellite (KUMC Main Campus):** The Delp satellite is located on the main KUMC campus and consists of 250 sq ft of dedicated research space. This basic unit is outfitted with a calibrated centrifuge, lab collection supplies, desk top computer, exam table, crash cart, scale, stadiometer, and vitals machine. Utilization averages 28 subjects per month.

- **Hoglund Brain Imaging Satellite:** The Hoglund satellite space is located at the Hoglund Brain Imaging Center to support clinical research procedures such as phlebotomy, clinical assessments, and cognitive testing that may accompany brain scanning protocols. The space is 150 sq ft and outfitted with centrifuge, exam table, and phlebotomy supplies. Utilization averages 28 subjects per month.

**KUMC Laboratory Animal Resources.** The Laboratory Animal Resources (LAR) is charged with housing and care of research animals at KUMC. The LAR is comprised of 99,388 gross assigned sq. ft. in 4 buildings located on the KUMC campus in Kansas City (independent of the University of Kansas, Lawrence campus facilities). The LAR employs 37 staff. The entire centralized animal care program was fully accredited by the Association for Accreditation and Assessment of Laboratory Animal Care International (AAALAC) in February 1992 and has maintained its accreditation since that time. Housing facilities are available for a wide variety of animal species, including the usual laboratory animals. The facilities include a variety of dual purpose animal rooms. Animals are housed separately by species and, when possible, by source and/or microbiological status. Research support also includes model development assistance, technical assistance, and IACUC protocol review. The principal site is the Research Support Facility (RSF), which includes conventional rodent rooms, biohazard suites, isolation cubicles, surgical suites, cagewash and support facilities. This facility totals ~75,896 sq ft and houses all species of animals. The second animal facility occupies the fifth floor of the Smith Building, including cagewash and support space as well as conventional rooms for housing rodent species and monkeys. The Smith Building animal facility totals ~6170 sq ft. A third animal facility is in the ground floor of the KLSIC building and totals ~14,340 sq ft. This facility includes housing and support space, cagewash, procedure rooms, the transgenic core facility, a rodent behavioral core, and an ABSL3 laboratory. This is a barrier facility equipped with bulk autoclaves and ventilated racks. The animal care facilities are integrated into a comprehensive program for animal care and use and have reporting responsibilities to two major organizational components of the university administration. Animals for specialist purposes are also housed in several small satellites.

The financial and policy management falls under the office of the School of Medicine Senior Associate Dean for Research as a core facility and the Director of Laboratory Animal Resources reports to the Senior Associate Dean for Research. The regulatory and compliance management falls under the Animal Research Protection Program (ARPP) in the Office of Compliance. The Institutional Official for the program is the Vice Chancellor for Administration, who oversees the Office of Compliance. The institutional official appoints the Institutional Animal Care and Use Committee (IACUC). The IACUC is managed by the ARPP program, which is independent of the LAR (to eliminate any conflict of interest). The director of ARPP is a certified IACUC administrator.

**KUMC Rodent Behavior Facility.** The Facility assists researchers in incorporating and executing sensorimotor behavioral research techniques using rodents in their individual research projects. The Rodent Behavior Facility provides both equipment and services, and is available for use with the appropriate training and approval.
KUMC Transgenic and Gene-targeting Institutional Facility. This Facility is an animal genetic model development and research facility that supports transgenic and gene-targeting research endeavors, promotes technology development, and serves as a resource for these technologies. It provides "3D" service for design, development, and depository of mouse models for researchers at KUMC and their collaborators at other academic institutions.

KUMC Confocal Imaging Center. This facility provides affordable, readily accessible, user-friendly state of the art laser confocal microscopy services to researchers at KUMC and other area institutions.

KUMC Electron Microscopy Research Laboratory. The Electron Microscopy Research Laboratory office is well equipped for routine electron microscopy applications and technical personnel are available to assist investigators. This technology is available to researchers by appointment.

KUMC Genomics Core. The Genomics Core was formed with the merger of the Genome Sequencing Facility and the Microarray Facility. By combining these core resources investigators have access to both Next Generation sequencing technology and Microarray technology in a centralized core. The Genomics Core provides access to both deep sequencing and array technologies to Institutional Investigators who participate in the Frontiers Clinical and Translational Research mission. Participating investigators receive affiliate pricing for all services provided by the Genomics Core. The Genomics Core has worked closely with Frontiers Investigators to provide deep sequencing and array data sets for the advancement of the research efforts.

The Genome Sequencing Facility provides deep sequencing services using the Illumina HiSeq2500 sequencing system. Full service library preparation services are also available. The Microarray Facility features microarray services using the Affymetrix GeneChip system. The Agilent Bioanalyzer services and nucleic acid isolation services provided through the Microarray Facility supports both the Next Generation sequencing and GeneChip microarray services provide through the Genomics Core. The Genomics Core also provides the following services: Paired end or single read Genome sequencing using the HiSeq 2500 Sequencing System with multiple sequencing cycle strategies. Sequencing library preparation services for a wide range of sequence interrogation strategies. Affymetrix GeneChip array interrogation for expression analysis (mRNA and transcriptome) and genome wide studies. Agilent Bioanalyzer QC analysis of RNA isolates. Access to discounted Sanger sequencing and oligonucleotide synthesis through outsourcing agreements with GENEWIZ and Integrated DNA Technologies (IDT).

KUMC Histology Imaging Analysis Core. The Histology Services facility houses sample preparation areas, including a fume hood and equipment for sample preparation for light and electron microscopy. The facility is supervised by a histology specialist who is responsible for maintaining all equipment and for training investigators and personnel in equipment use. The Histology laboratory is fully equipped for paraffin histology, including automated processing, embedding, sectioning and staining. Facilities also are available for the embedding and sectioning of frozen specimens. For viewing sectioned material, the histology laboratory is equipped with dissecting and light microscopes.

KUMC Hypoxia Core Laboratory. This Laboratory contains two profiling chambers located inside a glove box as well as two mobile chambers that can be set up in individual labs. The profiling chambers are controlled for temperature, humidity, CO₂ and oxygen. These chambers are operated by computer and allow for set point and profiled oxygen concentrations. The glove box is a controlled environment that can be used to change media and work with cells in an oxygen controlled workspace. Mobile chambers can operate in any temperature-controlled environment at any single oxygen set point. A computerized controller maintains the oxygen concentration by infusing a mixed gas that effectively dilutes the oxygen concentration to the set point.

KUMC MicroArray Facility. This Facility provides centralized access to gene expression microarray technology for advancing research conducted by investigators from KUMC, Kansas Reagents Institutions, and member institutions of the Kansas City Area Life Science Initiative (KCALSI). Using the GeneChip® expression arrays, researchers can monitor gene expression in multiple modeling systems. Expression data can be
analyzed using the expression analysis software. The Microarray Facility operates in conjunction with the KUMC Bioinformatics Core which serves as a resource for data analysis.

**KUMC Flow Cytometry Core.** The mission of the Flow Cytometry Core Laboratory is to provide access to state-of-the-art flow cytometry and related technologies to researchers at the University of Kansas Medical Center and other area institutions. The FCCL has served more than 70 researchers at KUMC, including support of projects in the basic, translational, and clinical sciences. Programs that heavily use the core include the Cancer Center and the Institute for Reproductive Health and Regenerative Medicine and the Departments of Microbiology, Hematology/Oncology, and Pathology. Core Staff provide assistance in experimental design, protocol development, sample preparation, data acquisition, and data analysis. In addition, staff perform all cell sorting experiments. Staff train users in the proper use of the instruments with level of service depending on the experience and wishes of the user. Experienced users receive training related to the specifics of our instruments and are able to operate the instruments independently. Novice users receive more extensive training and often choose to pay an hourly rate for staff to perform aspects of the experiments.

An extensive array of instrumentation is available in a suite of 775 sq ft. The *BD LSR II* which was present when the core was founded in 2005, has been upgraded and now is a four-laser, eighteen-parameter instrument. *Attune Nxt* is the newest instrument in the core. It is a two-laser, nine-parameter instrument that has features that offer flexibility for our users. Specifically, the autosampler allows the acquisition of data from a 96-well plate in as little as 15-20 min. In addition, the Attune is automated to allow simpler start-up and shut-down procedures and 24/7 access. *FACS Aria IIIu* has undergone two major upgrades that included the addition of lasers and detectors, as well as a new fluidics system. *Celigo* can take brightfield or fluorescence images of tissue culture plates and flasks. *Luminex* allows multiplex analysis of cytokines, chemokines, and other small molecules from small samples. The technology combines the concept of an ELISA with flow cytometry detection of beads bound to analytes. The instrument is often used as a screening tool for investigators to choose the analytes of interest and then pursue the findings with less expensive technology. *RoboSep* is an automated magnetic bead-based separation assay purchased from the funds provided by individual users.

**Shared Glassware Facility.** The Shared Glassware Facility (380 sq ft) provides shared glassware washing and autoclaving, media preparation and other services as requested by faculty at KUMC. Facility is operated by the Microbiology Department and is available to any KUMC investigator who chooses to participate by paying a portion of the technician's salary and supply costs. This facility has been part of the Microbiology Department for more than 20 years and continues to provide services as requested by KUMC faculty. The SOM has been involved with purchase of equipment and service contracts along with the glassware facility manager cap for salary. In recent years, salary support for the technician has been partially provided through the Microbiology Department COBRE Phase III grant.

**Biospecimen Repository.** This is a cancer focused but non-disease or site specific collection resource for highly annotated human samples. Specimens are available to qualified researchers at KUMC and vetted collaborating institutions. Services include Fresh frozen tissue (1mL aliquots) in monitored liquid nitrogen vapor phase freezers; Formalin-Fixed Paraffin-Embedded (FFPE) tissue; Blood products (1mL aliquots of buffy coats, plasma, viable lymphocytes and serum) in -80°C freezers; Isolated DNA; Urine; Saliva. The Biospecimen Repository is an established biospecimen bank of the University of Kansas Cancer Center that supports sample processing and storage for a wide variety of investigator-initiated studies on the KUMC campus. The BRCF coordinates the ethical collection, storage, annotation, and distribution of tissue and peripheral blood samples to support translational research. The BRCF supports the KU ADC sample processing and storage of whole blood, plasma, serum, buffy coat, platelets, DNA, and RNA. The laboratory is equipped with three -80° C Harris upright freezers (Model SLT-25V-8SSIA37), installed with a Revco CO2 back-up system (Model 6593-1); and two Custom Biogenics liquid nitrogen vapor phase freezers (Model ASC24T); a Sensaphone alarm system (Model 1104). These freezers are available for the purpose of storing tissue and blood samples. The BSR will support the processing and storage of blood samples for this study.
KU Program in Integrative Medicine. KU Integrative Medicine focuses on biomedical based therapies, combining the best therapies from conventional medicine with an integrative medicine approach. Practitioners at KU Integrative Medicine include physicians, a naturopathic doctor, nurse practitioner, nurse, certified neurofeedback technicians and registered dietitians. Research at KU Integrative Medicine is moving forward in both the basic science lab and in the clinical realm, with research on intravenous vitamin C leading the country.

KU SCHOOL OF MEDICINE-WICHITA

KUSM-Wichita Campus. KUSM-W is a community-based campus with offices spread across Wichita. The main campus building houses all administrative units and the Departments of Family and Community Medicine, Internal Medicine, Psychiatry and Behavioral Sciences, and Preventive Medicine and Public Health. Other departments are housed at one of the local community hospitals, including Pediatrics, Radiology, Orthopedics, Obstetrics and Gynecology, Surgery, and Anesthesiology (Figure FR-O.9). Resources also include the Farha Medical Library and the Office of Rural Health Education and Services. The KU Wichita School of Pharmacy is co-located with the School of Medicine. The School of Pharmacy provides unique opportunities for interprofessional education and research in Wichita.

KUSM-W Clinical Services. The KU School of Medicine-Wichita has considerable clinical and patient care facilities and resources. As a community-based medical school, faculty and staff have access to three major community hospitals for education, clinical practice, and research.

- Wesley Medical Center, part of Hospital Corporation of America, is an acute-care center licensed for 760 beds and 102 bassinets. Wesley treats more than 24,000 patients annually and delivers more than 6,000 babies, more than any hospital in a 13-state region. Wesley provides the most extensive emergency network in Wichita. Wesley also houses a resident continuity clinic for Obstetrics and Gynecology and Family Medicine.

- Via Christi Health is a member of Ascension Health, the largest Catholic and largest nonprofit health system in the US. Via Christi Health is the largest provider of healthcare services in Kansas. It serves Kansas and northeast Oklahoma through its doctors, hospitals, senior villages, and health services. Via Christi includes more than 245 physicians and more than 175 advanced practice professionals employed through Via Christi Clinic, hospitals, and community sites. More than 1,200 physicians have medical privileges at Via Christi Hospitals. Via Christi also houses a resident continuity clinic for Family Medicine.

- The Robert J. Dole VA Medical Center is a Joint Commission accredited, complexity level 2 facility. The Medical Center serves over 30,000 Veterans living in 59 counties of the state. The Medical Center is a primary and secondary care facility. It is a teaching hospital, providing a full range of patient care services, with state-of-the-art technology. Comprehensive health care is provided through primary care, secondary care, and long-term care in areas of medicine, surgery, psychiatry, physical medicine and rehabilitation, cardiology, neurology, oncology, dentistry, visual impairment and low vision rehabilitation, spinal cord dysfunction, traumatic brain injury, polytrauma, pain management, post-traumatic stress...
syndrome, homeless, mental health intensive case management, prosthetic laboratory/orthotics, and extended care services. In addition to the main facility in Wichita, they offer services in six community-based outpatient clinics.

The KUSM-W Medical Practice Association was established to provide medical education, research, and medical care through its members who are full-time faculty at the University of Kansas School of Medicine-Wichita. It includes the KU Wichita clinics: Adult Medicine (an internal medicine clinic), Internal Medicine Midtown (an internal medicine clinic), Center for Breast Cancer Survivorship, Center for Internal Medicine (the residency continuity clinic), Endocrinology, Gastroenterology, General Pediatrics, Subspecialty Pediatrics, Psychiatry, and Psychology.

**KU Wichita Clinical Trial Unit.** The KU School of Medicine-Wichita Clinical Trials Unit (CTU) is dedicated to determining the safety and optimal dosing of significant new medications to relieve the burden of mental illness on patients and families. This involves testing novel mechanism of action drugs and biologics for the most serious neuropsychiatric illness including Major Depression, Alzheimer’s disease, and Schizophrenia.

CTU investigators have between 8 and 30 years of experience covering the spectrum from trial design to study operationalization and execution across all phases of human testing. This includes development of study protocols, ensuring compliance with federal guidelines for good clinical practice, and analysis of results. The research group includes three investigators, four full-time staff, and one site manager and has been funded by private foundations, pharmaceutical companies, and the National Institutes of Mental Health.

Site resources include fourteen fully furnished research and clinical offices with telecommunications capabilities, two examination rooms, two centrifuges, one refrigerator, one full-size -20 freezer, one full-size -80 freezer, one half-size -80 freezer, one reception area, one patient waiting area, one conference room, and one record-storage room.

Because of the group’s background in biological psychiatry and neuroscience, the CTU’s efforts have focused on central nervous system drug development. In addition, the expertise and resources of the CTU are being utilized to expand the research efforts of other clinical departments on the Wichita campus. This involves oversight of study startup and operationalization including administrative oversight and training of investigators and site staff.

In addition to growing the academic mission of the campus, this work directly relates to the Universities teaching and clinical missions because health care providers must understand the process of drug development so they can critically evaluate the literature and judge whether and how to introduce new medications and devices into the treatment of patients.

**KUSM-W Laboratory.** The KU School of Medicine-Wichita (KUSM-W) does not have laboratory resources. However, laboratory resources are available through Wichita State University.

**KUSM-W Animal.** The KU School of Medicine-Wichita does not have animal facilities. However, animal facilities are available through Wichita State University.

**KUSM-W Computer.** Computer resources are provided by the KUSM-W Office of Information Technology (IT). These resources are linked to the information technology department at KUMC in Kansas City. Thus, KUSM-W has full access to all institutional IT resources. Locally, the Office of Information Technology develops computer-based tools and provides IT education and support in the areas of data retrieval, storage, manipulation, composition, production, and distribution. They support mobile and remote technology including interactive television, smartphone applications, and audience response systems.

**The Wichita Community Clinical Oncology Program (CCOP) is affiliated with KUSM-W.** The CCOP includes 11 medical oncologists; 6 radiation oncologists; 2 gynecologic oncologists; 1 pediatric oncologist; and
16 surgeons, urologists, and primary care physicians. The program receives patient referrals from more than 175 additional physicians. It first received funding through NCI in 1983.

KUSM-W publishes the Kansas Journal of Medicine, an online general medical journal (kjm.kumc.edu). The Kansas Journal of Medicine publishes original research, reviews, commentaries, and case studies on all aspects of clinical medicine, health care delivery, health policy, and medical education.

UNIVERSITY OF KANSAS – LAWRENCE

University of Kansas. The University of Kansas is a major public research and teaching institution that operates through a diverse, multi-campus system. This multi-campus system is comprised of the University of Kansas Campus in Lawrence, the University of Kansas Medical Center (KUMC) in Kansas City, the University of Kansas School of Medicine in Wichita and in Salina, and the University of Kansas Edwards Campus in Overland Park. KUMC houses the School of Nursing, the School of Allied Health, and the School of Medicine.

The University of Kansas (KU) is a comprehensive educational and research institution with more than 28,000 students and 2,800 faculty members. More than 98% of the faculty hold terminal degrees in their field. The University offers more than 360 academic degree programs.

KU occupies 1,000 acres at five principal locations in Kansas. The main campus is in Lawrence (KU-L; Figure FR-O.10), a thriving city of 90,000 in eastern Kansas. The KU Medical Center (KUMC) in Kansas City, Kan., about 45 miles east of Lawrence, is home to the academic schools of the health professions, medicine and nursing, as well as clinics and research centers. The KU Edwards Campus (KU-E) in Overland Park offers courses primarily for working adult students. The KUMC Wichita campus offers a four-year degree program, as does the KUMC campus in Salina. In addition, the University has numerous educational and research facilities throughout the state.

Institutional Excellence Highlights. The Carnegie Foundation classifies KU as one of 115 R1: Doctoral Universities: Highest Research Activity institutions. KU has been a member of the prestigious Association of American Universities since 1909. University of Kansas graduate programs continue to excel nationally, with 44 ranked programs, according to the 2016 U.S. News and World Report rankings. Ten KU programs appear in the top 10 among public universities nationally, and 38 are in the top 50.

Research at the University of Kansas. As noted above, KU is classified as an R1: Research Universities: Highest Research Activity institution. This designation reflects the breadth and depth of its graduate programs,
particularly its doctoral programs. KU is a national public research university and the state’s flagship institution, as measured by the broad range and global impact of its research enterprise and its high level of research funding.

As a comprehensive research university, the University of Kansas has outstanding research programs across the range of academic disciplines. Research efforts are organized through major multidisciplinary research centers at the KU-L and KUMC campuses. These major centers reflect KU strengths and provide resources necessary to build these strengths. The Lawrence campus also houses two state surveys that conduct research and provide vital service to the state of Kansas. Many additional research centers, institutes, and other non-academic units reflect the breadth of its research enterprise.

Research Rankings. For FY2013, the annual National Science Foundation survey of federally funded research and development expenditures ranked KU 72nd overall and 38th in the country among comparable, national, public, research universities.

Recent Notable Research-Related Awards. Since 2010, large, new and renewed, externally funded research and development awards at KU include:

- Frontiers Clinical and Translational Sciences Award (2011), $20 million, NIH
- Alzheimer’s Disease Research Center (2011), $8.7 million, NIH
- School-Wide Integrated Framework for Transformation (SWIFT) (2012), $24.5 million, ED
- NCI-Designated Cancer Center, $7.5 million (NIH)
- Alaska Assessments Program (2014), $25 million, State of Alaska
- Center for the Remote Sensing of Ice Sheets (2010 Renewal): $17.9 million, NSF
- Dynamic Learning Maps Alternate Assessment System (2010): $22 million, ED
- COBRE: Protein Structure and Function (2014 renewal): $5.6 million, NIH
- Kansas IDeA Network for Biomedical Research Excellence: $19 million, NIH
- The SWIFT Center became one of 14 affiliated centers of the Life Span Institute in April 2015 and is closely associated with the Department of Special Education at KU

The School of Pharmacy ranks second in the nation among pharmacy schools for the amount of research funding received from the National Institutes of Health.

KU Strategic Planning. During 2010-11, KU undertook a major strategic planning initiative at the Lawrence Campus. The result was a five-year plan known as Bold Aspirations. It features six overarching goals and four strategic initiative themes built around existing and emerging KU research strengths. Outcomes of the plan include the formation of a Research Investment Council for competitive internal grants that support the themes, as well as the hiring of 12 Foundation Distinguished Professors in strategic categories. Greater emphasis is being given to community-engaged research, innovation and doctoral education. The Changing for Excellence program has identified opportunities for cost-savings that can be reallocated to high priority areas. Bold Aspirations continues through 2017. On the Lawrence campus, this has resulted in the awarding of a number of Strategic Initiative Grants at various levels, several cluster hires, and the hiring of 17 Foundation Professorships. The recent recruitment of translational scientists such as Steven Soper, PhD, a biomedical engineer, biomarker expert and entrepreneur who engages clinicians on CTR projects, adds new depth to the Frontiers.

PHYSICAL INFRASTRUCTURE

KU Information Technology (KU IT). at the Lawrence campus supports the academic and research missions of the University of Kansas by providing a broad range of technology services, tools and infrastructure that
support research, learning, scholarship and creative endeavor. KU IT includes a 24/7 enterprise data center and knowledgeable staff with expertise in server and desktop support, application support, software development, IT security, networking, customer support and project management.

Collaboration and communications among KU researchers and colleagues at other institutions is paramount. KU IT has completed a number of projects in recent years to support research and facilitate collaboration on campus and around the world:

- Significantly expanded Wi-Fi on the Lawrence campus, including in core research buildings.
- Joined the eduroam global consortium, which allows KU researchers to use their KU credentials for logging in to Wi-Fi at eduroam partner institutions around the world, and allows visiting researchers from eduroam partners to access KU’s fast and secure Wi-Fi network.
- Upgraded older optical fiber backbone cabling to modern single-mode fiber in a number of buildings, allowing for gigabit connectivity and room for future expansion and growth.
- Upgraded bandwidth to multiple 10Gb connections within and between research buildings, as well as from campus to the outside world.
- Completed a redundant optical fiber loop on KU's West Campus to provide speed, bandwidth and capacity for growth to support discovery and innovation in up to 20 current or future buildings.
- Partnered with KU’s Information & Telecommunications Technology Center and the Office of Research to create the Center for Research Computing, which identifies and delivers cross-functional technology services and support to meet the needs of researchers.
- Provides high-performance, easily accessible file sharing and storage for KU research projects, research groups and service labs that need terabytes of secure, scalable data storage.
- KU has a dedicated team to provide workstation and other technology support to researchers. In addition, a Research Dashboard in KU’s portal provides 24/7 access to IT and other information needed for completing successful research grant applications. The dashboard includes a PI Proposal Checklist and links to other important resources.

The University of Kansas Libraries. The KU Libraries are committed to supporting the teaching, research and outreach efforts of the University and to serving the state of Kansas, the nation, and the world through the acquisition, preservation, application and dissemination of knowledge. Resources include 10 library facilities on 4 campuses, holding more than 4.7 million volumes, including photographs, maps, current serial subscriptions, and access to information through hundreds of electronic databases. Among university libraries nationwide, in terms of holdings KU ranked 49th overall and 27th among public institutions in 2013.

Libraries supporting science and medicine. The main Watson Library on the Lawrence campus houses the University’s collections in the social sciences, humanities and professional fields of journalism and social welfare.

- A.R. Dykes Medical Library, located at the University of Kansas Medical Center, is one of the premier medical libraries in the Midwest.
- In 2010, KUMC launched Meet Our Experts, an online service based on BibApp software to facilitate collaboration and public information access to the Medical Center’s faculty and staff.
New, Recent or Renovated Research-Related Space

- The Biodiversity Institute Genomics Complex (2013) is a $2.8-million project in historic Dyche Hall that provided major laboratory renovations, advance and modernize research facilities, and increased the capacity for training graduate students in biodiversity science.

- The Measurement, Materials and Sustainable Environment Center (2012) is an $18.8-million, 35,000 ft² facility for the School of Engineering. It provides space for engineering and other research groups to cooperate on developing projects in biofuels, remote sensing technologies, commercial avionics, and materials fracture and fatigue.

- The Learned Engineering Expansion Phase 2 (LEEP2) opened in 2015. It integrates with Learned Hall, Spahr Library and the Measurement, Materials and Sustainable Environment Center, adding more than 135,000 ft² to KU’s engineering facilities. Features include six active-learning classrooms, teaching and research labs, a remodeled library and numerous new collaboration and study spaces. Elsewhere on the Lawrence campus, the School of Engineering’s Structural Testing and Student Projects Facility also opened in 2015. Nearby is the Hill Engineering Research and Development Center (2013), which houses student projects related to sustainable energy approaches for automobiles and infrastructure.

- The Bioinformatics Computing Facility (2011) is a $4.6-million, 6,000 ft² renovation in Nichols Hall, home to the Information and Telecommunication Technology Center. The project supports a 20-fold boost in computing power and a 15 percent reduction in the building’s energy consumption. Business, Engineering, The Earth, Energy and Environment Center is currently under construction at Lawrence. It will be a multidisciplinary facility for programs in geology and engineering. Nearby, KU is preparing the site for a new Integrated Science Building, housing both research and teaching that is part of the Central District Redevelopment and the “Innovation Way” initiative.

- The Business, Engineering, Science and Technology Building (2011) at the KU-Edward Campus in Overland Park is a component of the Johnson County Education and Research Triangle project. Funded by a special sales tax, the $25-million, 75,000 ft² facility is part of a partnership involving the Kansas State University Innovation Campus in Olathe and the KU Clinical Research Center in Fairway.

- The Children’s Campus /Educare of Kansas City (2010) is a $15.5-million, 72,000 ft² facility in Kansas City that serves as a collaborative model for education, research and service. It houses KU’s Juniper Gardens Children’s Project and Kansas Center for Autism Research and Training, KUMC’s Project EAGLE Community Programs and the non-profit Family Conservancy. KU Medical Center Pediatrics offers clinical services.

- The School of Pharmacy observed its 125th anniversary in 2010, making it the third-oldest program west of the Mississippi River. The school ranks second nationally in the amount of research funding it receives annually from NIH. Also, in 2010, the school opened a new $45 million, 110,000 ft² teaching and practice building in Lawrence, adjacent to the West Campus Research Circle laboratory facilities. That year a $5-million satellite teaching facility opened at the KU Medical Center campus in Wichita.

- The Shankel Structural Biology Center (2004, 2008) is a $30-million, 60,000 ft² facility that houses 70 researchers on two levels and is home to the NIH-funded Center of Excellence in Chemical Methodologies and Library Development and NIH-funded Specialized Chemistry Center, as well as the High-Throughput Screening Lab and two COBRE centers: Cancer Experimental Therapeutics and Protein Structure and Function.

- The Multidisciplinary Research Building (2006) is a $40-million, 106,000 ft² facility featuring group lab space, a shared BSL-3 facility, and Class 100 and 1000 clean rooms for researches in medicinal chemistry,
bioanalytical chemistry, pharmaceutical chemistry and other programs. It is designed to accommodate approximately 200 researchers on three levels.

Recent major equipment investments

- An 800-MHz nuclear magnetic resonance (NMR) spectrometer was installed in the new Structural Biology Center as well as a second NMR, a mass spectrometer, and an X-ray diffractometer. This state-of-the-art instrument array is used to analyze proteins and provides additional capabilities for KU scientists not available at other universities in the region.

- The Microscopy and Electronic Imaging Laboratory acquired a LEO 1550 field-emission scanning electron microscope. In addition to the usual secondary and backscatter electron detectors, this high-resolution microscope is equipped with additional detectors that provide elemental analysis, mapping of zonal variation and chemical composition in materials, identification of phase changes and crystal deformations, and nanostructure device fabrication.

- The Mass Spectrometry Laboratory installed a dedicated HPLC/MS instrument with a triple quadrupole analyzer (Micromass Ultima) and another high performance tandem instrument of quadrupole-time of flight configuration (Micromass Q-TOF2). Together with other instruments already in place, the new equipment supports a wide range of research from small-molecule synthesis to analysis of whole proteins isolated from organisms.

- A High Throughput Screening Laboratory was established in 2002. Equipment in this laboratory allows a large number of small organic compounds to be screened against biochemical and cell-based assays. The systems provide the technology necessary for advancing drug development in the pharmaceutical industry.

- A Rigaku/MSCw X-Ray diffractometer was acquired in 2003. This equipment enhances the capabilities of KU researchers for determining the bonding arrangement of atoms in a crystalline solid.

- An Applied Biosystems Model 4700 MALDI/TOF/TOF mass spectrometer was acquired in 2003 as well as a ThermoFinnigan Model LTQ ion trap FT-MS hybrid mass spectrometer with electrospray source. These instruments will extend KU’s ability for proteomics research.

Haworth and Malott Halls. Both Haworth Hall and Malott Hall, connected by skywalk, house office and laboratory space for many Frontiers scientists.

Haworth Hall is the home of the Division of Biological Sciences comprising the departments of molecular biosciences (biochemistry; microbiology; molecular, cellular and developmental biology; neurobiology; and genetics) and of ecology and evolutionary biology (undergraduate biology; graduate programs in ecology and population biology, entomology, plant biology and systematics, macroevolution and biodiversity). Haworth also houses the offices of the Life Span Institute affiliated center, the Beach Center on Disability, the Kansas University Center on Developmental Disabilities, as well as the KU Genetics Program.

Malott Hall houses the departments of chemistry and of physics and astronomy and its observatory; the Molecular Structures Group of laboratories in mass spectrometry, nuclear magnetic resonance, protein structures and other specialties; administrative offices; faculty and staff offices; classrooms; specialty laboratories and research facilities; and the main Lawrence campus Animal Care Unit.

Smissman Laboratories is located on KU-L’s Campus. Housed in this laboratory is the locus for KU-L’s Affymetrix GeneChip-based microarray gene expression profiling, for broad applications such as pharmacogenomics and toxicogenomics, SNP (single nucleotide polymorphisms) based whole-genome association studies, Real-time quantitative PCR for nucleic acid sequence detection and quantitation, High-throughput genomics data generation, curation, biological knowledge extraction, Integration with high-throughput proteomics data through bioinformatics algorithms and genomics data storage (Dell PowerEdge 2850 Microarray Data Server and Dell PC Data Analysis Workstations).
**Wakarusa Research Facility.** In 2011, the Wakarusa Research Facility, built in 1994 at 1315 Wakarusa Dr., was acquired by the KU Center for Research Inc., the university’s not-for-profit research foundation. The 20,432 ft², two-story building had been leased by the center since 1999 and houses a variety of KU researchers. The facility lends itself to social sciences research because it affords easy access for families due to its off-campus location and plentiful parking. The Wakarusa Facility houses the offices of the School-Wide Integrated Framework for Transformation (SWIFT) Center.

**High Throughput Screening Laboratory (HTS).** The High Throughput Screening Laboratory provides researchers with high throughput technologies and compound libraries to assist in identifying biological probes and to provide hits and leads for drug discovery. High throughput screening of large chemical libraries of compounds is a proven way to identify novel chemical entities that target a biological system of interest. In order to have this technology available to biomedical researchers in Kansas and beyond, the HTS laboratory was established in 2002 at the University of Kansas, Lawrence with support from a NIH COBRE grant, the State of Kansas and KU. There are no other HTS facilities within a 250 mile radius of KUCC member laboratories. KU-HTS is a state-of-the-art facility dedicated to providing exceptional services in advancing drug discovery research initiatives, as well as assistance in preparing grant applications. HTS personnel have extensive experience in executing biochemical, cell-based, siRNA as well as high-content screening campaigns against a plethora of target classes. KU-HTS is a fee-for-service facility dedicated to providing exceptional quality services at the lowest cost. HTS staff partners with the investigators collaboratively to expedite their drug discovery efforts. The 4500 sq. ft. state-of-the-art High Throughput Screening Laboratory is housed in the Structural Biology Center new addition on the West Campus. It houses two cell culture laboratories, and the main laboratory with a variety of liquid handlers (6), bulk reagent dispensers (8) and microplate readers (8) to facilitate screening of compounds in a high-throughput mode. Several common signal detection technologies are also available, including UV-visible light absorbance, fluorescence, time-resolved fluorescence, FRET, TR-FRET, BRET, fluorescence polarization, AlphaScreen, Label-Free, radiometric and luminescence. The laboratory is fully equipped for conducting, cell-based, biochemical and siRNA assays and screens. There are two separate cell culture laboratories within the HTS main laboratory that house 5 BSL2 cell culture hoods and 6 Thermo Forma Series II CO₂ Incubators. Two separate rooms, with a total of 500 sq ft of space house the ImagXpress Micro and BD Pathway, the two high-content imaging systems. The personnel have access to Medline, Current Contents, CAB, PubMed, PubChem and Biosis. The laboratories have access to SciFinder and other on-line capabilities for database searches. Compound libraries are stored in a state-of-the-art Nexus Labstore compound management system for compound storage and retrieval. The HTS office space (740sq.ft) houses the office of the Director, and also has office space available for 10 researchers and a conference room. HTS staff has individual desks, bookcases, filing cabinets and internet connections in rooms separated from the laboratories. HTS currently has 3 people on staff plus an open position. Melinda Broward provides project management and administrative support for the group. The HTS-ready assays can be used to screen the KU-HTS compound collection of approximately 296,672 compounds. Chemoinformatics analysis has shown the presence of 61,980 scaffolds across the entire collection. KU HTS charges for compound usage and approximately 50-80% of these charges are placed in a designated compound library account to periodically purchase compounds to update and expand the library. The compound library was obtained from the following sources: (1) Repurposing library collection of 5,292 FDA approved compounds derived from Prestwick, Enzo, TimTec, Selleck, and BioFocus NIH clinical collection. All of the FDA-approved compounds have well-characterized bioactivity, safety and bioavailability and hits from this set of compounds will ensure accelerated drug development and optimization processes. (2) Diversity sets representing a diverse scaffold collection include: (A) 5,197 unique compounds, not commercially available, from the KU CMLD Center (Chemical Methodology and Library Development Center) synthesized within the KU CMLD Center Synthesis Core as well as ~200 legacy compounds synthesized by the KU Medicinal Chemistry Department staff; (B) ChemBridge Library (43,736 compounds); (C) ChemDiv Library (56,232 compounds); (D) Life Chemicals Inc. Diversity Subset (15,040 compounds), and (E) Orthogonally Compressed Library (OCL) collection of 104,000 compounds from The Lankenau Institute for Medical Research (LIMR) Chemical Genomics Center (LCGC). Importantly, chemoinformatics analysis has demonstrated that at least 45,000 of the 104,000 compounds from
the LIMR are unique to the collection and are not represented in ChemBridge and ChemDiv diversity sets. These KU-HTS libraries have been used extensively in screening various targets and have resulted in valuable hits. (3) Bioactives Compound Library: a collection of 1902 structurally diverse and cell permeable bioactive compounds and peptides which include inhibitors, natural products and chemotherapeutic agents. (4) GreenPharma Natural product library of 480 purified, chemically diverse and drug-like compounds, a subset of much larger 150,000 natural compound structures. Compounds like amino acids, peptides, nucleic acids, long fatty chains and metals were discarded and different phytochemical families were selected carefully in order to have as many family representatives as possible. (5) Anti-Infectives Library (TimTec) includes 960 low molecular weight, drug-like molecules with scaffolds found in antiseptic agents with anti-bacterial (Gram+ve and Gram-ve), anti-fungoid, anti-microbial activities. (6) ChemDiv CNS set (26,136 compounds), compounds that can cross blood-brain barrier. (7) ChemDiv Beyond the Flatland (33,864 compounds) sp³-hybridized carbon scaffolds and (8) Life natural product like compounds (8,128 compounds) with amenable scaffold synthesis. In 2015, KUCC Laboratory for Early Stage Translational Research (LESTR) program purchased the NCI 60 human tumor cell line panel. The panel is available to cancer center researchers to identify and characterize novel compounds (natural products or synthetic) for growth inhibition anticancer activity across the entire panel. Human tumor cell lines that are represented include breast, brain, colon, kidney, leukemia, lung, and prostate. The individual cell lines are also available to expand and for HTS to perform a primary cell line screen against the selected compound libraries as well as secondary screening assays or counter screens.

Biotechnology Innovation and Optimization Center (BIOC). The Biotechnology Innovation and Optimization Center (BIOC) is approximately 5,000 sq ft composed of 7 laboratory areas and associated supporting office space on two floors of McCollum Laboratories and in the Higuchi Laboratories animal facility on KU’s West Campus. The BIOC has provided drug delivery, solubilization and stabilization services to researchers since its inception in 1989 as the Center for Drug Delivery Research. Additional services include analytical chemistry and bio-analytical method development, physical /chemical characterization of drug candidates, preparation of dose formulations, animal pharmacokinetic studies and early-stage pharmacology testing. The BIOC conducts development projects for solid oral, liquid oral, topical and injectable (liquid and lyophilized) dosage forms, including development of pediatric dosage forms. More specifically, the BIOC conducts solubility and stability screening of compounds in pH=7.4 PBS, 0.1 N HCl and a representative analytical mobile phase (50:50 acetonitrile:water) using a UV analysis. If needed, HPLC can be used for the analysis of the stability screening samples. The saturated solutions used for solubility testing are diluted to avoid precipitation problems and these diluted solutions are evaluated for the 48 hour stability evaluations. Additional pharmacology screening including hepatic microsomal stability, plasma stability and plasma protein binding are all conducted using validated LCMSMS bio-analytical testing. These same LCMSMS bio-analytical methods are applied for the analysis of blood and tissue samples obtained from pharmacokinetic studies. The BIOC routinely conducts both PK screening studies and more comprehensive PK studies with mice and rats. Analysis of tissue extracts including brain tissue for blood-brain-barrier penetration studies is also available. Plasma data is evaluated using WinNonLin software for the determination of routine pharmacokinetic parameters. The major instrumentation and equipment includes fully equipped analytical laboratories containing 4 Shimadzu HPLC systems with UV, fluorescence, diode array and/or evaporative light scattering detectors. Additional analytical / bio-analytical equipment includes a Shimadzu GC, Perkin Elmer differential scanning calorimeter, a Perkin Elmer TGA7 thermogravimetric analyzer, a Varian UV/Vis spectrophotometer and two Applied Biosystems Sciex 3200 LC-MS/MS systems. In the formulation laboratories, we have a Glatt Air Technologies UniGlatt fluid bed coat er / drier, a Retsch mill, a Turbula shaker/mixer, a Stokes instrumented tablet press, a NicaSystem AB extruder, a Luwa Model QJ-320 maunuerizer, a Vitriv Genesis tray lyophilizer and several isolation glove boxes for hazardous chemicals. The staff at the BIOC (8 people) is a mixture of formulators, analytical and bio-analytical chemists, and preclinical / pharmacokinetic specialists with many years of pharma industry, CRO and academic research experience. Approximately half of the staff have Ph.D. degrees and the remaining half have either MS or BS/BA degrees. The mix of expertise, experience and equipment provide for a unique capability and the ability to handle projects quickly and efficiently.
**Medicinal Chemistry.** The *Medicinal Chemistry* function is led by Frank Schoenen, Ph.D., a synthetic organic chemist, with 15 years’ experience as Medicinal Chemist and Manager at GlaxoSmithKline (GSK) and as Vice President at Nuada Pharmaceuticals, working in the inflammation and cancer therapeutic areas, and in high-throughput chemistry at the early stages of drug discovery. In 2005, Schoenen joined the University of Kansas (KU) Chemical Methodologies and Library Development Center as the Associate Director for the Administrative Core and the Director for the Synthesis Core, where he was responsible for imagining, creating, and operating high-functioning compound-library construction, library design, analysis & purification, and compound management cores, and for directing the synthesis and distribution of thousands of compounds to academic, government, and private-sector biological collaborators throughout the world. This led naturally in 2008 to his position as Associate Director, Project Manager, and Chemistry Team Leader for the KU Specialized Chemistry Center, one of only two laboratories funded by the National Institutes of Health (NIH) Molecular Libraries Probe Production Centers Network (MLPCN) to support synthesis and medicinal chemistry aspects of hit-to-probe optimization. In these roles, Schoenen provided scientific leadership and management for a diverse portfolio of over 40 MLPCN projects leading to 23 probe compounds. Currently, Schoenen is Associate Research Professor in the Higuchi Biosciences Center at the University of Kansas, and Medicinal Chemist on the Target Acceleration Group sponsored by the D3ET within the KUCC. Schoenen brings expertise to consultations and collaborations with KUCC members including compound screening collection building, chemical tools for biological target identification, compound identity and purity quality control, identification of Pan Assay Interference (PAINS) and PubChem Promiscuity compounds, compound physicochemical property assessment, compound and biological data deposition to PubChem, compound scale-up for *in vivo* studies, identification of commercial sources for compound sample purchase, identification of contract research organizations for compound scale-up, hit confirmation and prioritization, hit-to-probe optimization, probe-to-lead optimization, lead-to-preclinical-candidate optimization and preclinical-candidate to clinical-candidate optimization. In June 2008, the KU Chemical Methodologies and Library Development Center (CMLDC) moved into new laboratories in the Delbert M. Shankel Structural Biology Center (SBC) on the University of Kansas West Campus. Schoenen operates within the KU CMLD Center, directed by Professor Thomas E. Prisinzano, which has all of the laboratory space required to support the medicinal chemistry activities of the LDOSR. In addition to the facilities available to the Schoenen team for synthesis and medicinal chemistry, the CMLD Center contains a number of core laboratories which perform specialized functions, and all of these facilities are available for use on the present grant on a shared basis. Schoenen’s office is located adjacent to the CMLDC labs in the SBC building.

**RESEARCH ADMINISTRATION**

**KU- Lawrence Research Administration.** KU-L, KUMC, and the KU-E campuses are united under the leadership of Chancellor Bernadette Gray-Little. The entire research portfolio at the Medical Center is related to the life sciences. While research on the Lawrence campus is more diverse, life sciences research still accounts for nearly 60 percent of all sponsored project expenditures. Because of this shared focus, cross-campus collaborations are widespread and increasing. These collaborations are facilitated by major equipment and services available to researchers on all campuses.

**Sponsored Project Expenditures.** During FY2010, KU’s externally funded sponsored project expenditures for science and engineering research, training, service and other research exceeded $224 million. A new record was achieved in FY2012, at $275 million, including ARRA funding. The comparable figure during FY2014 was $238.8 million, the same amount as in FY2015.

**Collaborative Research Culture.** Major research endeavors often require a community of scholars. The University of Kansas is dedicated to fostering collaborative relationships among researchers at its several campuses, as well as encouraging research partnerships with other institutions. KU has a long and successful record of coordinating researchers and resources through integrative research centers and institutes such as
the KIDDRC and the Life Span Institute. These centers transcend traditional disciplinary boundaries and allow multiple perspectives and expertise to focus on broad research programs with far-reaching consequences.

**KU Innovation & Collaboration.** The University of Kansas Innovation and Collaboration (KUIC) is a 501(c) (3) with a thirteen-member Board chaired by the Provost and Executive Chancellor of the University of Kansas with the purpose of partnering with corporations and bringing KU innovation to the marketplace. Serving both the Lawrence and Medical Center campuses. KU has a strong tradition of effective technology transfer built on research in such fields as drug development and delivery; education and human development; biosciences, biofuels and bioengineering; information technologies and informatics; and remote sensing. Total staff: 4.

**On-Campus Business Incubators.** In 2010, the Bioscience & Technology Business Center (BTBC) opened its Main Facility Phase I building on KU’s West Campus Research Circle in Lawrence. BTBC is a partnership involving the university, KU Endowment, the City of Lawrence, Douglas County, the Lawrence Chamber and the Kansas Department of Commerce. Phase II opened in 2014, and there is also an expansion facility elsewhere in Lawrence. The BTBC system is designed primarily to assist the development of start-up and emerging companies, as well as foster industry-funded research collaborations with KU faculty. At the Medical Center, the BTBC is located in the renovated Breidenthal Research Building. Among all of its locations, the BTBC hosts 41 tenant companies employing more than 180 people.

**Patenting, Marketing, Licensing.** The product development-focused translational research methods and processes established by IAMI to develop and demonstrate medical innovation technologies are novel and unique in the context of the larger KU research portfolio. To support IAMI in its execution of medical innovation projects, a Memorandum of Understanding (MOU) between IAMI and the University of Kansas Innovation and Collaboration organization (KUIC) was established in August 2014. Specific to medical innovation projects receiving IAMI investment, the MOU defines the roles and responsibilities of KUIC and IAMI in developing and executing patenting, marketing and licensing strategies. Unique to IAMI is its for-profit partner, BioNovus Innovations LLC. A group of Kansas City investors and community leaders recognized the value of this Frontiers core to the region. The investors also recognized the challenges IAMI faced in finding private sector partners with the resources and expertise necessary to further develop, demonstrate and disseminate promising medical innovations de-risked by IAMI. As a result, the investors formed BioNovus Innovations LLC in 2015. Through a preferred partnership agreement, IAMI and BioNovus jointly invest in promising projects with IAMI’s partner granted an exclusive to exercise pre-negotiated licensing terms.

**Schiefelbusch Institute for Life Span Studies (Life Span Institute)**

The Schiefelbusch Institute for Life Span Studies, located on the KU Lawrence campus, was created in 1990 out of the 67-year-old Kansas Bureau of Child Research. Today it is one of the largest and most highly regarded human development and disabilities research centers in the country. The LSI brings together scientists of diverse disciplines including psychology, psychiatry, speech pathology, sociology, education, biology, pharmacology, physiology and medicine to study human development from its genetic origins through the final stages of life. The LSI supports basic and applied research, treatment and assessment clinics, service coordination and delivery, consultation, and training. The Life Span Institute’s 12 centers have more than 130 programs and projects active at any one time in Kansas and other states, directly serving individuals, families, and communities in underserved Kansas City neighborhoods and rural Kansas counties.

The Life Span Institute, which is directed by Dr. J. Colombo, is integral to Frontiers. The Institute commands the largest external funding support of any research center on the Lawrence campus, a rarity for behavioral sciences centers. The success of the Life Span Institute is a reflection of the campus’ long-time strengths in child development and disability research and intervention, a commitment that spans several academic units,
many clinical and research settings, and three campuses of the University. The Life Span Institute brings together 176 scientists who are affiliated with 20 academic departments to study human development from its genetic origins through the final stages of life. These investigators are supported by 175 research and administrative staff members, including 66 graduate research assistants and 114 student assistants. The Institute has two affiliated multidisciplinary graduate/dotalor programs, as well as several post-doctoral training programs. The Life Span Institute’s 14 centers and Peruvian affiliate currently have 135 active grants that constitute basic and translational research, training, direct services, consultation, and technical assistance. Last year, some 30,500 Kansans also benefited from the Institute’s direct services, training and technical assistance. The Institute’s central office is in the Robert Dole Human Development Center in Lawrence with components at the John T. Stewart Children’s Center and Malott Hall and Wakarusa facility. The Institute also operates in Kansas City at the University of Kansas Medical Center, the Children’s Campus of Kansas City, the University of Kansas Edwards Campus, and at the Life Span Institute in Parsons, Kan. Much of the work of the Institute is accomplished in and directly benefits underserved Kansas City neighborhoods and rural Kansas counties. Several projects are collaborations with researchers in other parts of the state, region, country, and world, and are regional, national, or international in scope. The Life Span Institute attracts more combined federal, state, and private dollars than any other designated research center at the University of Kansas, drawing $32.8 million in sponsored project support in FY 2015.

- Beach Center on Disability. Through excellence in research, training, technical assistance and public service in Kansas, the nation and the world, the Beach Center on Disability seeks to make a significant and sustainable difference in the quality of life of families and individuals affected by disability. Research focuses on access to the general curriculum, assistive technology, deaf-blindness, disability policy, employment, family supports and services in early childhood, family quality of life, individual control of funding, positive behavior support and self-determination. Founded in 1988 by KU Distinguished Professors Ann and Rud Turnbull, the Beach Center honors Ross and Marianna Beach for their long-standing efforts on behalf of families affected by disability and was inspired by the Turnbulls’ son, Jay, who had several disabilities.

- The Center for Biobehavioral Neurosciences in Communication Disorders (BNCD) was founded in 2002 when the National Institute on Deafness and Other Communication Disorders awarded a core grant to establish the center. The BNCD is a natural outgrowth of the Life Span Institute’s long-standing focus on communication and language development and intervention. The BNCD’s research spans a wide range of issues relevant to the causes and treatment of communication disorders from infancy to old age including studies on infant attention, the genetics of language impairments, language intervention, the decline of working memory in old age as reflected in speech and more precise measures of hearing loss to aid cochlear implant design.

- The Center for Research on Learning (CRL), joining the Life Span Institute in 2014, has a long history as an internationally recognized research and development organization noted for creating solutions that dramatically improve quality of life, learning, and performance, especially for those who experience barriers to success. The CRL encompasses six divisions, each with a slightly different research emphasis. Researchers study problems in education and work to place solutions that make a difference into the hands of educators, learners, employers, and policy makers.

- The Child Language Doctoral Program was established in 1983 as the first specialized degree program in the emerging field of child language acquisition. The program focuses on the interdisciplinary academic preparation and research training of child language specialists. The internationally recognized faculty brings diverse approaches to the study of how children communicate and speak. The program offers students a wide choice of research tools, facilities and field sites including the Child Language Acquisition Studies Lab that has the largest known archive of transcribed spontaneous samples from a longitudinal study of preschool children diagnosed as specific language impaired (SLI). The Life Span Institute, the Language Acquisition Preschool and the clinical and research facilities of the Speech-Language-Hearing Clinic provide research sites and practica.
The Gerontology Center’s affiliation with the **Bureau of Child Research** in 1990 paved the way for an extended research agenda of the newly formed Life Span Institute. Center researchers are interested in all areas of aging but are distinguished by seminal research in cognition, communication and aging, long-term health care and housing alternatives and decision making in later life. The Center coordinates a multidisciplinary graduate program that offers both masters and doctoral degrees in gerontology, as well as dual-title doctoral degrees that combine training in gerontology with certain social and behavioral sciences.

The **Juniper Gardens Children's Project (JGCP)** began in 1964 when citizens from northeast Kansas City, Kansas joined with faculty from the University of Kansas to devise solutions to specific problems in educational achievement and parenting in that low-income community. The JGCP has grown over the years from a small, community-based research initiative housed in the basement of a liquor store to a unique, internationally recognized research center which includes local and national community sites in projects and investigations housed at the Children’s Campus of Kansas City, four blocks from where it began. The Children’s Campus of Kansas City is a joint community initiative in Kansas City, Kansas—an effort that the JGCP has been supporting for the past decade. The JGCP is particularly recognized for its contributions to the development of effective approaches for accelerating learning and reducing classroom conduct problems in both special and general education. In 1996, the JGCP was awarded the Research Award of the International Council for Exceptional Children in recognition of its outstanding research contributions.

More than 40 years ago, as the Life Span Institute’s research on developmental disabilities took root, efforts began to translate this research into practice through what is now known as the Kansas **University Center on Developmental Disabilities (KUCDD)**. Virtually all of the Life Span Institute’s direct service, technical assistance and post-doctoral, pre- and in-service training are associated with KUCDD. These include clinics to diagnose and treat children with disabilities, a statewide project that provides assistive technology to people with disabilities and their families and training childcare providers and social workers to support individuals with disabilities. In addition, investigators affiliated with the KUCDD conduct research that has state, national and international impact in areas like self-determination, positive behavior supports, inclusive educational practices, early childhood education, community and workplace supports, family systems and supports and other areas critical to the lives of people with developmental disabilities and their families.

Three KUCDD projects should be mentioned in that they function much as LSI centers and exemplify how the KIDDRC has translated its behavioral and biobehavioral research strengths to impact social programs and professional practice:

- **Kansas Institute for Positive Behavior Support (KIPBS)**. KIPBS is a rigorous statewide training program for practicing professionals in developmental disability, child welfare, and mental health organizations to learn how to implement positive behavior support for children with serious behavioral problems.

- **The Center for Child Health and Development**. The Center for Child Health and Development (CCHD) at KU Medical Center diagnoses and develops treatment recommendations for children with developmental disabilities. The clinic assists families, teachers, doctors and others who work with these children and recommend the most effective treatment as described below in the Kansas City campus: Other complementary research centers.

- **Assistive Technology for Kansas Project**. The Assistive Technology for Kansas Project planned and oversees a model statewide program to deliver services and equipment to people with disabilities in Kansas with centers in Oakley, Salina, Wichita, Lawrence, and Parsons. Related projects have established an assistive technology loan cooperative, equipment loan bank, equipment consignment and reuse system, and a rehabilitation program for farmers injured in agriculture-related accidents.

Three KUCDD projects should be mentioned in that they function much as LSI centers and exemplify how the KIDDRC has translated its behavioral and biobehavioral research strengths to impact social programs and professional practice:
As the founding center of the Schiefelbusch Institute for Life Span Studies (Life Span Institute), the University of Kansas Life Span Institute at Parsons has partnered with national, state, regional and community partners to conduct research, develop model service programs and provide training for professionals involved in services to young children, youth and adults with disabilities and their families. Located in a rural community in southeast Kansas, the Parsons LSI includes a component of the Kansas University Center on Excellence in Developmental Disabilities. Current research focuses on individuals with autism, novel intervention strategies for challenging behavior, hearing assessment with individuals who are difficult to test, effects of toxic stress on children and families and maladaptive and challenging behavior. Additionally, the Parsons LSI provides significant service and training across the nation and state of Kansas on assistive technology, early childhood and training for community organizations and agencies serving persons with developmental disabilities.

The Merrill Advanced Studies Center, established in 1990 with an endowment from Virginia Urban Merrill and Fred Merrill, is a catalyst for scholarship on disabilities and policies that shape university research. Merrill conferences and publications establish new directions and build collaborative projects in both science and policy. World-class experts often meet as a group for the first time at Merrill conferences and go on to develop national projects that answer key questions in science. The Center publishes books on topics relevant to developmental disabilities and makes policy papers available online and in print. The Merrill web site at KU has fact sheets and discussions on science and policy for the general public.

The Research and Training Center on Independent Living (RTC/IL) has a 35-year history of conducting disability research, providing training and transferring knowledge to practice. The Center furthers independent living for people with disabilities through scientifically sound, theoretically driven sustainable interventions and measures that lead to effective community living solutions and policy change. Center researchers work closely with consumers and service providers to develop research and products that meet their critical needs. The Center also partners with other universities and agencies to improve the health and participation of people with disabilities.

SWIFT Center was launched in 2012 with a $24 million grant from the U.S. Department of Education Office of Special Education Programs—one of the largest in KU history. SWIFT is a national K-8 technical assistance center that builds school capacity to provide academic and behavioral support to improve outcomes for all students through equity-based inclusion. SWIFT assists districts and state educational agencies to implement its successful model for educating general and special education students together while leveraging existing resources, breaking down administrative silos and improving schoolwide academic outcomes. SWIFT is currently partnered with five state agencies and 17 districts in Maryland, Mississippi, New Hampshire, Oregon and Vermont.

Centro Ann Sullivan del Perú (CASP). Centro Ann Sullivan del Perú (CASP) is a nonprofit educational institution that serves children and adults with intellectual disabilities, autism and behavioral problems, as well as their families and professionals from Peru and other parts of the world. Under the direction of its founder, Liliana Mayo, Ph.D., CASP is recognized and honored worldwide for its contributions as a model research, demonstration and training center. Mayo has been supported by a steady stream of her KU colleagues who have volunteered as consultants, trainers, administrators and fund raisers; notably, Judith Le Blanc, who has served as CASP Research Director for more than 30 years, and retired Life Span Director Stephen Schroeder and Carolyn Schroeder. CASP has a formal agreement with the Life Span Institute and receives much of its staff education through university faculty from the KU departments of Special Education and Applied Behavioral Science.

Higuchi Biosciences Center. Like the Life Span Institute, the Higuchi Biosciences Center is a designated research center of centers engaged in biomedical research at the University of Kansas. These include the COBRE in Protein Structure and Function; COBRE in Molecular Analysis of Disease Pathways; Center for Chemical Methodologies and Library Development Legacy; and KU Alzheimer’s Disease Center -
Mitochondrial Genomics and Metabolism Core. The Higuchi Biosciences Center seeks to enhance both the environment for interdisciplinary, basic research and the commercial development of resulting technologies. To those ends, the Center provides research support and administers funds from a variety of sources, including the NIH, NSF, industrial partners, and private foundations. The Higuchi Center is directed by William Picking, Foundation Distinguished Professor of Pharmaceutical Chemistry and lead researcher for the Kansas Vaccine Development Center.

Established in 1989, the Higuchi Biosciences Center (HBC) is a center engaged in biomedical research at the University of Kansas. As a designated research center of the KU Center for Research (KUCR), the Higuchi Biosciences Center seeks to enhance the environment for interdisciplinary, basic research. To that end, the Center provides research support and administers funds from a variety of sources, including the NIH, NSF, industrial partners, and private foundations. The Higuchi Biosciences Center mission is to foster an environment conducive to interdisciplinary, biomedical research. In practical terms, this means:

- Relieving participating researchers of the non-scientific work involved in grant submission and administration, providing funding incentives for multi-investigator, interdisciplinary projects.
- Offering personnel services, including assistance with searches and visa applications.
- Providing laboratory space and opportunities for equipment sharing.
- Promoting translational research in the biomedical sciences.

The HBC includes a Genomics Facility that consists of 1,600 square feet of lab space. Services performed are high-throughput genomics analysis from RNA extraction and quantification to synthesis of labeled cRNA, microarray hybridization, array washing and staining, microarray image scanning and data collection. For downstream bioinformatics data mining, the facility is equipped with a number of commercial and open source software packages for complete multi-dimensional microarray data analysis, including identification of differently expressed genes, gene clustering, biological pathway analysis, Gene Ontology analysis and gene network construction. In addition, the facility provides full service for real-time quantitative PCR for confirmation of microarray results or stand-alone gene expression analysis. Major equipment in the genomics facility includes a complete Affymetrix GeneChip microarray system, a microfluidics based Agilent 2100 Bioanalyzer and NanoDrop ND-1000 spectrophotometer, an Applied Biosystems 7500 Fast Real-Time PCR System, a Beckman Biomek NX laboratory automation workstation, and an Arcturus PixCell Ile Laser Capture Microdissection (LCM) System. Software packages available include Gene Chip Operating Software (GCOS), Gene Spring, Spotfire Decision Site for Functional Genomics, Gene Traffic, Pathway Assist, and the open source software dChip and GenMAPP.

**Other Related Core Research Resource Laboratories**

**Clinical Pharmacology.** The Clinical Pharmacology Core, directed by Dr. Gregory Reed, professor in the Department of Pharmacology, Toxicology and Therapeutics, KUMC, supports clinical proof of concept studies evaluating drug and diagnostic technologies advanced to patients. Located in the Clinical Research Center on the Fairway campus of KUMC, the Bioanalytical Core provides GLP bioanalysis support to early phase clinical trials. The bioanalytical core is equipped with: Shimadzu LC-20-Waters Quattro Premier LC-MS/MS, Waters Acquity -Quattro Premier XE UPLC-MS/MS, Shimadzu LC-20 binary gradient HPLC system, with UV, fluorescence, and radiometric detectors, auto sampler, and column oven and Shimadzu VP-Chrom computer-based data acquisition and data processing system; Agilent 6890N gas chromatograph with FID and ECD detectors. The core develops and validates bioanalytical methods to quantify drug and metabolites in biological matrices as well as biochemical-based biomarkers. The core provides design support to early phase clinical trials including biological sample sampling schemes, sample collection, processing, storage and shipment requirements, as well as pharmacokinetic and pharmacodynamics data analysis. Clinical Pharmacology works closely with the BIO Center to seamlessly and efficiently transfer validated bioanalytical methods from animal
to human matrices. Parametric and non-parametric pharmacokinetic data analysis is performed using WINNONLIN™ software.

**Animal Care Unit.** The ACU is comprised of more than 33,000 ft² of dedicated animal and procedure space dispersed in nine buildings across the Lawrence campus. Housing facilities are available for common laboratory animals, including but not limited to rodents, rabbits, fish, reptiles and amphibians. Specialized facilities, including a modified rodent barrier and surgical, ABSL-2 and necropsy suites are available. KU-Lawrence maintains an Assurance (A3339-01) with the NIH Office of Laboratory Animal Welfare (OLAW). It also adheres to standards prescribed in the Public Health Service Policy on Humane Care and Use of Laboratory Animals and the OLAW Guide for the Care and Use of Laboratory Animals for all activities involving laboratory animals. Additionally, KU-Lawrence is a U.S. Department of Agriculture SDA-registered facility (48-R-0002) and complies with provisions of the Animal Welfare Act and Regulations for all activities involving regulated species. The animal care program has maintained full accreditation by the Association for Assessment & Accreditation of Laboratory Animal Care since 1982.

**Department of Environment, Health & Safety - Laboratory Safety Services.** EHS is responsible for managing and monitoring the laboratory safety program efforts at the University of Kansas - Lawrence Campus to prevent and/or minimize occupational and environmental exposure from hazardous materials usage and hazardous activities being conducted in the laboratory environment.

**Instrumentation Design Laboratory.** The IDL is an Analytical Resource Laboratory that provides collaborative support to research scientists in the natural sciences in order to enhance their research through custom instrumentation and laboratory automation. That instrumentation and automation is often based on small computers and workstations. Instrumentation solutions to laboratory problems may be developed as “turnkey” systems in which the IDL develops all hardware and software or as a coordinated project where the IDL both consults with a member of a research group and provides hardware and software modules as needed.

**Kansas Center for Advanced Scientific Computing.** The Kansas Center for Advanced Scientific Computing (KCASC) is a statewide interdisciplinary research infrastructure initially funded in April 1996 by the NSF EPSCoR Cooperative Agreement through the Kansas EPSCoR program. An Origin2400 system is an all-purpose supercomputer and has the capability of performing both shared and distributed memory parallel computing at the same time. Since 1996, the system has served as a major supercomputing resource for state-of-the-art computational researches in sciences, mathematics, and engineering in the State of Kansas and at KU.
CHILDREN’S MERCY KANSAS CITY

Overview

Children’s Mercy Kansas City (CMKC; Figure FR-O.11) is the only free-standing children's hospital between St. Louis and Denver and provides comprehensive care for patients from birth to 21. Children’s Mercy consistently is ranked among the leading children’s hospitals in the nation. CMKC is the first hospital in Missouri or Kansas to earn the prestigious Magnet designation for excellence in patient care from the American Nurses Credentialing Center.

Clinical Care

- Medical staff of more than 700 pediatric specialists
- More than 40 pediatric specialties
- First hospital in Missouri or Kansas to receive Magnet designation in 2003 from the American Nurses Credentialing Center for superior nursing quality
- First hospital in the region to receive re-designation in 2007 and again in 2012

Education

- Affiliation with University of Missouri-Kansas City School of Medicine
- Principal teaching hospital for The University of Kansas Medical Center
- More than 400 medical students each year.
- 60 doctors take part yearly in our fellowship programs
- Home of the nation’s first Pediatric Emergency Medicine Fellowship
- Nursing students from dozens of schools in the Kansas City area receive training at Children’s Mercy

Research

- More than 100 physician scientists, basic scientists, nurses, fellows and residents involved in research projects, representing millions of dollars in multi-year awards
- Co-leading the largest nephrology research project in North America
- More than 140 clinical trials on-going at any one time
- The largest Pediatric Clinical Pharmacology program in North American and one of four U54 Centers for Research in Pediatric and Developmental Pharmacology (RPDP) supported by NICHD
- The Center for Pediatric Genomic Medicine, established in 2011 as the first genome center in the world entirely inside a children's hospital with a focus on the diagnosis of inherited pediatric diseases. One of the 10 leading institutions in the Kansas City Area Life Sciences Institute, which also includes the University of Kansas, Midwest Research Institute, University of Missouri-Kansas City and the Stowers Institute.

CMKC is a 355 bed academic pediatric hospital and medical center located in Kansas City, Missouri that provides comprehensive primary and tertiary specialty care to children from Missouri and Kansas. It is the only pediatric medical center between St. Louis and Denver. Comprehensive care is provided in 50 pediatric subspecialties including Adolescent Medicine, Allergy/Immunology, Developmental and Behavioral Pediatrics,
Cardiology, Clinical Toxicology, Clinical Pharmacology, Craniofacial Reconstructive Surgery, Critical Care, Emergency Medicine, Endocrinology/Metabolism, Gastroenterology, Genetics, Infectious Diseases, Hematology/Oncology, Bone Marrow Transplantation, General Pediatrics, Neonatology, Nephrology/Dialysis, Neurology, Ophthalmology, Otolaryngology, Orthopedics, Pulmonology, Rehabilitation Medicine, Rheumatology, Pediatric Surgery, Pediatric Sleep Clinic, Pediatric Cardiovascular Surgery, Solid Organ Transplantation, Urology, and a Fetal Health Center for the delivery of high-risk pregnancies. The Hospital is the only Level 1 pediatric trauma center in the region, and is the primary pediatric teaching hospital for the University of Missouri - Kansas City (UMKC) School of Medicine. CMKC's primary service area consists of 18 counties, nine each in the states of Missouri and Kansas, with an additional 20 counties in Kansas and 30 counties in Missouri constituting its secondary service area. The area served by outreach clinics includes a further 21 and 22 counties in Kansas and Missouri, respectively, within a maximum three hour drive of the main campus in Kansas City, MO.

**CMKC Ambulatory Care.** Ambulatory pediatric care is predominantly delivered in a 7-story ambulatory building adjacent to and connected to the main hospital; in a specialty clinic facility located at the Children’s Mercy Kansas City South Campus in Overland Park (Johnson County), KS; a facility that also has 54 inpatient beds staffed by Hospitalist members of the CMKC pediatric faculty; at Children’s Mercy Northland, located in Kansas City, MO (approx. 14 miles from the main campus); and at Children’s Mercy Clinics on Broadway (approx. 2 miles from the main campus). Urgent and emergent ambulatory care is provided in the Emergency Department facility located in the main hospital and the suburban urgent care centers. The Emergency Department is staffed 24 hours/day, 365 days/year by board certified pediatric emergency medicine physicians.

Of these beds, 115 are special care beds comprised of pediatric intensive care (PICU; 41) and neonatal intensive care (NICU; 74). During FY 2014, there were 13,649 inpatient admissions with 82,688 total patient-days, including 22,510 NICU patient days and 10,078 PICU patient-days. During this same reporting period there were 471,441 outpatient visits, including 212,330 at the main campus; 98,956 at Children’s Mercy South Specialty Clinics in suburban Johnson County, KS; 47,005 at Children's Mercy North Specialty Clinics, 70,204 in the Primary Care Clinics; and 6,609 visits to Outreach Clinics. There were also a total of 162,611 emergency/urgent care visits.

The demographics of the population served by CMKC (from fiscal year 2014) are as follows:

<table>
<thead>
<tr>
<th>Age Range</th>
<th>% Total</th>
<th>Gender</th>
<th>% of Total</th>
<th>Race</th>
<th>% Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neonate</td>
<td>14.3%</td>
<td>Female</td>
<td>47.9%</td>
<td>American Indian/Alaskan Native</td>
<td>0.3%</td>
</tr>
<tr>
<td>infant</td>
<td>14.3%</td>
<td>Male</td>
<td>52.1%</td>
<td>Asian</td>
<td>1.9%</td>
</tr>
<tr>
<td>1 to 4</td>
<td>27.3%</td>
<td></td>
<td></td>
<td>Black or African American</td>
<td>21.0%</td>
</tr>
<tr>
<td>5 to 9</td>
<td>23.8%</td>
<td></td>
<td></td>
<td>Caucasian/White</td>
<td>55.2%</td>
</tr>
<tr>
<td>10 to 14</td>
<td>20.6%</td>
<td></td>
<td></td>
<td>Hispanic</td>
<td>13.5%</td>
</tr>
<tr>
<td>15 to 17</td>
<td>10.7%</td>
<td></td>
<td></td>
<td>Multiracial</td>
<td>5.1%</td>
</tr>
<tr>
<td>18+</td>
<td>3.3%</td>
<td></td>
<td></td>
<td>Native Hawaiian/Pacific Island</td>
<td>0.3%</td>
</tr>
<tr>
<td>Grand Total</td>
<td>100.0%</td>
<td></td>
<td></td>
<td>Other</td>
<td>1.8%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Not Available; Unknown; Declined</td>
<td>1.0%</td>
</tr>
<tr>
<td>Grand Total</td>
<td>100.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**RESEARCH ADMINISTRATION**

Children’s Mercy Kansas City Office of Research Integrity Children’s Mercy has a Federalwide Assurance (FWA) with the Department of Health and Human Services, in which we assure Federal officials that any research project, whether it is a chart review or administration of investigational drugs, is conducted in
accordance with Federal regulations. The Office of Research Integrity assists investigators in every step of the research process. The CMKC Institutional Review Board (IRB) is a completely electronic process through MARS, Mercy's Automated Research System. Researchers use the MARS system to gain access and submit IRB submissions for review. Submissions are entered, routed, reviewed and finalized electronically. This tool improves efficiency for the IRB review and investigators.

**CMKC Clinical Research Infrastructure and Assets.** Pediatric Clinical Research Unit (PCRU): Brand new facilities to admit children for research protocols and to accommodate outpatient visits for clinical research opened in January, 2013 in 5,500 ft² located on the ground level of the Hall Inpatient Tower, immediately adjacent and connected to the Division of Clinical Pharmacology and Therapeutic Innovation offices and Developmental Pharmacology and Experimental Therapeutics research laboratory. The facility is a self-contained clinical research nursing unit with accommodations for both inpatient and outpatient studies. It is comprised of three single patient rooms and one three-bed patient room, an ambulatory study room, examination/treatment room, specimen processing laboratory, conference room/library, play room, and secure document storage and offices to accommodate 9 clinical coordinators, as well as an office for the PCRU Medical Director. Recreational items such as games, crafts, TV, Nintendo, and videos are available to entertain children during their stay. In addition, the Child Life staff may assist with constructive activities for children. The facility is equipped with age-appropriate examination equipment, storage space, crash cart, and monitoring equipment. Facilities are available for phlebotomy, urine collection, initial specimen processing, and temporary specimen storage prior to delivery to the laboratory. This unit has been constructed to meet all applicable FDA/ICH guidelines for a phase I study unit and also, fully meets accreditation standards by JCHAO.

**CMKC Clinical/Integrated Pharmacology Infrastructure and Assets.** The Developmental Pharmacology and Experimental Therapeutics Laboratory is a 3,112 ft² space within the Division of Clinical Pharmacology, Toxicology and Therapeutic Innovation that previously served as the NICHD Pediatric Pharmacology Research Unit (PPRU) core laboratory throughout the Network’s existence. The laboratory supports the clinical and basic research programs of the Division of Clinical Pharmacology and Therapeutic Innovation, including pharmacogenetic and analytical (HPLC) support for phase I and phase II clinical studies. In addition, specific areas within the facility are designed for and devoted to cell culture, protein biochemistry and molecular biology for applied research related to the pathogenesis of idiosyncratic drug reactions, ontogeny of
drug metabolism, and pharmacogenetics. In the past two years, research infrastructure has been increased as described in detail below.

**CMKC Analytical Resources.** The analytical facilities of the Division of Clinical Pharmacology, Toxicology and Therapeutic Innovation occupy approximately 1280 ft\(^2\) in the CMKC Pediatric Research Center and contains several analytical instruments, including two triple quadrupole mass spectrometers (a Waters Xevo TQD and a Waters Xevo TQ-S), a Waters Xevo G2 QToF mass spectrometer, each with Acquity UPLC front end systems, three Agilent HPLC systems, two of which are equipped with fluorescence and uv/vis detectors and the third with a diode array detector, and two POC-One infrared spectrometers for analyzing \(^{13}\text{C}\)O\(_2\) breath test samples.

**CMKC Pharmacogenetics and Pharmacogenomics Resources.** The Pharmacogenetics and Pharmacogenomics Core Laboratories, under the direction of Andrea Gaedigk, Ph.D. and Roger Gaedigk, Ph.D., conduct genotyping analysis utilizing a variety of platforms including TaqMan, High-Resolution Melt Curve analysis and traditional PCR-RFLP for SNP detection and long-range PCR to detect major gene arrangements. GeneMapper and simple agarose gel electrophoresis is employed for the detection of length variations and DNA sequencing for a variety of DNA variations. Genotyping panels have been established for many CYP genes, including CYP2D6 (one of the most comprehensive genotyping panels for this highly polymorphic enzyme that is notoriously difficult to accurately genotype), CYP2C9 and CYP2C19, CYP2B6, the CYP3A gene locus, as well as multiple genes in the folate pathway and several drug transporters and receptors. Quantitative multiplex PCR procedures have also been established to determine gene copy number for CYP2D6, SULT1A1 and UGT2B17. For the purposes of the current proposal, the primary genotyping platform will be TaqMan assays using custom-designed OpenArrays. The arrays will be run on a recently obtained QuantStudio 12K. This analysis will be complemented with quantitative multiplex-PCR (analyzed on a 3730 DNA analyzer instrument using GeneMapper) and long-range PCR to aid in the detection and characterization of gene rearrangements and DNA sequencing.

The Division is equipped with standard and real-time PCR instruments, a 3730x DNA sequencer (Applied Biosystems) that serves multiple purposes (including sequencing and copy number assays), and a Kodak DS Image Station 440CF (PC-controlled) for photodocumentation, data analysis and storage. All other necessary equipment, such as centrifuges, electrophoresis and blotting systems, and -20ºC and -80ºC storage are available to perform the described tests with DNA, RNA and protein isolated from a variety of sources such as blood, tissue and saliva and store specimens appropriately. The unit has nine 96-well PCR instruments, three quantitative real-time PCR cycler systems (ABI QuantStudio 12K; ABI 7900HT real time thermocycler; an Eppendorf realplex4 epgradient S Mastercycler and an MJ Research Opticon 2 Q-PCR instrument) as well as two EcoRealTime PCR instruments (Illumina) to facilitate HRM analysis. The laboratory also has a dedicated MiSeq platform that is housed in the Center for Pediatric Genomic Medicine.

**CMKC Center for Pediatric Genomic Medicine.** The Center for Pediatric Genomic Medicine at Children’s Mercy Kansas City was formed in January 2011, moved into approximately 16,000 ft\(^2\) of space at the Crown Center office complex, which is immediately adjacent to the Hospital, in the fourth quarter of 2012.

**Genome Center Lab Capabilities.** All sequencing operations are performed in a custom-designed, CLIA-accredited, new (2012), 3105 ft\(^2\) genome center with versioned, written protocols. Office space is in a new 3000 ft\(^2\) suite for the Center for Pediatric Genomic Medicine. The Center has three HiSeq 2500 sequencers (two of which have the v4 1TB upgrade), one HiSeq 2000, and two MiSeqs.

**Computational and analysis resources.** Dedicated computational resources are located in a new (2012) data center with environmental controls, air conditioning, conditioned power, emergency back-up power and UPS. As of November 2012, the computational resources are a 368-core Intel Xeon X5670/E5-2650 cluster (2TB of DDR3 RAM and 14TB SATA hard drives), a pipeline server (12-core Intel Xeon X5670 with 48GB RAM and 1TB SATA hard drive), Isilon IQ 36000 storage system (454TB usable capacity), tape backup server, Quantum Scalar i500 23U tape backup system, web server (6-core Intel Xeon X5670 with 6GB RAM and 1TB SATA drive), and database server (12-core Intel Xeon X5670 with 48GB RAM and 16TB SATA drives) on which are deployed the
Grindstone LIMS, GATK, GSNAP, Casava, SSAGA, CMH Variant Warehouse, RUNES, and VIKING software systems. Computational resources increase by ~$400,000 annually.

**Genome Center Laboratory Equipment:** The major Center capital equipment items include one Illumina HiSeq 2000 DNA sequencer, three Illumina HiSeq 2500 DNA sequencers, two Illumina MiSeqs, two Illumina cBots, one PerkinElmer Sciclone NGS, one Janus NGS Express, and one Janus 8-Tip with Gripper liquid handling robots for sequencing library preparation, qPCR, and hybridization enrichment and washing incorporating Agencourt SPRI magnetic bead separation; a PerkinElmer Chemagic MSMI robot for nucleic acid isolation, a Life Technologies ViiA7 Real-Time PCR System capable of running 96-well and 384-well plates, a Bio-Rad CFX96 real-time PCR detection system, PerkinElmer Lab Chip GX, Agilent Bioanalyzer 2000, Agilent TapeStation 2200, Covaris LE220 96-well plate DNA sonication system, Nanodrop S2000 spectrophotometer, a Qubit 2.0 Flurometer, a PerkinElmer DropSense 96 instrument equipped with cDrop software, two Eppendorf MasterCycler Pro thermal cyclers, four Bio-Rad S1000 thermal cyclers, five vortex mixers, seven minicentrifuges, eight temperature dry baths, one digital water bath, one upright -80°C freezer, six -20°C freezers and five 4°C refrigerators, and compute resources.

**CMKC Computational Infrastructure.** CMKC has a 10MBit/s Internet-2, 45MBit/s DS3 (T3) and 100MBit/s SureWest fast internet links for high speed transmission of large data files between CMKC investigators and collaborators. The hospital has site licenses for Grindstone, GATK, GSNAP, HGMD, Microsoft Office, JMP Genomics, Photoshop 7, Illustrator 10.0, Sigma Plot 2000, ChemDraw Office and EndNote X.

**Primary WGS Analysis, file hierarchy and structure.** Primary analysis of HiSeq 2000/2500 WGS and exome and MiSeq targeted panel data, to produce sequence reads, is performed with Illumina Real Time Analysis (RTA) software and CASAVA 1.8.2. Results of primary analysis are stored in the Center sequence archive, in which each sequence run has a single top level directory that stores the sequences and quality scores from that run. After the completion of primary analysis, raw sequence run data (intensity files, BCL files) are discarded. Quality control for each sequence run is achieved through review of sequencing metrics produced by the Illumina sequencing control software. HiSeq 2000/2500 and MiSeq v.2 runs are passed or failed according to a written protocol.

**Tertiary Sequence Analysis Pipeline.** Symptom- and sign-assisted genome analysis (SSAGA) is the centerpiece software developed for analysis. SSAGA is a clinicopathological correlation tool that maps clinical terms (such as SNOMED-CT) to genetic disease terms (e.g. OMIM) to causal gene symbols (e.g. ENTREZ genes). Other STAT-seq software components are as follows: Basecalling uses standard Illumina software. Sequences are aligned to the reference nuclear and mitochondrial genomes [Hg19 and GRCh37 with BWA, ELAND (Illumina) or GSNAP (Genentech), and variants are identified and genotyped with the GATK. Nucleotide variants are annotated with RUNES, our variant characterization pipeline, which incorporates VEP (Variant Effect Predictor), comparisons to NCBI dbSNP, known disease mutations from the HGMD, and additional in silico predictions of variant consequences from ENSEMBL and UCSC. RUNES assigns each variant a composite ACMG pathogenicity category and allele frequency from the Variant Warehouse. Interpretation of RUNES-annotated variants is performed with VIKING. For each sample, VIKING (Variant Integration and Knowledge Interpretation in Genomes) displays SSAGA information (patient phenotypes, corresponding genes and diseases), and RUNES-annotated variants from that patient, organized by gene. VIKING allows dynamic sorting, selection and prioritization of displayed variants with a menu of filters. These include inheritance pattern, variant frequency, genotype, and ACMG pathogenicity category. The variant attributes displayed can be modified. The variants displayed can be changed by altering the SSAGA information. The likelihood of each variant being disease causative is manually tagged. VIKING sessions can be saved. Interpreted findings can be exported into a standard report format that includes OMIM and HGVS nomenclature (genome, transcript and protein coordinates), ACMG-guided transcript ID, ACMG pathogenicity category, predicted functional consequence, SSAGA terms, RUNES annotations and VIKING settings for final report generation. Variants (both primary and secondary findings) and their RUNES and SSAGA annotations are de-identified and stored in our Variant Warehouse, which is updated with the results of each sample. To date it contains 19.1 million variants and 1,237 samples.
**Computer Resources.** The Center's computer resources are located within a dedicated data center with environmental controls, 15 tons of air conditioning, conditioned power, hospital emergency back-up power and 45kVa UPS capability. The compute resources comprise a 608-core Linux compute cluster with 6TB of DDR3 RAM and 20TB SATA hard drives (20 x 12-core Intel Xeon X5670, 8 x 16-core Intel Xeon E5-2650 and 12 x 20-core Intel Xeon E5-2660), redundant head nodes (12-core Intel Xeon X5670 with 48GB RAM and 500GB SATA drive), a pipeline server (12-core Intel Xeon X5670 with 96GB RAM and 1TB SATA hard drive), Isilon X400 storage system with 810TB usable capacity, SGI Infinite Storage Gateway disaster recovery and backup appliance with 160TB usable capacity, Spectra Logic T950 tape library with 2.4PB uncompressed usable capacity, redundant web servers (12-core Intel Xeon X5670 with 48GB RAM and 500GB SATA drive), and database server (12-core Intel Xeon X5670 with 96GB RAM and 16TB SATA drives) on which are deployed the LIMS, GATK, GSNAP, CASAVA, SSAGA, CMH variant warehouse, RUNES and VIKING software systems. The data center is adjacent to the room housing the DNA sequencers, which also features environmental controls to maintain ambient temperature at 65 degrees C, conditioned power, hospital emergency back-up power and substantial UPS capability.

**Translational Genetics Research Facility.** The CMKC Translational Genetics Research Facility is directed by Shui Qing Ye, MD, PhD. Dr. Ye has more than 25 years of experience in biomedical research. Previously, he served as the Director of the Gene Expression Profiling Core in the Center of Translational Respiratory Medicine at Johns Hopkins University School of Medicine (2001 to 2005) and as the Director of the Molecular Resource Core in a NIH funded Program Project Grant on Lung Endothelial Pathobiology at the University of Chicago Pritzker School of Medicine (2005 to 2007). Major equipment in the facility includes an Illumina HiSeq 1500 next generation sequencing system; a 7th generation real-time PCR system; ViiA™ 7 Real-Time System (Applied Biosystems), Experion™ System (Bio-Rad) for assessment of RNA and DNA quantity and quality, Epoch Microplate Spectrophotometer(BioTek); an ECIS Z Theta electric cell-substrate impedance sensing (ECIS) instrument and its accessories (Applied BioPhysics) to automate tissue culture research by measuring the impedance of mammalian cells cultured on small electrodes; New Lab Alliance APLC system for the purification of recombinant proteins and cellular protein; TriStar LB 941 (Berthold Technologies) for absorbance, luminescence, and fluorescence detection, Alphaimager (Alpha Innotech) for documenting DNA-, RNA- agarose and protein SDS-PAGE gel images and western blotting results; an Olympus IX 71 fluorescence microscope, Olympus CKX31 inverted and a Leica Dissecting Microscope as well as Sanger sequencing capabilities (Applied Biosystems 3130 sequencer).

The CMKC Research computer resources are located within a dedicated data center with environmental controls, conditioned power, and hospital emergency back-up power. There is one head node with six compute nodes installed in a dedicated rack with room for several more nodes. The compute resources comprise a 96-core cluster with 384GB of DDR3 RAM and 48TB SATA hard drives (6 x dual 8-core Intel Xeon E5-2670 “Sandy Bridge” 2.6GHz processors), Quantum SuperLoader3 2U 16 tape library for backups. Deployed on the cluster are the latest versions of GATK, CASAVA, Bowtie, TopHat, Cufflinks, R with CummeRbund, Python with NumPy and SciPy, BreakDancer, Plink, and Haploview software applications.

**CMKC/KUMC Pediatrics Department.** The combined Department of Pediatrics across KUMC and Children’s Mercy Kansas City (CMKC) are highly focused on enhancing innovation, access, and quality in a measurable way through translational research. Both Departments offer annual Departmental Research Grants focused solely on translational research in children. These grants have led not only to larger externally funded studies, but also to innovations in the way we care for our pediatric patients. The IRB reciprocity and other tools that are already in place make it easy for the two sites to collaborate and recruit large groups of children for translational efforts (such as recent grants in Pediatric Diabetes R01 DK100779, and R21 HD081502 and in Pediatric Autism R21 HD076116). Both sites also participate in the PCORI CDRN effort, allowing for integration of our medical records for tools such as patient recruitment, subject size calculations, and engagement of relevant clinics and personnel in translational research efforts.

CMKC and KUMC also have several Centers focused on translational efforts. For example, the Center for Children’s Healthy Lifestyles & Nutrition jointly houses clinical and research programs focused on activity and...
nutrition, as well as serving as home to a large community collaborative with over 400 members called Weighing In. This community collaborative helps tie (though our quarterly meetings) scientists to community members in working groups such as pregnancy and breastfeeding, early childhood, healthy schools. As part of a recent strategic planning process, CMKC has also founded a Division focused on Health Services and Outcomes Research, which capitalizes upon the strong clinical programs to strengthen translational research. A Director has been hired and efforts are underway focused on partnerships with inner city faith based organizations focused on health disparities (RC4 MD005738; R01 MH099981) and several health service innovations studies (R01 MH104086, R01 HD076673, R01 DK93592, R34MH107337, R34 MH108393) among others efforts. A world renowned genome center, the first of its kind with a pediatric focus, provides clinical genomic services while simultaneously conducting state-of-the-art genomic research, seeking to become a leader in pediatric genomic translational research (U19 HD077693). The Center for Child Health and Development provides diagnostic evaluation for Autism Spectrum Disorders using “gold standard” research tools. The current CCHD research database has over 6000 Intake records, over 4000 completed Patient Information Forms, over 1300 detailed psychological score measures and 1200 Developmental Pediatrics visits. With Russ Waitman, PhD, the CCHD is in the process of mapping the current database into the Electronic Medical Record (O2), which will result in further integration between the clinical research database and our EMR system and better access for researchers across Frontiers. With Dr. Waitman, the CCHD will continue to develop the database for researchers using the Harvard ontologies developed to provide researchers a concept-based approach to identifying behavioral features of importance and for correlating these with genotypic data.

The joint Departments offer multidisciplinary training programs at all of their sites, focused not only on medical students and residents, but also on graduate students in psychology, exercise physiology, public health and related fields, as well as providing regular trainings to community members through talks, health fairs, and other community events.

UNIVERSITY OF MISSOURI-KANSAS CITY

Overview The University of Missouri-Kansas City (UMKC, Figure FR-O.12) is one of four University of Missouri campuses and is a doctoral research public university offering traditional and interdisciplinary programs serving approximately 15,746 students. The University of Missouri-Kansas City has a broad and inclusive educational mission with specific emphasis in three areas: visual and performing arts, health and life sciences and urban affairs. UMKC's unique profile includes the College of Arts and Sciences and Schools of Education, Nursing and Health Studies, Management, Medicine, Law, Computing and Engineering, Biological Sciences, Dentistry, Pharmacy and the Conservatory of Music and Dance.

The University’s 11 academic units include Schools of Medicine, Pharmacy, Nursing & Health Studies and Dentistry, all located adjacent to one another on the Health Sciences (Hospital Hill) Campus and are also adjacent to
three of our main clinical partners, The Truman Medical Center, Children’s Mercy Kansas City, and the Center for Behavioral Medicine. In addition, the University is home to the School of Biological Sciences, the School of Computing and Engineering, and the Colleges of Arts and Sciences, all of which have faculty members that maintain active joint appointments, as well as research and programmatic collaborations with each of the Health Professional Schools.

RESEARCH ADMINISTRATION

Office of Research and Economic Development. Research at UMKC is coordinated through the activities of the Office of Research and Economic Development, encompassing the Office of Research Services (ORS), the Office of Research Compliance, the UMKC Innovation Center, the Office of Technology Commercialization, the Institute for Human Development and the Laboratory Animal Research Center (LARC). Annually, the ORS processes approximately 250 awards totaling $35.5 M. Approximately 70% of the award total comes from federal sources for Life and Health Sciences-related research activity.

Office of Research Services. (http://ors.umkc.edu/home) The Office of Research Services provides faculty with pre-award services including proposal and budget development support, application concept review, non-technical and technical review, and application submission support. The Office also provides assistance in finding relevant sponsors for research through an institutional subscription to PIVOT as well as through other more individualized activities and efforts. Once an award is received the post-award staff members assist researchers in setting up spending accounts and provide the back-end support necessary for budget management, compliance with University, federal, and other sponsor requirements as well as timely and accurate reporting. The Office also works seamlessly and in collaboration with the Office of Research Compliance and the Office of Technology Commercialization (http://ors.umkc.edu/otc)

Office of Research Compliance ensures that researchers and their proposed research are in compliance with governmental regulations and university requirements. The Office coordinates our efforts to comply with Animal Care and Use (IACUC), human subject research (Institutional Review Board), Laboratory and Biosafety (Institutional Biosafety Committee), Radiation Safety regulations, and HIPAA accountability and training. Specifically, The UMKC Research Compliance Office provides the following services: helps researchers navigate complex federal and state compliance regulations; reviews and manages conflicts of interest to ensure the researcher’s personal interests do not influence their primary obligations to science, university, colleagues, students, and sponsors; provides for the humane care and use of all animals in research and teaching; oversees research protection as it relates to human participants, recombinant DNA, and bio-hazardous material; provides oversight to research investigators and serve as liaisons to the review boards and committees; coordinates the radiation safety program; and, offers education and training to faculty and staff.

UMKC LIFE AND HEALTH SCIENCES RESEARCH CENTERS AND INSTITUTES

Center for the Study of Dental and Musculoskeletal Tissues, UMKC-CEMT. The UMKC CEMT is a multidisciplinary and interdisciplinary center that includes investigators from the Schools of Dentistry, Medicine, Nursing, and Computing and Engineering to focus on dental and musculoskeletal health. This UMKC Center of Excellence integrates all investigators, whether basic or clinical, into powerful translational teams to prevent and treat diseases of mineralized tissue which includes teeth, cartilage, bone, and muscle. This goal aligns with the NIH roadmap initiative and focuses on mineralized tissue research with regards to obesity, cancer, osteoporosis, bone trauma, aging, metabolic bone disease, and diseases of oral tissue. Not only can findings be applied to biomaterials and composite research, medical devices, diagnostics, and clinical imaging, but also be expanded to veterinary practice and diagnostics and treatment of animal dental and bone disease.

There are four major objectives for this center:

- Develop a world-class basic science research program in mineralized tissues.
Create an outcomes science platform and clinical trial networks.

Provide education from graduate students and clinicians.

Establish an infrastructure to develop biotechnology and technology transfer.

Partnerships have been forged with the School of Medicine, School of Nursing, School of Computer and Engineering, and the School of Dentistry. This Center brings together and facilitates collaboration not only among faculty from several of UMKC’s life and health sciences schools but also their Kansas City clinical partners. UMKC's health professions schools are located on Hospital Hill, adjacent to several of the region’s top clinical care facilities. Primary clinical partners include Truman Medical Center, Children’s Mercy Kansas City, and Saint Luke’s Hospital. Together, with the UMKC School of Medicine (SOM) and School of Nursing (SON), they offer a unique patient base that provide rich information for research and clinical applications into diseases of mineralized tissue. Researchers in the School of Nursing provide experience in implementation of clinical findings to practice and assessment of the impact of changes in clinical practice on health outcomes. Bioengineers at the School of Computing and Engineering (SCE) have generated significant numbers of patents and devices in biometrics and the school is developing a program in biomedical engineering that integrates with the health professional schools. The UMKC School of Dentistry is the only dental school in either Missouri or Kansas. The Bone Biology and Biomaterials/Bioengineering research programs are recognized nationally and internationally and have researchers with long histories of competitive federal support for their work. Investigators in Bone Biology include molecular biologists, engineers, protein chemists, and geneticists with expertise in the area of the genomics, proteomics, and transgenics in the study of mineralized tissue. The Biomaterials program includes investigators with international reputations in biomaterials for the repair and regeneration of tissues. 

http://cemt.umkc.edu/default.shtml

Vision Research Center. The goal of the Vision Research Center is to accelerate new discoveries and convert these discoveries into therapies serving those afflicted with these eye diseases. The Vision Research Center’s members from the UMKC Schools of Medicine and Pharmacy and from other affiliated institutions leverage existing resources and established extramurally funded programs in three key areas of research: 1. discovery of novel basic science mechanisms that underlie the function of the normal and diseased visual system and that generate the urgently needed rationale for novel innovative high-impact therapies; 2. development of novel therapies and drugs through translational research resulting from extramural support by the National Institutes of Health and other agencies supporting eye research, from collaborations with companies targeting eye diseases and from formal collaborations with the life science community in the Kansas City area; 3. Development of novel diagnostic strategies and their incorporation in state-of-the-art clinical research building on the VRC’s national leadership status in these areas and fast-tracking outcomes-validated new medicines and therapies.

Shock Trauma Research Center. The Shock Trauma Research Center was founded in 2001 as a UMKC multidisciplinary research center. It includes basic scientists, clinicians, and translational scientists. Laboratories in the Center conduct research into shock, inflammation, and trauma, all of which are critical areas of medical research. Work from the Center enriches the educational and academic programs, especially in surgery and in the basic medical sciences. Trauma, with its sequela of shock and inflammation, is a leading cause of death among young people. It is in fact the leading cause of death in people under 44 years of age. For this and a variety of other reasons, it is a major urban public health issue. The incidence of trauma in the centers of the largest cities - including Kansas City - is a major national problem. For this reason, the work of the center is especially important in the urban environment, and is a highly appropriate activity for a major urban university. The focus of the Center continues to be on the development of innovative treatment strategies for shock and injury, and for sepsis, two of the most lethal clinical problems today. The Center has received continuous extramural funding for the past 10 years. Scientists in the Center present their work locally, nationally, and internationally, and publish in high quality medical and scientific journals. They have served on national advisory groups and have served in national office in medical and scientific organizations. Dr. Charles Van Way has served as Vice Chair of the Residency Review Committee of the ACGME, and
continues to serve as President of the A.S.P.E.N. Rhoades Research Foundation.

**Collaborative for Excellence in Behavioral Health Research and Practice (The Collaborative)** is located in the UMKC School of Nursing and Health Studies (SoNHS). The Collaborative is a group of professionals working to advance health and wellness by bringing behavioral health research to practice and by supporting people, organizations, and systems through change processes. The Collaborative accomplishes this through a variety of projects in collaboration with local, state and federal partners. Members of the Collaborative lead or partner on a range of federally and locally funded projects, including the Centers for Disease Control and Prevention (CDC) funded *Capacity Building Provider Network National Resource Center*, which coordinates the CDC’s flagship program of 21 grantees that train health departments, community-based organizations and healthcare organizations to deliver high-impact HIV prevention strategies; the Substance Abuse and Mental Health Services Administration (SAMHSA) funded *Addiction Technology Transfer Center (ATTC) National Office*, which coordinates SAMHSA’s network of 14 ATTC centers that identify and promote evidence-based practices for addiction treatment, and helps to integrate addiction treatment into healthcare settings; the SAMHSA-funded *Mid-America ATTC Regional Center*, which serves Iowa, Kansas, Missouri, and Nebraska by developing and conducting online and in-person trainings and assists states and healthcare systems to implement evidence-based addiction treatments; and the SAMHSA funded *UMKC SBIRT* grant that provides health and behavioral health students and professionals with training to screen and intervene with patients who use alcohol and drugs.

**Center for Health Insights** ([http://chi.umkc.edu/](http://chi.umkc.edu/)). The UMKC Center for Health Insights (CHI) provides biomedical researchers with investigators to accelerate their research. The CHI supports the UMKC REDCap research instance, Ingenuity for biological pathways analysis, the UMKC/Truman Medical Center i2b2 installation and the UMKC Insights High Performance Computing Platform, which includes a national de-identified data set derived from electronic health records. The CHI also innovates through our portable motion capture platform, our development of novel web resources to enhance information about patient context and initiatives related to the “Internet of Things”.

**Institute for Human Development** ([http://www.ihd.umkc.edu/](http://www.ihd.umkc.edu/)). The UMKC Institute for Human Development (IHD), a University Center for Excellence in Developmental Disabilities, is an Applied Research and Interdisciplinary Training Center for Human Services. IHD exemplifies the University’s goals by practicing engaged scholarship supporting research to practice so that people, agencies, and the community can benefit from the application of new knowledge and practices generated by the university.

IHD conducts and collaborates on a wide variety of applied research projects to develop, implement, and demonstrate as well as evaluate new ideas and promising practices that support healthy, inclusive communities. Through our interdisciplinary university training we infuse best practices into the curriculum of graduate and undergraduate students in a wide range of professional disciplines. Through community services and supports, IHD assists individuals, community and state agencies, and university faculty to build the capacity of their programs through needs assessments, technical assistance, grant development, demonstrations, and program evaluation. IHD is also a vital information link through the dissemination of products and the establishment of information resource centers. These resource centers become vital assets to the community as demonstrations of research to practice.

IHD focuses its work on seven broad priority need areas: health and wellness promotion; early childhood and youth; individual advocacy and family support; adult community living; aging and developmental disabilities; interdisciplinary university training; and policy, program development, and quality assurance. Every project at IHD falls into one of these categories. While the projects may change, the priority areas stay constant and serve to guide the larger vision of IHD.

IHD partners with university, community, state, and federal level organizations. IHD generates over $9 million in extramural funding through demonstration programs and leverages an estimated $20 million for other community agencies. 37% of IHD’s funding was from Federal sources, 39% from state, and 24% from local
and university funds. In the past year, projects and initiatives continue to focus on youth, families, and adults with developmental disabilities, as well as underserved populations (i.e. low-income minority youth and urban Latino communities).

Mid America Heart Institute. The Mid America Heart Institute is a vertically-integrated entity residing within Saint Luke’s Hospital, winner of the 2003 Malcolm Baldridge Award for Quality, and one of the 2 primary teaching facilities for the University of Missouri - Kansas City. In addition to its cutting-edge clinical services, MAHI created the Cardiovascular Research Center over 30 years ago to manage and analyze clinical data. A unique feature of MAHI is the commitment to translating findings into clinical practice. We have successfully pilot-tested and disseminated personalized consent forms and screening programs for depression and diabetes. The commitment of the health system to innovate and participate in research to further improve care means that our trainees will have extraordinary access to patients across a broad spectrum of disease and throughout a broad continuum of care. In Outcomes Research, the ‘laboratory’ refers to the data resources from which important clinical questions can be answered and the clinical environment in which novel interventions can be implemented and pilot tested. We hold an extraordinary array of unique databases in such areas as National Quality Databases, Multi-Center Outcomes Databases, Clinical Trial Databases which are used for clinical outcomes research. Importantly, each of these databases is actively used by investigators, enabling efficient use and extension of these data to support clinically important projects of our trainees.

- **Outcomes Research Center, Mid-America Heart Institute** houses the Cardiovascular Outcomes T32 (NHLBI 5T32HL110837) and is one of the leading centers in cardiovascular outcomes research in the United States. Many of the current methods used nationally for quantifying and analyzing patient–centered health status outcomes were designed by faculty in this Center. Members of this group have developed new techniques for performance measurement and have applied methods of cost-effectiveness and decision analysis to novel cardiovascular technologies. The Outcomes Research Center has a strong record of interdisciplinary collaboration between cardiologists, nephrologists, internists, nurses, economists, psychologists, and pharmacists from both UMKC and KU. This Center provides critical support to training efforts in interdisciplinary outcomes research and precision medicine.

The cardiovascular research program not only mentors and collaborates with researchers throughout Frontiers, other CTAs and internationally (China’s National Center for Cardiovascular Disease, Australia and Europe), but it has a strong commitment to training the next generation of translational scientists. In particular, our T32 in Cardiovascular Quality and Outcomes Research has become a leading training center for young investigators interested in the terminal phase of translational research. Beyond our own accomplished faculty, we create collaborations for our trainees with leading outcomes researchers at Yale (Harlan Krumholz), Duke (Eric Peterson, Lesley Curry, Adrian Hernandez), and the Universities of Colorado (John Rumsfeld, Fred Masoudi, Larry Allen) and Michigan (Brahmajee Nallamothu, Rodney Hayward). Trainees are able to exploit existing data from >30 clinical trials and registries led by MAHI/UMKC faculty and the national registries of the AHA and ACC (for which MAHI/UMKC is one of 3 analytic centers, along with Yale and Duke, for the ACC NCDR registries). In addition, our trainees are able to participate in the newly-established Saint Luke’s Center for Healthcare Innovation, which support novel interventions to achieve the triple aim of healthcare. These resources thus support access to the latest analytic approaches (supported by 12 biostatisticians at MAHI alone), deep experience in the increasingly important analysis and interpretation of patient-reported outcomes measure and in the challenges and evaluation of implementation research. One hundred percent of our trainees have remained in academia, either as clinical trainees or as Assistant Professors with a research emphasis.

- **UMKC RESEARCH CORE FACILITIES**

**Laboratory Research Animal Center.** The UMKC Laboratory Animal Research Center is an AAALAC-accredited facility located in the ground floor of our Health Sciences Building on Hospital Hill. The facility is
isotopic labeling, purification and characterization of target peptides and proteins as well as other biophysical
facilities are equipped through the affiliated Protein Interaction and Dynamics core to assist researchers with
High Field NMR Facility

available for preparation of cryo-EM samples of particulate specimens, rapidly frozen in liquid ethane. A liquid
and plasma discharge stations for initial substrate preparation and cleaning. A manual freeze-plunger is
available for preparation of cryoEM samples of particulate specimens, rapidly frozen in liquid ethane. A liquid
nitrogen dewar is used for storing cryoEM specimens prior to use in the electron microscope.

High Field NMR Facility. The High Field NMR Facility at MKC is equipped with a state-of-the-art Oxford AS
600/51 spectrometer equipped with cryo and RT probes for high-resolution structural determinations. The
facility is equipped through the affiliated Protein Interaction and Dynamics core to assist researchers with
isotopic labeling, purification and characterization of target peptides and proteins as well as other biophysical
properties determinations relevant to NMR analysis including isothermal titration calorimetry, circular-
dichroism, dynamic light scattering, surface plasmon resonance, analytical ultracentrifugation, and
microcalorimetry. http://sbs.umkc.edu/research_nmr.cfm

X-Ray Crystallography Facility. UMKC is a member of the Southeast Regional Collaborative Access Team
operating two beam-lines at the Advance Photon Source at the Argonne National Laboratories. The UMKC
Crystallography Laboratory is also equipped to assist researcher with protein crystallization, crystallization and
preliminary screening of samples for signature protein diffraction with in-house instrumentation prior to beam-
line analysis. http://sbs.umkc.edu/research_xray.cfm

Libraries. The University Libraries at UMKC consists of three libraries: the Health Sciences Library, the Miller
Nichols Library and the Dental Library. This library system provides the researchers at UMKC many important
resources including: over 250 multi-disciplinary databases, including Alt Health Watch (complimentary
medicine) Medline, BIOSYS, Web of Science, Scopus, Embase, and International Pharmaceutical Abstracts;
online books from respective publishers like ScienceDirect, Wiley InterScience, and McGrawHill; and, online
journals from leading publishers, including the American Chemical Society, Nature Publishers, and Springer. If
a needed document is not found in the Libraries’ collection, the highly trained staff can obtain almost any
document, usually in just a couple of days or less. In addition, the librarians at the University Libraries offer all
researchers specialized liaison services, from one-on-one consultations at the start of a research project, to
assistance with data management plans, open access compliance assistance, copyright help and archiving.

UMKC CLINICAL PARTNERS

Truman Medical Centers (http://trumed.org/) is Kansas City’s essential, two acute-care safety net hospital
health system. The TMC Health System includes TMC Hospital Hill, TMC Lakewood, TMC Behavioral Health,
the Jackson County Health Department and a number of primary care practices throughout Eastern Jackson
County. TMC is also the primary teaching hospital for the University of Missouri-Kansas City Schools of health
sciences.

Truman Medical Center Hospital Hill. TMC Hospital Hill provides a wide array of outpatient medical
services. It is perhaps best known for its emergency and trauma services. TMC Hospital Hill has the busiest
adult emergency room in the Kansas City metropolitan area with more than 50,000 visits a year. TMC Hospital
Hill is also noted for Bariatrics, Asthma, Diabetes, Ophthalmology, high risk-obstetrics, and women’s health.

Truman Medical Center Lakewood. Primary Care, Family Medicine and Geriatrics are among the core
services at TMC Lakewood. TMC Lakewood has 112 acute care beds and 212 long-term care beds. It is a
primary care hospital offering a full range of therapeutic, diagnostic and rehabilitative services and more than
74,000 people receive their primary care at TMC Lakewood each year.

Saint Luke’s Hospital of Kansas City. As part of the Saint Luke’s Health Systems, a 10-hospital locally
owned and operated, not-for-profit, faith-based system, Saint Luke’s Hospital of Kansas City has served the
health care needs of the region for more than 130 years. Saint Luke’s provides tertiary and quaternary services
including: Level I Trauma Center; Level III Neonatal Intensive Care Nursery; comprehensive cardiac treatment
in the Mid America Heart Institute; center for women and children; Cancer Institute; Regional Arthritis Center;
Sexual Assault Treatment Center; Children’s S.P.O.T. (a developmental preschool speech and hearing
program); heart, kidney, and liver transplantation programs; and the Saint Luke’s Marion Bloch Neuroscience
Institute.

Children’s Mercy Kansas City. Children’s Mercy Kansas City have been providing exclusive medical service
to children for more than 100 years. Children’s Mercy Kansas City today provides the highest level of medical
care, technology, services, equipment and facilities all tailored to meet the intricate needs of its pediatric
patients. Children’s Mercy is the only Level I Pediatric Trauma Center in the region. Physicians representing
more than 40 pediatric specialties care for children who come from a 150-county region in western Missouri
and eastern Kansas. The hospital is nationally recognized in: Cardiac Surgery, Transplantation, Nephrology, Neonatology and more.

**Center for Behavioral Medicine.** The Center for Behavioral Medicine is an agency for the Department of Mental Health located on Hospital Hill and provides comprehensive psychiatric care to patients from Kansas City and the seven surrounding counties. CBM serves as the University of Missouri-Kansas City’s Department of Psychiatry, fulfilling academic and research needs. CBM offers services in alcoholism, drug, family, group and individual counseling, crisis intervention, group psychiatric therapy, and suicide prevention as well as hospital inpatient care, mental health aftercare and psychiatric care. The hospital also offers treatment to mentally ill patients with substance abuse problems.

**The Kansas City Veterans Administration Medical Center.** The Kansas City VAMC is one of eight medical centers in VISN 15. The mission of the KC VAMC is to provide high quality, comprehensive primary and tertiary healthcare to veterans in our service area, and to provide selected specialty care services to referred veterans. KC VAMC also provides education and training to healthcare professionals and performs research that benefits veterans. The KC VAMC offers residency training in all major medical and surgical specialties and subspecialties. Associated Health Training is offered in nursing, psychology, audiology, social work, dietetics, pharmacy, chaplaincy, health care administration and optometry.

**Research Medical Center.** Research Medical Center was founded more than 120 years ago and today is one of the crown jewels of the HCA Midwest Health System, with a new lobby and admitting areas, a renovated and expanded Cancer Center and Women’s Care Unit, new private patient rooms, and an expanded emergency room. The 22,000-square foot Cancer Center is a comfortable outpatient facility and a dedicated inpatient oncology unit. The Liver and Pancreas Institute is the first unit in the Midwest to provide specialized care to patients who suffer liver, pancreas and biliary cancers. The Transplant Institute has received national recognition for best outcomes in kidney-pancreas transplants.  www.researchmedicalcenter.com

**FRONTIERS AFFILIATE INSTITUTIONS**

**KANSAS CITY UNIVERSITY OF MEDICINE AND BIOSCIENCES**

The Kansas City University of Medicine and Biosciences (KCU) campus houses a private, post-baccalaureate, not-for-profit institution of higher education (Figure FR-O.13). Founded in 1916, KCU is one of the oldest of 145 medical schools in the United States, and is the oldest in Kansas City, Missouri. The location of the university campus in the heart of the downtown district of Kansas City, Missouri provides access to a rich, multi-cultural community that can be

Figure FR-0.13. Kansas City University of Medicine and Biosciences
RESEARCH ADMINISTRATION

Office of Research and Sponsored Programs. The growth of research infrastructure and culture at KCU has been remarkable over the last three years. A focus of the university strategic plan has been on fostering an environment supportive of research. Dr. Jeffrey Joyce was hired as Vice-President for the Office of Research and Sponsored Programs approximately three years ago. Dr. Joyce has enhanced the intellectual environment with opportunities for faculty to discuss and share ideas creatively to support the research endeavor at KCU. Science Fridays and the University Lecture Series occur throughout the year, and provide a rich scientific environment that is strongly supportive of research, and therefore, the success of this partnership with KUMC.

Some of the existing research support capacity has been enhanced, and a significant increase in funding from federal research grant awards has occurred. The Office of Research and Sponsored Programs (ORSP) also provides pre and post award support for research grants as well as compliance oversight by the KCU Manager of Research Compliance who is charged with promoting and supporting ethical research at KCU. Mechanisms devoted to increase the practice and quality of ethical research include education and training via on-line modules, small-group presentations, and one-on-one contacts. Some of this training is mandatory, and must be completed prior to beginning the research, and must be updated annually. In particular, all investigators and personnel participating in human subjects or animal research are required to complete the appropriate basic education program developed by the Collaborative Institutional Training Initiative (CITI). The ORSP provides a fully functioning Institutional Review Board (IRB) and an Institutional Animal Care and Use Committee (IACUC). Members of these committees must complete mandatory CITI training. In addition, committee members must also participate in on-going training during committee meetings. KCU has a fully operational animal laboratory facility located on campus, and has submitted an application for OLAW approval. The ORSP is also responsible for the Conflict of Interest program which assures and monitors investigator compliance with institutional policy on financial conflict of interest.

Biological Safety. KCU operates a Biological Safety Program and has an Institutional Biosafety Committee (IBC) to review all research activities involving recombinant DNA or the deliberate infection of experimental animals, as required by the NIH Guidelines for Research Involving Recombinant DNA Molecules, and by university policy. A mandatory, web-based Biosafety Training Program for both investigators and their laboratory personnel is required. Approved programs are subject to annual continuing review, and all laboratories of IBC-approved programs are inspected by our biological safety officer (BSO). IBC committee members must also participate in mandatory training modules.

PHYSICAL INFRASTRUCTURE

Office Space. Office space provided for research faculty members is fully equipped with desks, chairs, file cabinets, bookshelves, and computer stations with laptop computers, desk jet and laser printers, and scanners. Those designated spaces have multiple high speed T1 access to the internet through the site: www.KCUMB.edu. The Ethernet connection allows for continuous access to the Internet and connection to the University Library. Faculty can perform literature and database searches directly from their offices. KCU is fully interconnected via a Novell Local Area Network. The university also provides file sharing, networked printing, and e-mail access. Research faculty have easy access to many regularly updated word processing, graphics, statistical, and data analyses programs as needed. (ex. IBM SPSS Statistics 22). Faculty can access a variety of medical applications loaded at the workstation and file server level. Other services provided by the IT department include computer application training, helpdesk services, distance education, and 24-hour on-call IT staff availability for emergencies. The PI’s lab is equipped with a desktop computer, with redundancy back up storage for large data-sets, and another laser printer.
Library. The Library reference service offers assistance with research, teaching, and other information needs by performing literature searches in MEDLINE (PubMed), MD Consult, OVID, EBM Reviews (OVID), ScienceDirect, OSTMed.DR, Natural Standard, ERIC, Google Scholar, EBSCO, and Gale databases. Other databases are also available for information requests and include: Access Medicine, Access Pediatrics, Access Surgery, CDC, USA.gov, Clinical Pharmacology, John Hopkins ABX Guide, Journal Citation Reports, Medical Letter, First Consult, Up-to-date, MedlinePlus, New Bank, Springer Images, and Ulrich’s Periodical Index. Reference questions or search requests are provided for KCU faculty and clinical community faculty without charge. Interlibrary Loan service augments the holdings of the D’Angelo Library by providing access to other national and international library collections.

KCU is invested in the success of our research faculty, and will provide resources in the form of logistical support such as administrative management, oversight, and best practices training and financial support such as protected faculty time for research associated with this partnership. The facilities and other resources available to research faculty and their research teams will include everything needed to successfully undertake, support, and complete this research partnership.

COMMUNITY PROGRAM

Score 1 for Health. The University has access to unique and diverse patient populations as a result of our affiliations with several area hospitals and clinics that provide our student rotations for third and fourth year medical student training. Score 1 for Health is another program located on the campus of KCU. This program has been providing free in-school health screening to children (K-5th) for more than fifteen years. Targeting elementary schools that enroll 50% or more of their students in the free lunch program, Score 1 screens approximately 14,000 students annually, and to date has screened over 100,000 students. KCU clinical faculty and medical students conduct these screenings, along with the Score 1 for Health registered nurses, allied health professionals and nursing students from schools in the Kansas City metro area. These screenings include height and weight assessments including calculation of BMI, hearing tests, blood pressure tests, dental checks and a head-to-toe physical assessment. An annual assessment of the student screening data is conducted and a corresponding report is produced.

TRUMAN MEDICAL CENTERS

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- **Truman Medical Center Hospital Hill** TMC Hospital Hill provides a wide array of outpatient medical services. It is perhaps best known for its emergency and trauma services. TMC Hospital Hill has the busiest adult emergency room in the Kansas City metropolitan area with more than 50,000 visits a year. TMC Hospital Hill is also noted for Bariatrics, Asthma, Diabetes, Ophthalmology, high risk-obstetrics, and women’s health.

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SAINT LUKE’S HOSPITAL
As part of the Saint Luke’s Health Systems, a 10-hospital locally owned and operated, not-for-profit, faith-based system, Saint Luke’s Hospital of Kansas City has served the health care needs of the region for more than 130 years. Saint Luke’s provides tertiary and quaternary services including: Level I Trauma Center; Level III Neonatal Intensive Care Nursery; comprehensive cardiac treatment in the Mid America Heart Institute; center for women and children; Cancer Institute; Regional Arthritis Center; Sexual Assault Treatment Center; Children’s S.P.O.T. (a developmental preschool speech and hearing program); heart, kidney, and liver transplantation programs; and the Saint Luke’s Marion Bloch Neuroscience Institute. The hospital is the primary teaching hospital for the University of Missouri–Kansas City School of Medicine, which includes a physician residency program. The Saint Luke’s health system boasts a network of more than 600 physicians representing over 60 medical subspecialties. In 2014, the Saint Luke’s Central Office of Research Administration reported 131 active studies, 2,659 patient enrolled in studies, 174 publications, and 243 abstracts/presentations.

SWOPE HEALTH SERVICES
Swope is a patient-centered medical home that provides primary health care and behavioral health services in Kansas City. Swope Health Services mission is to improve the health and wellness of the community by delivering accessible, quality, comprehensive patient care. Today, Swope Health Services provides care for more than 40,000 patients in western Missouri and eastern Kansas.

The PCI program in Frontiers Hub Research Capacity component uses the Swope Health Center to increase enrollment in clinical trials to include their largely minority, underserved population. The PCI program has dedicated research space at Swope that includes 2215 sq ft of space that includes 10 offices and 3 workstations. The space enhances access to the patient population served at Swope and provides the space to accommodate over 2400 research assessments annually. Currently, there are three smoking cessation projects including two R01 funded projects led by Drs. Nollen (DA031815) and Cox (DA035796) and a PCORI-funded project (AD-1310-08709) led by Dr. Nollen. Additionally, the satellite presence created opportunities for the KU AD Center to participate in an NIA funded multi-site trial of aspirin in reducing clinical events in older adults.

CENTER FOR PRACTICAL BIOETHICS
The Center for Practical Bioethics is a nonprofit, free-standing and independent organization nationally recognized for its work in practical bioethics. For more than 30 years, the Center has helped patients and their families, healthcare professionals, policymakers and corporate leaders grapple with difficult issues in healthcare and research involving patients. The Center does not wait to be called upon. Their vision and mission requires them to be proactive — to call attention to ethical issues and to develop programs, policies and publications that address them. Through this unique approach, the Center puts “practical bioethics” into action. A dedicated Board of Directors and staff representing multiple disciplines and fields of expertise, as well as individuals and organizations throughout the nation committed to advancing ethical practices and policies in health and healthcare, support the Center.

PAIN KC: For the past three years, Frontiers staff has facilitated a community group of people living with chronic pain called PAINS KC. This group is a grassroots response to the IOM Report calling for action to address the widespread public health problem of chronic pain. The group meets in the Clinical Research Center facility monthly and includes patients, family members and caregivers. This venue is particularly appreciated by the community for its easy access for wheelchairs and those with mobility limitations as well as ample, nearby parking and public transportation.
To the research community:

We are celebrating continued research success at the University of Kansas Medical Center Research Institute, and we thank you for your interest in learning more about us.

This annual report, in addition to summarizing the scope of basic and clinical research and other sponsored research activity at our institution, describes some of our key strengths. At KU Medical Center, our researchers are among the nation's best, and we are competitive on a national stage.

KU Medical Center is one of just 21 medical centers in the country to have a nationally-designated Alzheimer's Disease Center, a National Cancer Institute-designated Cancer Center and a Clinical and Translational Science Award from the National Institutes of Health. Our researchers have been among the nation's leaders in obtaining funding from the relatively new Patient-Centered Outcomes Research Institute.

But beyond our success in obtaining federal funding, conducting cutting-edge clinical trials and in advancing basic science research, we are most proud of our work that has an impact on the lives of patients.

From looking at new chemical compounds in the laboratory that hold promise in the fight against conditions like sickle cell disease to new ideas to fight Alzheimer's disease with diet and exercise, our investigators are advancing medical knowledge every day.

We hope you enjoy this report, and that you learn a few things you may not have already known about our research activity.

Sincerely,

Richard Barohn, M.D.
Vice Chancellor for Research
KU Medical Center Research Institute
The University of Kansas Medical Center

Jamie Caldwell
Executive Director, KU Medical Center Research Institute
Associate Vice Chancellor for Research Administration
The University of Kansas Medical Center
Researchers at the University of Kansas Medical Center have been successful in obtaining grants from the Patient-Centered Outcomes Research Institute, an independent nonprofit organization supported in part by the Affordable Care Act. KU Medical Center was notified of three awards totaling more than $10 million for three new projects: a new electronic medical record data network, a new clinical trial to evaluate four drugs for the treatment of pain associated with neuropathy and a new trial to examine the effectiveness of long-term nicotine replacement therapy for patients with chronic obstructive pulmonary disease. Another large project in October received $10 million to focus on fighting obesity in rural areas.
"One of our primary missions at KU Medical Center is to improve the health of all Kansans, with a special emphasis on those who are living in underserved areas."

Fighting obesity in rural areas

A research team at the University of Kansas Medical Center is using a $10 million funding award by the Patient-Centered Outcomes Research Institute (PCORI) to study the comparative effectiveness of obesity treatment options in rural communities.

The study was one of 46 proposals PCORI approved for funding in September 2014 to advance the field of comparative effectiveness research (CER) and provide patients, healthcare providers and other clinical decision makers with information that will help them make better-informed choices.

Christie Befort, Ph.D., associate professor of preventive medicine and public health, will lead the research project at KU. The study is one of two obesity-focused studies that PCORI selected to explore ways to reduce disparities in health care and outcomes for individuals who are disproportionately affected by obesity.
Nearly 20 percent of the population in the United States lives in rural communities. Rural residents suffer disproportionately from obesity and have less access to effective weight loss programs.

Befort’s study will evaluate different approaches for treating obesity in primary care settings. Her three-arm study will compare the traditional, fee-for-service model with models that coordinate services either in the context of a patient-centered medical home or through a telephone-delivered disease management program.

The study calls for one of the three treatment approaches to be delivered at 36 primary care practices located in Kansas, Nebraska, Wisconsin and Iowa. Patients’ weight loss at 24 months will be used to measure the effectiveness of the different approaches. Approximately 1,400 patients will participate.

The project, the Midwestern Collaborative for Treating Obesity in Rural Primary Care, will last five years. Befort worked with a patient advisory panel to shape the treatment approaches and also engaged with rural primary care providers, insurers, the American Academy of Family Physicians, the National Committee for Quality Assurance and state health departments.

The study is one of two obesity-focused studies that PCORI selected from 490 submissions that responded fully to all of the funding announcements PCORI issued in February 2014. They were selected through a highly competitive review process in which patients, clinicians and other stakeholders joined clinical scientists to evaluate the proposals. Applications were assessed for scientific merit, how well they will engage patients and other stakeholders, and their methodological rigor among other criteria.

“One of our primary missions at KU Medical Center is to improve the health of all Kansans, with a special emphasis on those who are living in underserved areas,” said Douglas Girod, M.D., executive vice chancellor of KU Medical Center. “This award and the research that comes out of it will go a long way in helping rural residents in our state live healthier and longer lives.”
Leading the fight against Alzheimer's disease

The KU Alzheimer's Disease Center is one of just 29 national Alzheimer’s Disease Centers designated and funded by the National Institute on Aging. Each center has its own unique area of emphasis. The KU center focuses on mitochondrial genomics, metabolism and neuroimaging. Collaborative studies and clinical trials draw upon the expertise of scientists from many different disciplines as they work together to promote healthy brain aging and find strategies to prevent Alzheimer’s disease.
"If, by any chance, I can be a small part of this study, I will feel as if I could be of help to my mother, all those who came before her and the millions who will come after her."

A key area of focus for the Alzheimer's Disease Center at the University of Kansas Medical Center is on prevention of disease.

The center's leaders, Jeffrey Burns, M.D., and Russell Swerdlow, M.D., both professors of neurology at KU Medical Center, focus on exercise and brain metabolism as ways to potentially stave off the disease.

Burns often points out that even if researchers could find a way to delay the onset of the disease by five years, they could cut the prevalence of the disease in half.

In 2014, scientists at the center participated in several studies, including a national study to determine whether a new antibody treatment can prevent the onset of memory problems before they arise.

The national study, called the "Anti-Amyloid Treatment in Asymptomatic Alzheimer's" study - or the A4 study - will seek to enroll 1,000 adults...
between the ages of 65 to 85 who may be at higher risk for developing the disease, but who have no symptoms. The study will take place at trial sites across the United States, Canada and Australia.

The development of amyloid plaques in the brain has been linked to the development of Alzheimer’s disease. The study will seek to determine whether a drug treatment can slow memory loss associated with the buildup of the plaques.

“Our Alzheimer’s Disease Center is a national leader in research into the prevention of Alzheimer’s disease,” Burns said. “Our participation in this study complements our other work, including studies where we are trying to determine the role exercise can play in reducing the buildup of these plaques in the brain.”

The center frequently works with patients and volunteers in clinical studies, many of whom volunteer for repeat studies. Joann Bell, of Olathe, Kan., volunteered to participate in the new A4 study in 2014. Though she herself shows no signs of Alzheimer’s, Bell served as the primary caregiver for her mother, who struggled with the disease for years.

“If, by any chance, I can be a small part of this study, I will feel as if I could be of help to my mother, all those who came before her and the millions who will come after her,” Bell said.

The study is one of a range of different efforts ongoing at the KU Alzheimer’s Disease Center, which has been conducting new Alzheimer’s trials and other research efforts since being awarded a five-year, $6 million grant from the National Institute on Aging in 2011. 

Ian Weidling, graduate student.
Basic science research helps form the bedrock of medical knowledge. At the University of Kansas Medical Center, our scientists are working on a wide array of projects to expand the basis for further clinical study. One such study, conducted by Kenneth Peterson, Ph.D., professor and vice chairman of the Department of Biochemistry and Molecular Biology, led to a new discovery that could lead to new treatments for sickle cell disease, along with many other blood disorders. Peterson collaborated with the High Throughput Screening Laboratory on the KU campus in Lawrence to help make the discovery.
"If we can find an existing drug or new compound that can treat these disorders in a cost-effective way, it would be a great scientific and medical achievement."

Discovering chemical compounds today to fight diseases tomorrow

A University of Kansas School of Medicine scientist discovered chemical compounds that may lead to a new treatment for sickle cell disease and other genetic blood disorders.

Kenneth Peterson, Ph.D., a professor and vice chair of the Department of Biochemistry and Molecular Biology at KU Medical Center, working with researchers at the High Throughput Screening Laboratory on the KU campus in Lawrence, has come up with a list of compounds that have the potential to turn on fetal hemoglobin, which can help negate the effects of sickle cell disease, Cooley's anemia and some forms of beta thalassemia.

Sickle cell disease is caused by a mutated version of the beta-globin gene that helps make hemoglobin - a protein that carries oxygen in red blood cells. The mutated gene causes red blood cells to form into a crescent shape, which block capillaries and
causes them to break apart easily, causing severe pain, anemia, organ damage and stroke. More than 100,000 people have sickle cell disease in the United States.

Peterson says a lot of gene therapy research has focused on ways to fix the mutated gene to prevent sickle cell disease in the future. However, this approach requires technologies that are not generally available and are cost-prohibitive. He says inexpensive treatments are needed now.

"There are millions of people in the world with sickle cell and other genetic blood diseases, particularly in Third World countries" Peterson says. "If we can find an existing drug or new compound that can treat these disorders in a cost-effective way, it would be a great scientific and medical achievement."

Peterson says there has never been a comprehensive screen for compounds for genetic red blood disorders before this simply because the tools to do it haven't been available. He says one major hurdle was cleared when he was able to derive mouse cells containing the entire human beta-globin locus from genetically modified mice. Those cells were then used in a screen at the KU High Throughput Screening Lab in Lawrence.

"What we were searching for were compounds that that would turn on a fetal form of hemoglobin, which would counteract the symptoms associated with the mutated gene," Peterson says.

The initial screen found 232 base compounds that could fit those criteria. Peterson says they eventually narrowed it down to the seven most promising compounds. Those seven compounds were re-screened with a human cell line, and the results were replicated.

Peterson says the next step is to test the seven compounds in mice and to work with medicinal chemists at KU to make sure the compounds are safe for humans.

"This is a great example of what kinds of breakthroughs can occur when researchers on our two campuses work together, and demonstrates the importance of basic research as a driver for discovery of new medical treatments," Peterson says.
"We're looking forward to helping to lead the national conversation about ways to advance scientific knowledge faster by creating better studies and analyzing data more."

The KU Medical Center-led Great Plains Collaborative Network received an $8.6 million dollar grant to continue its work on establishing a network of medical centers in the Midwest to connect electronic medical record systems and building tools that can use patient data to answer specific research questions. The grant came from the Patient-Centered Outcomes Research Institute (PCORI), an independent organization authorized by the U.S. Congress in 2010 as part of the Patient Protection and Affordable Care Act.

L. Russell Waitman, Ph.D., director of medical informatics and assistant vice chancellor for Enterprise Analytics at KU Medical Center, is the principal investigator on the project. Waitman says grant will allow Great Plains Collaborative Network to build relationships with other institutions and broaden the scope of its work.

"We're looking forward to helping to lead the national conversation about ways to advance scientific knowledge faster by creating better studies and analyzing data more," Waitman said.

The network is building a data set from electronic medical records that will be used to contribute to new research in the fields of breast cancer, obesity and amyotrophic lateral sclerosis (also known as ALS, or Lou Gehrig's disease).
Young clinical researchers at the beginning of their careers at the University of Kansas Medical Center can often struggle to find financial support for their projects.

Sometimes, a boost from a career development program from KU Medical Center's Clinical and Translational Science Award (CTSA) grant can help propel promising researchers to bigger grants. Megha Ramaswamy, Ph.D., M.P.H., associate professor of preventive medicine and public health, participated in that program and is using a $1.5 million grant from the National Cancer Institute to examine ways to lower the rates of cervical cancer among incarcerated women.

Ramaswamy has done extensive research into why cervical cancer rates are four to five times higher among women in jails or prisons than in women who aren’t incarcerated.

"It’s pretty treatable if women get Pap screenings once every three years. Doctors can detect cancerous cells, and then women can get treated," Ramaswamy says.

Ramaswamy and her collaborators conducted an earlier research study that attempted to understand incarcerated women’s experiences with Pap tests and follow-up.

"The findings of that study showed that these women indeed had incredible deficits in knowledge. They also had problems with self-efficacy and confidence navigating the system. In many cases, they also lacked money, transportation and social support," she says.

The new study will follow 100 incarcerated women in Wyandotte County and 100 women in Jackson County for three years. The researchers will test whether a 10-hour interactive session conducted over a weeklong period in jail will help women increase their reproductive health knowledge and lead to positive changes in health behaviors.

Ramaswamy says that while it may seem like a simple solution, she and her team will also work over three years to tease out the complex set of factors related to the women’s health behaviors.

After following the study participants that long, Ramaswamy said that they will be able to help answer key questions that still remain about sexual and reproductive health care for women with criminal justice histories, which is relatively understudied in medical research, she says. ■

This project is supported by a grant from the National Institutes of Health, 1R01CA1811047, and a Clinical and Translational Science grant from the National Center for Advancing Translational Sciences awarded to KU Medical Center for Frontiers, #UL1TR000001.
FY 2013/14 - 2014/15
Extramural Awards Summary

In fiscal year 2014/15, extramural awards from all sources (including KU Endowment funds) totaled just over $108 million, about a 6 percent decrease from last year's totals.

Figure 1
FY 2014 and FY 2015 Extramural Award Summary

Table 1
Research Activities for FY 2013/14 - FY 2014/15

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<thead>
<tr>
<th></th>
<th>FY 2013/14 ($)</th>
<th>FY 2014/15 ($)</th>
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FY 2005 - 2015
Awards by School

Figure 4. School of Medicine - KC Awards for FY 2005 - FY 2015 (Million $)

Figure 5. School of Medicine - Wichita Awards for FY 2005 - FY 2015 (Million $)

Figure 6. School of Health Professions Awards for FY 2005 - FY 2015 (Million $)

Figure 7. School of Nursing Awards for FY 2005 - FY 2015 (Million $)
## FY 2013/14
Awards by Funding Agency Type

<table>
<thead>
<tr>
<th>Department</th>
<th>National Institutes of Health*</th>
<th>Other Federal Agencies‡</th>
<th>State of Kansas</th>
<th>Private Awards / Other Sources‡</th>
<th>Private Clinical Trials‡</th>
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<th># of Awards</th>
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| School of Health Professions | $1,733,336                     | $209,000               | $73,809        |                                 |                          | $2,016,145       | 14          |
| Dietetics & Nutrition        | $1,078,459                     |                        | $165,000       |                                 |                          | $1,317,268       | 8           |
| Hearing & Speech             | $387,217                       |                        |                |                                 |                          | $387,217         | 2           |
| Physical Therapy Rehabilitation Sciences | $267,660                    |                        | $44,000        |                                 |                          | $311,660         | 4           |

| School of Medicine | $57,392,266 | $12,737,633 | $657,179 | $14,019,397 | $8,818,910 | $93,625,385 | 679 |
| School of Medicine - Kansas City Campus | $56,501,724 | $10,429,677 | $518,772 | $13,802,904 | $8,220,799 | $89,473,876 | 648 |

| Administration | $75,505 | $75,505 | 1 |
| Basic Science Departments | $26,470,978 | $2,467,956 | $76,928 | $3,387,798 | $32,603,660 | 112 |
| Anatomy & Cell Biology | $7,632,808 | $75,000 | $330,153 | $8,037,961 | 15 |
| Biochemistry | $1,316,773 | $160,000 | $1,476,773 | 6 |
| Biostatistics | $239,713 | $1,928 | $335,378 | $577,019 | 5 |
| Cancer Biology | $1,303,628 | $1,503,965 | $678,086 | $3,485,679 | 16 |
| Microbiology, Molecular Genetics & Immunology | $4,728,146 | $219,558 | $4,947,704 | 16 |
| Molecular & Integrative Physiology | $4,022,544 | $159,555 | $418,885 | $4,600,984 | 21 |

*Including clinical trials and indirect grants

1Other federal agencies - DoD, NSF FDA; Private/non-federal/foundations - American Heart Association, American Cancer Society, Pew Scholars/Searle Scholars, Patient Centered Outcomes Research Institute or "PCORI" Private clinical trials - industry sponsored.
## FY 2013/14
### Awards by Funding Agency Type

<table>
<thead>
<tr>
<th>Department</th>
<th>National Institutes of Health*</th>
<th>Other Federal Agencies†</th>
<th>State of Kansas</th>
<th>Private Awards / Other Sources†</th>
<th>Private Clinical Trials‡</th>
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†Other federal agencies - DoD, NSF, FDA, Private/non-federal/foundations - American Heart Association, American Cancer Society, Pew Scholars/Searle Scholars, Patient Centered Outcomes Research Institute or "PCORI" Private clinical trials - Industry sponsored.
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<th>Private Clinical Trials‡</th>
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<tr>
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*Including clinical trials and indirect grants
†Other federal agencies - DoD, NSF, FDA, Private non-federal foundations - American Heart Association, American Cancer Society, Pew Scholars/Seaver Scholars, Patient Centered Outcomes Research Institute or "PCORI" Private clinical trials - industry sponsored.
## FY 2014/15
Awards by Funding Agency Type

<table>
<thead>
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<th>Department</th>
<th>National Institutes of Health*</th>
<th>Other Federal Agencies†</th>
<th>State of Kansas</th>
<th>Private Awards/Other Sources†</th>
<th>Private Clinical Trials†</th>
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*Including clinical trials and indirect grants
†Other federal agencies - DoD, NSF FDA, Private/non-federal/institutions - American Heart Association, American Cancer Society, Pew Scholars/Seerle Scholars, Patient Centered Outcomes Research Institute or "PCORI" Private clinical trials - industry sponsored
# FY 2014/15

## Awards by Funding Agency Type

<table>
<thead>
<tr>
<th>Department</th>
<th>National Institutes of Health*</th>
<th>Other Federal Agencies‡</th>
<th>State of Kansas</th>
<th>Private Awards / Other Sources‡</th>
<th>Private Clinical Trials‡</th>
<th>Total</th>
<th># of Awards</th>
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*Including clinical trials and indirect grants
‡Other federal agencies - DoD, NSF FDA, Private/non-federal/foundations - American Heart Association, American Cancer Society, Pew Scholars/Searle Scholars, Patient-Centered Outcomes Research Institute or "PCORI" Private clinical trials - industry sponsored.
# Departments with Highest Total Award Dollars

In fiscal year 2015, 20 departments, centers and institutes earned at least $1 million in total award funding, led by the departments of internal medicine, neurology and anatomy and cell biology.

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Grants and Clinical Trials Managed by the Research Institute

In fiscal year 2015, 23 departments, centers and institutes earned grants and 15 departments, centers and institutes participated in clinical trials.

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<td>11</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>All Other Units</td>
<td>103</td>
</tr>
</tbody>
</table>

*All other units include but not limited to the following: Laboratory Animal Resources, Library, Police, Emergency Room, Project EAGLE, Radiation Oncology, Radiology, Alternative Medicine, Surgery Plastics, Pharmacy, KU Alzheimer's Disease Center, Telemedicine, Biostatistics, Anesthesiology, Bioinformatics and Cardiovascular.*
Extramural Expenditures Summary and Expenditures by Funding Source

Total extramural expenditures for FY 2015 were $114 million, an increase of almost 5 percent from the last fiscal year. (Note: These amounts include funds on deposit with the KU Medical Center RI and KU Medical Center, but do not include amounts from other institutions.)

Figure 9.
Total Extramural Expenditures, FY 2005 - 2015 (Million $)

Figure 10.
Federal Funds as a Percent of Total Extramural Expenditures, FY 2005 - FY 2015

Expenditures are separated into four major categories by sponsor: federal, state, industry and other private sponsors. The table shows trends in these data going back 10 years.

Table 6
Total Extramural Expenditures by Funding Source, FY 2005-FY 2015 (Thousand $)

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Federal Government</th>
<th>State &amp; Local Government</th>
<th>Industry</th>
<th>Not-for-Profit &amp; Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>59,176</td>
<td>34</td>
<td>5,273</td>
<td>7,606</td>
<td>72,089</td>
</tr>
<tr>
<td>2006</td>
<td>58,785</td>
<td>126</td>
<td>5,452</td>
<td>10,201</td>
<td>74,563</td>
</tr>
<tr>
<td>2007</td>
<td>60,653</td>
<td>94</td>
<td>5,532</td>
<td>14,109</td>
<td>80,388</td>
</tr>
<tr>
<td>2008</td>
<td>62,765</td>
<td>592</td>
<td>5,019</td>
<td>16,033</td>
<td>84,409</td>
</tr>
<tr>
<td>2009</td>
<td>67,420</td>
<td>316</td>
<td>4,190</td>
<td>21,201</td>
<td>93,128</td>
</tr>
<tr>
<td>2010</td>
<td>70,819</td>
<td>959</td>
<td>4,053</td>
<td>21,336</td>
<td>97,167</td>
</tr>
<tr>
<td>2011</td>
<td>82,468</td>
<td>913</td>
<td>4,938</td>
<td>20,213</td>
<td>108,532</td>
</tr>
<tr>
<td>2012</td>
<td>78,415</td>
<td>1,182</td>
<td>4,841</td>
<td>24,768</td>
<td>109,206</td>
</tr>
<tr>
<td>2013</td>
<td>75,734</td>
<td>909</td>
<td>8,288</td>
<td>28,522</td>
<td>113,453</td>
</tr>
<tr>
<td>2014</td>
<td>68,772</td>
<td>1,024</td>
<td>8,807</td>
<td>30,104</td>
<td>108,709</td>
</tr>
<tr>
<td>2015</td>
<td>68,116</td>
<td>832</td>
<td>8,170</td>
<td>36,927</td>
<td>114,045</td>
</tr>
</tbody>
</table>
Principle Investigators with Highest Total Award Dollars

In fiscal year 2015, 20 principal investigators were awarded more than $1 million in total award dollars. These investigators are listed below.

**FY 2014**

<table>
<thead>
<tr>
<th>Amount</th>
<th>Investigator</th>
</tr>
</thead>
<tbody>
<tr>
<td>$5.6M</td>
<td>Richard Barohn</td>
</tr>
<tr>
<td>$5.51M</td>
<td>Heather Schrotberger</td>
</tr>
<tr>
<td>$2.68M</td>
<td>Lemuel Waitman</td>
</tr>
<tr>
<td>$4.55M</td>
<td>Douglas Wright</td>
</tr>
<tr>
<td>$2.35M</td>
<td>Peter Smith</td>
</tr>
<tr>
<td>$2.64M</td>
<td>Paul Terranova</td>
</tr>
<tr>
<td>$2.15M</td>
<td>Dale Abrahamson</td>
</tr>
<tr>
<td>$2.03M</td>
<td>Hartmut Jaeschke</td>
</tr>
<tr>
<td>$1.17M</td>
<td>Michael Soares</td>
</tr>
<tr>
<td>$1.38M</td>
<td>Jeffrey Burns</td>
</tr>
<tr>
<td>$2.05M</td>
<td>Roy Jensen</td>
</tr>
<tr>
<td>$1.3M</td>
<td>Joseph Lutkenhaus</td>
</tr>
<tr>
<td>$1.4M</td>
<td>Christie Befort Cardador</td>
</tr>
<tr>
<td>$1.3M</td>
<td>Russell Swerdlow</td>
</tr>
<tr>
<td>$1.4M</td>
<td>Keith Greiner, Jr.</td>
</tr>
<tr>
<td>$1.41M</td>
<td>Joseph Donnelly, Jr.</td>
</tr>
<tr>
<td>$1.07M</td>
<td>Nicole Nollen</td>
</tr>
<tr>
<td>$1.07M</td>
<td>Jinx Wang</td>
</tr>
<tr>
<td>$1.07M</td>
<td>Alan Shiu Leun Yu</td>
</tr>
<tr>
<td>$1.07M</td>
<td>Wenxing Ding</td>
</tr>
<tr>
<td>$1.07M</td>
<td>Nancy Dunton</td>
</tr>
<tr>
<td>$1.07M</td>
<td>Andrew Godwin</td>
</tr>
<tr>
<td>$1.07M</td>
<td>Michael Heggeness</td>
</tr>
<tr>
<td>$1.07M</td>
<td>Christine Daley</td>
</tr>
<tr>
<td>$1.07M</td>
<td>Won Sup Choi</td>
</tr>
</tbody>
</table>

**FY 2015**

<table>
<thead>
<tr>
<th>Amount</th>
<th>Investigator</th>
</tr>
</thead>
<tbody>
<tr>
<td>$6.18M</td>
<td></td>
</tr>
<tr>
<td>$4.91M</td>
<td></td>
</tr>
<tr>
<td>$4.55M</td>
<td></td>
</tr>
<tr>
<td>$4.55M</td>
<td></td>
</tr>
<tr>
<td>$3.84M</td>
<td></td>
</tr>
<tr>
<td>$2.9M</td>
<td></td>
</tr>
<tr>
<td>$2.64M</td>
<td></td>
</tr>
<tr>
<td>$2.19M</td>
<td></td>
</tr>
<tr>
<td>$2.08M</td>
<td></td>
</tr>
<tr>
<td>$1.77M</td>
<td></td>
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<td>$1.66M</td>
<td></td>
</tr>
<tr>
<td>$1.59M</td>
<td></td>
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<td>$1.57M</td>
<td></td>
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<tr>
<td>$1.54M</td>
<td></td>
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<tr>
<td>$1.46M</td>
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<tr>
<td>$1.44M</td>
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<td>$1.42M</td>
<td></td>
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<td>$1.41M</td>
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<td>$1.05M</td>
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<tr>
<td>$1.05M</td>
<td></td>
</tr>
<tr>
<td>$1.03M</td>
<td></td>
</tr>
</tbody>
</table>
NIH Rankings

In the 2013/14 federal fiscal year:

- The School of Health Professions ranked 17th in the country with $1.5 million in NIH funding from five awards.
- The School of Medicine ranked 60th in the country with $51.2 million in NIH funding from 118 awards.
- The School of Nursing ranked 53rd in the country with $560,000 in NIH funding from one award.

<table>
<thead>
<tr>
<th>School of Health Professions</th>
<th>Total # of NIH Awards</th>
<th>Total NIH $ Awarded (Millions)</th>
<th>School Rank (All Institutions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>7</td>
<td>1.61</td>
<td>8</td>
</tr>
<tr>
<td>2007</td>
<td>6</td>
<td>2.06</td>
<td>7</td>
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<tr>
<td>2008</td>
<td>3</td>
<td>1.25</td>
<td>12</td>
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<tr>
<td>2009</td>
<td>4</td>
<td>0.98</td>
<td>18</td>
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<tr>
<td>2010</td>
<td>4</td>
<td>0.76</td>
<td>24</td>
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<tr>
<td>2011</td>
<td>4</td>
<td>0.52</td>
<td>27</td>
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<tr>
<td>2012</td>
<td>6</td>
<td>1.18</td>
<td>11</td>
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<tr>
<td>2013</td>
<td>6</td>
<td>1.71</td>
<td>14</td>
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<tr>
<td>2014</td>
<td>5</td>
<td>1.50</td>
<td>17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>School of Medicine</th>
<th>Total # of NIH Awards</th>
<th>Total NIH $ Awarded (Millions)</th>
<th>School Rank (All Institutions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>95</td>
<td>36.9</td>
<td>76</td>
</tr>
<tr>
<td>2007</td>
<td>110</td>
<td>45.4</td>
<td>70</td>
</tr>
<tr>
<td>2008</td>
<td>116</td>
<td>45.2</td>
<td>67</td>
</tr>
<tr>
<td>2009</td>
<td>114</td>
<td>46.6</td>
<td>66</td>
</tr>
<tr>
<td>2010</td>
<td>133</td>
<td>50.5</td>
<td>63</td>
</tr>
<tr>
<td>2011</td>
<td>146</td>
<td>55.7</td>
<td>59</td>
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<tr>
<td>2012</td>
<td>129</td>
<td>49.8</td>
<td>63</td>
</tr>
<tr>
<td>2013</td>
<td>112</td>
<td>48.2</td>
<td>60</td>
</tr>
<tr>
<td>2014</td>
<td>118</td>
<td>51.2</td>
<td>60</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>School of Nursing</th>
<th>Total # of NIH Awards</th>
<th>Total NIH $ Awarded (Millions)</th>
<th>School Rank (All Institutions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>6</td>
<td>2.17</td>
<td>19</td>
</tr>
<tr>
<td>2007</td>
<td>3</td>
<td>1.31</td>
<td>34</td>
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<td>2008</td>
<td>3</td>
<td>1.45</td>
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<tr>
<td>2009</td>
<td>3</td>
<td>1.44</td>
<td>31</td>
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<tr>
<td>2010</td>
<td>3</td>
<td>1.31</td>
<td>31</td>
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<td>2011</td>
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<td>0.69</td>
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<tr>
<td>2012</td>
<td>1</td>
<td>0.39</td>
<td>58</td>
</tr>
<tr>
<td>2013</td>
<td>1</td>
<td>0.62</td>
<td>47</td>
</tr>
<tr>
<td>2014</td>
<td>1</td>
<td>0.56</td>
<td>53</td>
</tr>
</tbody>
</table>

Notes: American Recovery and Reinvestment Act awards are not included. Award counts, total dollars, and ranks are generated from data downloaded via the NIH RePORT tool (report.nih.gov). For the School of Medicine, award data matches that used by the Blue Ridge Institute for Medical Research in producing their ranks of U.S. Medical Schools.
Frontiers Resources. Frontiers has an impressive array of resources available to achieve its aims of engaging stakeholders, creating a sustainable translational research workforce and strengthening infrastructure to accelerate translational research. We draw on the considerable strengths of the University of Kansas Medical Center (Kansas City and Wichita campuses), the University of Missouri-Kansas City, Children’s Mercy Kansas City, and the Kansas City University of Medicine and Biosciences. In addition, we take advantage of a strong history of entrepreneurship investment in the Kansas City region (e.g., the Ewing Marion Kauffman Foundation, the UMKC Regnier Institute for Entrepreneurship and Innovation, the Kansas City Area Life Sciences Institute and the KU Innovation and Collaboration Center) to leverage drug, device, diagnostic, medical device and population health product development to achieve faster success. We have a plethora of community organizations, clinics, and providers across the region willing and excited to collaborate with Frontiers investigators, experts in entrepreneurship who will lead and train the next generation of successful business developers in the biomedical sciences and a growing cadre of team science-trained teams to work in emerging lifespan clinical and translational research. Together these institutions and resources provide the necessary research faculty, administrative staff, office and meeting space, educational technology and the research administration support necessary to successfully implement the Frontiers proposed TL1 Training Core Program.

UNIVERSITY OF KANSAS MEDICAL CENTER

Overview. The University of Kansas School of Medicine is a public medical school located on the University of Kansas Medical Center campuses in Kansas City, Kansas, Salina, Kansas, and Wichita, Kansas. The Kansas City campus is co-located with the independent University of Kansas Hospital.

Founded in 1905, the University of Kansas Medical Center (KUMC) now spans 50 acres within metropolitan Kansas City and includes extensive research and clinical facilities. (Figure FR-TL1.1.) KUMC has the ultimate objective of improving the quality and availability of health care in Kansas and the greater Kansas City area by providing research in the health sciences, educational programs for health care professionals, and clinical services for patients. The University of Kansas Hospital is a tertiary care facility serving patients from across the region (Kansas, Missouri, Oklahoma, Arkansas, and Nebraska). The KU Hospital has patient satisfaction ratings well above national means and is a nationally recognized biomedical research center with many academic programs ranking among the best in the nation.

KUMC Clinical Facilities and Outreach. KU Hospital is equipped with over 500 beds and staffed to care for the approximately 25,000 inpatients admitted and approximately 550,000 outpatients each year. It is designated as Level 1 Trauma Center which serves over 350,000 outpatients annually, offering a variety of specialized treatments to provide comprehensive care to its patients. Among the specialized services are those offered through the Center for Advanced Heart Care, the Mid-America Radiation Center, the KU Cancer Center, the Bloch Cancer Care Pavilion, the Hoglund Brain Imaging Center, the Asher Comprehensive Spine Center, the Burnett Burn Center, the Sutherland Institute, the Epilepsy Center, the Diabetes Education and
Research Center, the Senior Citizens Health Center, the Family Practice Clinic, and other sites within the hospital itself.

Physician practices represent more than 200 specialty areas, including kidney transplant surgery, renal dialysis, treatment of polycystic kidney disease, the only liver transplant program in the region, sterile environments for bone marrow transplant patients and other patients whose immune systems are not functioning properly, a state-of-the-art facility for delicate facial and body reconstruction surgery services, hyperbaric oxygen therapy, comprehensive cardiology care, arthritis clinics with immunology specialists, medical and surgical treatments for epilepsy, specialized neurology programs for the treatment of multiple sclerosis and headaches as well as Parkinson's and Alzheimer's disease, and comprehensive gynecologic and obstetrics services for problem pregnancies with an intensive care nursery for premature and sick newborns. Additionally, comprehensive rehabilitation services and psychiatric services are offered on both an inpatient and outpatient basis.

**University of Kansas Hospital.** University of Kansas Hospital (Figure FR-TL1.2) in Kansas City, KS is ranked nationally in 11 adult specialties. It was also high-performing in 1 adult specialty. University of Kansas Hospital is a 713-bed general medical and surgical facility with 27,380 admissions in the most recent year reported. It performed 10,124 annual inpatient and 8,743 outpatient surgeries. Its emergency room had 47,771 visits. University of Kansas Hospital is a teaching hospital. It is also accredited by the Commission on Accreditation of Rehabilitation Facilities (CARF).

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Gender</th>
<th>Race</th>
<th>Race Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-9 years old</td>
<td>Male</td>
<td>American Indian or Alaskan Native</td>
<td>0.4%</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>Asian</td>
<td>2.7%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>Black or African American</td>
<td>9.1%</td>
</tr>
<tr>
<td>10-17 years old</td>
<td>Male</td>
<td>Native Hawaiian/Other Pacific Islander</td>
<td>0.1%</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>Two races</td>
<td>1.3%</td>
</tr>
<tr>
<td>18-34 years old</td>
<td>Total</td>
<td>White or Caucasian</td>
<td>86.4%</td>
</tr>
<tr>
<td>35-44 years old</td>
<td></td>
<td>Grand Total</td>
<td>100.0%</td>
</tr>
<tr>
<td>45-54 years old</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>55-64 years old</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65-74 years old</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>75-84 years old</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>85 and older</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table FR-TL1.1. University of Kansas Hospital (2014)
KUMC RESEARCH ENVIRONMENT

The research enterprise at KUMC has expanded recently, with the construction of a 5-floor, 200,000 sq.ft. research building, and newly renovated space for the Kidney Institute and KU Cancer Center. Excellent support facilities exist, including an outstanding Transgenic and Gene-Targeting Institutional Facility (TGIF), a Biotechnology Support Facility (next generation DNA sequencing, RNA-Seq, microarray, and bioinformatics), and two Laboratory Animal Resources Facilities. The medical center also provides a number of other shared resource facilities for electron microscopy, histology, flow cytometry, proteomics and mass spectrometry, biostatistics, and drug development. Users of the biomedical research cores will have access to the following institutional cores and shared resource facilities located on the KUMC or KU-Lawrence campus. This rich and supportive research environment is also home to a number of research centers and institutes as well as research support services.

RESEARCH ADMINISTRATION

KUMC Research Institute Established in 1992, the KUMC Research Institute (RI) serves as the recipient of all grants and contracts to and with KUMC and assists with the research activities of KUMC faculty. Frontiers’ Regulatory Knowledge Support is housed within the RI, a private, not-for-profit 501(c)(3) corporation. The RI fosters individual partnerships between KUMC researchers and the private sector, enhances revenue to researchers and the University through the transfer of research discoveries and other information to the private sector, and facilitates a cooperative and profitable interaction between KUMC and corporations throughout Kansas, the greater Kansas City Metropolitan area, domestically and internationally. The Research Institute employs more than 50 staff members. Research Institute divisions are: Sponsored Programs Administration; Clinical Research Administration unit; Office of Legal Services; and Financial Services.

The KUMC RI is led by Jamie Caldwell (Executive Director) and Dr. Richard Barohn (President) (Figure FR-TL1.3). Table FR-O.2 displays the most recent statistics for research income from various sources to KUMC through the Research Institute.

<table>
<thead>
<tr>
<th>Table FR-O.2 Research Activities for FY 2013/14 - FY 2014/15</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY 2013/14 ($)</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>KUMC Research Institute Managed</td>
</tr>
<tr>
<td>Grants</td>
</tr>
<tr>
<td>ClinicalTrials</td>
</tr>
<tr>
<td>Other Sources of Extramural Funding</td>
</tr>
<tr>
<td>Total of All Awards</td>
</tr>
</tbody>
</table>
RI Sponsored Programs Administration (SPA). The primary responsibility of SPA is to facilitate the research-related activities of all Schools within KUMC and to serve as a resource for the research faculty during all aspects of their research. SPA assists faculty and staff in acquiring extramural support in research, education and service projects and is responsible for post award administration of contracts and grants awarded to KUMC to ensure that these projects are conducted in compliance with federal and state regulations, university policies and commitments specified in grants, contracts and other agreements with external sponsors.

RI Office of Legal Affairs. The KUMC RI, located within a few minute drive from the main KUMC campus, is in a building across the street from the KU Clinical Research Center (Figure FR-TL1.4). The KUMC RI encourages relationships with the corporate sector and has participated in a wide variety of written agreements related to pre-clinical and clinical research. The Office of Legal Affairs will either review the contract provided by the company or initiate a contract based on the standard Research Institute Clinical Trials Agreement. The Research Institute negotiates master agreements with companies who place multiple clinical trials at the Research Institute. The Office of Legal Affairs provides rapid turn-around times on contract completion as well as consultation regarding any other legal issues related to research. Services include reviewing and negotiating:

- Clinical Trial Agreements
- Confidential Disclosure Agreements
- Fee-for-Service Agreements
- Grant Agreements (Federal and Privately Funded)
- License Agreements
- Material Transfer Agreements
- Sponsored Research Agreements
- Subcontract Agreements

RI Clinical Research Administration (CRA) Clinical Research Administration is the central liaison between the funding agency, Institutional Review Board and principal investigators at KUMC. The CRA markets KUMC to potential research sponsors, receives and manages protocol initiation, and provides ongoing administrative support to ensure timely and cost-effective completion of clinical trials. Clinical Research Administration services include:

Pre-Initiation
Attend, if requested by study staff, site evaluation visits to answer institutional questions on study processing and activation time

Serve as centralized contact between sponsors and the study staff for all clinical trial, regulatory, administrative, and budget and contract work at the University of Kansas Medical Center

Provide protocol development support for investigators

Prepare consent form for investigator’s review

Secure Human Subjects Committee approval of protocol and consent form

File regulatory documents required by FDA and sponsor

Prepare and negotiate trial budgets

Request pricing for hospital and clinical services

Review and negotiate clinical trial and data use agreements

Notify investigator and sponsor of final HSC approval

Prepare and submit initial IND documents, amendment and annual progress reports for IND

**Post-Initiation**

Secure HSC approval of protocol revisions and revised consent forms

Obtain HSC approval for print or media advertising

Process internal adverse events and IND safety reports for HSC submission and approval

Provide status reports of each investigator’s trials as requested

Submit reports to HSC for annual re-certification of trials

Coordinate ongoing communication between sponsor and investigator

Revise and negotiate budget and clinical trial agreements

**Study Closure**

Process study closure for trial termination

Complete reconciliation documents for trial account closure

**Quality Improvement for Clinical Research**

In conjunction with the Office of Compliance, conduct quality improvement visits [QIV]

**Education Opportunities**

Host and organize Clinical Trial Education Lecture (CTEL) series on a monthly basis

Provide training workshops (CTEC) for investigators and study coordinators

Meet with physicians and study coordinators to review Research Institute services

Provide new study coordinator/research nurse orientation

Facilitate coordinator certification, networking and educational opportunities
KUMC Office of Compliance. The major responsibility of this office is to assure the highest standards of excellence and integrity in all its research endeavors, and to promote ethical conduct of research through proactive mechanisms such as education and outreach; established policies and procedures for institutional and individual accountability; assessment, monitoring, auditing and reporting; and institutional oversight committees.

- **KUMC Human Research Protection Program.** In 2004, KUMC developed a comprehensive Human Research Protection Program (HRPP) that is designed to ensure the rights, safety and welfare of all subjects recruited or enrolled in research projects, regardless of funding source. The program supports weekly IRB meetings on the Kansas City Campus and monthly meetings on the Wichita campus. AAHRPP accreditation has been maintained since 2007. The program oversees the institutional review process and coordinates ancillary reviews with radiation safety, biosafety, HIPAA, conflicts of interest, and data security. To support efficient review, the IRB application identifies not only key elements necessary for IRB review but also captures information that supports the ancillary reviews. Streamlining of compliance functions occurs through cross-membership on the various committees and a parallel review process.

KUMC Grants and Awards. In fiscal year 2015, extramural expenditures for KU Medical Center totaled $108 million. Of that amount NIH expenditures were more than $57 million. Among our successful grants and contracts to date we include:

- Frontiers Clinical and Translational Sciences Award (2011), $20 million, NIH
- Alzheimer’s Disease Research Center (2016, second renewal), $8.75 million, NIH
- NCI-Designated Cancer Center, $7.5 million (NIH)
- Midwestern Collaborative for Treating Obesity in Rural Primary Care, $10 million (PCORI)
- Greater Plains Collaborative, $15.6 million (PCORI; 2 contracts)
- Kansas IDeA Network for Biomedical Research Excellence: $19 million, NIH
- Kansas Intellectual and Developmental Disabilities Research Center: $5.5 million NICHD

**Frontiers Research Gateway.** The Frontiers Research Gateway is a web-based resource to provide all Frontiers investigators with helpful tips and information to enable them to conduct their research. The webpages provide information ranging from generating research ideas to seeking extra-mural funding to executing research projects. Divided into four sections – Study Development, Study Initiation, Conducting a Study, and Study Close-Out – the Gateway walks investigators though the overall research process and breaks down that process with detailed steps. Those steps are supplemented with specific information on how Frontiers can help. The Research Gateway was developed by the Frontiers Administration team in 2013 with input from investigators who shared their experiences in navigating the research process and with the Frontiers website team. The webpages of the Gateway contain many useful links that researches frequently need and find useful. (www.frontiersresearch.org/frontiers/research-gateway)

**Frontiers IRB Reciprocity.** In 2013, Frontiers partner institutions, including University of Kansas Medical Center, University of Missouri–Kansas City, Children’s Mercy Kansas City, and University of Medicine and Biosciences entered into an IRB reciprocity agreement. Typically a research project involving partners from these institutions will only need one IRB review. Detailed instructions on how to initiate an IRB application with reciprocity are found on the Frontiers website (http://frontiersresearch.org/frontiers/IRB-reciprocity).

We have gained considerable experience by creating and participating in IRB consortia that positions the Frontiers program to deliver efficient implementation for regional and national multi-center trials. Frontiers institutions developed and implemented regional IRB reciprocal processes across all our affiliated institutions.
early in the third year of our initial CTSA funding. When our PCORnet GPC was funded we leveraged this regional experience to establish reliance agreements at 12 GPC sites. Our experience with using single IRB models includes central IRBs, deferred reciprocal models, and shared review models. We are members of IRBShare, and most recently we were invited to participate in the pilot phase of the NCATS IRB Reliance Initiative (NIRI). Efficiencies gained through single IRB models like IRB reciprocity are further enhanced and complemented by our experiences with streamlined approaches for master agreements and budgets (e.g., NeuroNEXT, StrokeNet, Neonatal Research Network), our PCORnet CDRN sub-awards, and multiple master agreements with external sponsors. We have a great deal of experience both leading multicenter trials involving CTSA hubs and other sites and being a part of such trials led by others.

**KUMC Electronic IRB submissions.** Since 2013, all proposals to the KUMC IRB are submitted through our electronic IRB system (eIRB) using Huron’s Click IRB7. Our eIRB automates all aspects of submission, routing, review and approval for the entire lifecycle of the project. The system supports compliance by serving as the repository for all IRB-approved documents and by tracking human subjects training and current conflict of interest disclosures. For research conducted under a central IRB or other reliance mechanism, eIRB delivers a truncated application process that allows investigators to register their study and upload the approval of the reviewing IRB.

**KU Health System and Research Institute Steering Committee and Sub-Committees.** In an effort to improve communications and processes across the KU Health System and the Research Enterprise, a collaborative group has been created to improve clinical and translational research that occurs in the KU Hospital setting. This process was started by Dr. Barohn after he became Vice Chancellor for Research. He asked Dr. Ator, the KU Hospital Chief Information Officer to co-chair the steering committee. The steering committee and workgroups are composed of member from KUMC, KU Hospital, and KU Physicians, Inc. A number of workgroups meet regularly and report to the steering committee chaired by Drs. Barohn and Ator. Drs. Barohn and Ator then report final recommendations to the Executive Vice chancellor, Dr. Girod, and the Hospital CEO, Mr. Page for endorsement.

**Full Steering Committee**

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<tr>
<th>Position</th>
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<tr>
<td>Steering Committee co-chair</td>
<td>Greg Ator</td>
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<tr>
<td>Steering Committee co-chair</td>
<td>Rick Barohn</td>
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<td>Committee Support</td>
<td>Debra Brogden</td>
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<td>Karen Blackwell</td>
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<td>Marge Bott</td>
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<td>Jamie Caldwell</td>
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<td>Chad Cannon</td>
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<td>Ed Ellerbeck</td>
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<tr>
<td>Russ Waitman and/or Tamara McMahon</td>
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<td>Dawn Walters</td>
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Colette Lasack  
Bill Marting  
Matt Mayo and/or Brooke Fridley  

Susanne Welborn  
Steve Williamson  
Jeff Wright

**Research Revenue Cycle / Research Clinical System Operations (Inpatient/Outpatient Research)** The purpose of this subcommittee is to improve efficiencies in patient billing and invoicing by determining whether it was research versus routine or standard of care.

Workgroup Support: Shawn Fapp  
Jamie Caldwell (co-chair)  
Colette Lasack (co-chair)  
Greg Ator  
Angie Ballew  
Ethan Carter  
Carol Cleek  
Kelly Daniels  
Rolina Everett  
Dhanunjaya Lakkireddy  
Barbara MacArthur

Chris Mackay  
Dinesh Pal Mudaranthakam  
Seamus Murphy  
Caroline Murray  
Ted Noravong  
Marilyn Rymer  
Debra Seyfried  
Reta Studnicka  
Peter Tadros  
Sue Welborn

**Personnel & Access to O2 / Consent Form/Patient Identification**

Workgroup Support: Kelly Robertson  
Peter Griffith (co-chair)  
Greg Ator (co-chair)  
Hobs Apell  
Sandra Bergquist-Beringer  
Marge Bott  
Jamie Caldwell  
Melinda Clark  
Carol Cleek  
Mazen Dimachkie (co-chair)  
Rolina Everett  
Susie Farkas  
Ensley Fleming (ECG)  
Laura Herbelin  
Angella Herrman  
Brad House II

Theresa Jackson  
Bart Lindsley  
Joe McGuirk  
Seamus Murphy  
Caroline Murray  
Dinesh Pal Mudaranthakam  
Trish Palmer  
David Robbins  
Debra Seyfried  
Bob Spaniol  
Reta Studnicka  
Karen Tevault  
Sue Thomas  
Sue Welborn  
Steve Williamson (co-chair)  
Jennifer Wilson

**Recruiting Subjects via the Electronic Medical Record (EMR)** The purpose of this subcommittee is to determine the best method of identifying study participants using the electronic medical record.
Frontiers Affiliate Regulatory Committee

Comprised of regulatory representatives and officials from Frontiers partners and affiliates, this consortium-wide group was established to address regulatory hurdles affecting Frontiers research. The Committee divided into smaller groups to address specific issues: IRB Reciprocity Subcommittee, RB Forms Subcommittee, Conflict of Interest Subcommittee, and Training Subcommittee. These groups held numerous meetings over many months, resulting in Frontiers-wide regulatory efficiencies, including IRB reciprocity among KUMC, KU-Wichita, Children’s Mercy, Truman Medical Centers, University of Missouri-Kansas City, and St. Luke’s Health System.

PHYSICAL INFRASTRUCTURE

The Hemenway Life Sciences Innovation Center (2007; Figure FR-TL1.5) is a $58-million, 200,000 ft² facility that houses 300 people and more than 125 research projects focusing on cancer, liver disease, reproductive and developmental sciences, neuroscience, diabetes and proteomics. This serves as home to all KIDDRC cores at KUMC, and nearly all members of Themes 3 and 4.

The Wahl/Hixon Research Complex (2011) is a $26.4-million renovation of an existing building that will create new space devoted entirely to cancer research.

The Health Education Building (groundbreaking 2015) will be a new 171,000 ft² facility that will become the face of the KU Medical Center campus to accommodate modern learning and facilitate the education of a greater number of physicians, nurses and allied health care professionals to address critical health care worker shortages in Kansas.

The University of Kansas Hospital is building an additional hospital tower north of the main campus. The 300,000 ft² Cambridge North Tower will expand access to healthcare in Kansas City and be home to highly specialized surgical services for oncology, neurosciences and otolaryngology. Cambridge North is expected to be completed in late 2017.

![Figure FR-TL1.5 Hemenway Life Sciences Innovation Center](image)
University of Kansas Information Technology at the University of Kansas Medical Center, Information Resources (IR) provides researchers and faculty with critical technology infrastructure, as well as technical services and support. Recent technology improvements and relevant services include:

- KUMC made several large commitments to ensure a robust and secure network and storage including: a $3.4M Network Infrastructure Upgrade to bring 1GB bandwidth to all desktops, improve wireless coverage throughout the campus; a $2.5M Research and Employee File-Level Storage Expansion, providing long-term storage via expandable one-petabyte NAS with additional backend storage for backups; and, $2.4M for Information Security Architecture Improvements.
- Acellion Secure File Transfer service allows researchers to securely send and receive large files from colleagues at KUMC and/or external recipients.
- Proofpoint secure email is an encrypted messaging system that works seamlessly with the Medical Center's existing email system. Secure email gateways encrypt email as it leaves the University's private networks and heads out onto the Internet.
- The Barracuda Spam Firewall system has been expanded to further reduce SPAM e-mail messages, virus attachments, and phishing attacks aimed at compromising our researchers.
- SharePoint is a browser-based collaboration platform that includes document management, workflow management, and social networking.
- Researchers can securely collaborate in real-time with both video (Polycom) and web (Adobe Connect) conferencing.
- IT policies and procedures are being reviewed and updated to ensure that our research mission is well protected and situated to remain competitive in the marketplace.
- Portable electronic device theft tracking and recovery options have been expanded to ensure that our research data is protected while at rest, while in transit, and if lost or stolen.

KUMC Department of Biostatistics. The Department of Biostatistics occupies 6834 ft$^2$ of contiguous office space at the University of Kansas Medical Center located on the ground and 5th floors of the Robinson building as well as the 5th floor of the adjacent Wescoe building. This includes 20 lockable offices, two conference rooms and cubical spaces that can house up to 26 staff/students. The Department of Biostatistics personnel consists of 13 biostatistics faculty members, 2 teaching associates, 4 research analysts, 4 information specialist personnel, 1 project manager, 2 administrators, and 1 administrative assistant.

KUMC BERD Computer Resources

Hardware. Shared high speed workstation with dual Xeon 3.40 GHz processor, 8 GB of SDRAM, over 500GB of high speed storage, digital tape backup, and a DVD read/write drive. 34 HP Intel Core i5 CPU @ 3.40 GHz processor, 16 GB of SDRAM, over 800GB of high speed storage; 4 HP Intel Core i7 CPU @ 3.60 GHz processor with 32 GB of SDRAM along with 1 TB hard drive.

Networking/Internet and Servers HP PowerEdge 4600 file server with a 3.6GHz Xeon CPU, 8GB of DDR SDRAM, six 18GB SCSI Hard Drives in a RAID 5 configuration, 200GB digital tape backup system. Internet Explorer 11; Microsoft Outlook email; Internet 2 access through KUMC's LAN. The Department also has 14 windows 2008 R2 virtual servers - with dual Xeon processors, 8 GB SDRAM and over 240 GB of storage area ; 5 windows 2012 R2 virtual servers - with dual Xeon processors, 16 GB SDRAM and over 320 GB of storage area; 1 SUSE Linux server Quad core processor, 8 GB SDRAM. An HP PowerVault tape backup is also located in the server room along with a cooling system to maintain optimal conditions for optimal server performance. Tape backups are performed daily on modified data and full tape backups are performed weekly and stored off-site for 9 weeks.

**KUMC Velos eResearch** Velos eResearch supports patient recruitment, patient scheduling, study monitoring, project planning, study design, protocol compliance, budget, invoicing, and milestone management, data safety monitoring, adverse event reporting, system integration and study execution.

Velos was designed from the ground up to support both study administration and clinical data management. This type of design is fundamental to Velos’ customer service abilities to solve customers’ research, information and coordination challenges. Key features are:

**STUDY ADMINISTRATION**
- Protocol management
- Patient scheduling
- Regulatory reporting
- Adverse event management and reporting
- Budgeting, milestones, invoice, and payment/receipts processing
- Management of research organizations, personnel, and collaborators

**CLINICAL DATA MANAGEMENT**
- Patient profiling
- Longitudinal, patient-level information collection and analysis
- Study-specific data collection and analysis
- Workflow configuration
- Integration with internal and third party information systems

Some other notable strengths of Velos eResearch are:
- An advanced, carefully considered commercially available clinical research information system.
- Velos was designed to provide off-the-shelf support for all of study administration, clinical data management, adverse event reporting, and integration with internal and third party cancer center systems through one integrally-designed system.
- The ability to add, modify, and apply study- and customer-specific data dictionaries with minimal technical involvement.
- HL7 compliance. Velos already has dozens of working laboratory, medical record, and device interfaces that are already in production.
- Compliance with industry standards (such as CFR11) and a commitment to supporting standards that foster higher collaboration. Velos is active in and supportive of government initiatives intended to foster greater collaboration among researchers (example FDA funded studies).
- Patient-level of study-level system architecture. Most research systems were primarily designed for research sponsors and focus on the needs of single studies. The system architecture to support research sites well is quite different and must consider both patient- and study-level views and also integrate the two.
- Advanced technology and security features to support multi-institutional, cooperative trials, community-based research and patient self-reporting, in a single environment.

Through these capabilities, Velos helps effect a paradigm shift from the current sponsor-centric clinical research information model to one that is investigator-centric. In doing so, Velos believes it can help its customers, and the research community in general, unleash tremendous improvements in research productivity, collaboration, and, ultimately, patient care.
KUMC Division of Medical Informatics and Office of Enterprise Analytics (TICS). The Division of Medical Informatics (MI) provides capabilities and expertise for clinical investigators and other health professionals in software engineering, data warehousing, data management and administration of clinical trial and electronic data capture systems. MI works with internal and external partners for consultation, training and access to tools enabling research data collection. MI tools and resources include:

- **HERON**: The Healthcare Enterprise Repository for Ontological Narration (HERON) is a method to integrate clinical and biomedical data for translational research. The MI team has distributed the open-source HERON framework to collaborators using the i2b2 (Informatics for Integrating Biology and the Bedside) software and have leveraged other open source environments to increase data transparency and reusability.

- **REDCap**: REDCap is used by more than 700 institutions in over 60 countries and has become a dominant tool for electronic data capture for research studies at most academic medical centers in the United States.

The Office of Enterprise Analytics (EA) provides business intelligence and other analytical support for planning and decision-making at KUMC, and serves as the source for official data.

EA manages and develops online reports within a QlikView environment, distributed to departments and upper management via a secure Access Point. Currently, EA offers reports on finance, payroll, commitments, and extramural research (summary and detail reports, research efforts), as well as reports designed for executives at the Medical Center (e.g. All Sources/All Spends). The EA staff possesses enhanced skills in data mining, analysis, and reporting, with backgrounds in academics, data management, finance and accounting, and application development.

Together, the Division of Medical Informatics and the Office of Enterprise Analytics occupy a total of 4,228 ft² on the third floor of the Student Center: Medical Informatics occupies 2,276 ft²; Enterprise Analytics occupies 1,055 ft²; and both departments share 897 ft².
KUMC CENTERS AND INSTITUTES

FEDERALLY FUNDED CENTERS

The University of Kansas Cancer Center. The University of Kansas Cancer Center earned National Cancer Institute (NCI) designation in June 2012 (P30 CA168524). KU Cancer Center operates as a matrix organization and includes: the University of Kansas Medical Center (KUMC) campuses in Kansas City, Wichita and Salina, the University of Kansas in Lawrence (KU-Lawrence) and its School of Pharmacy, The University of Kansas Hospital, the Stowers Institute for Medical Research, and Children’s Mercy.

Currently, there are 345 KU Cancer Center members in four research programs: Cancer Biology, Cancer Control & Population Health, Drug Discovery, Delivery, and Experimental Therapeutics, and Cancer Prevention & Survivorship. These scientists use more than 85,000 ft² of laboratory space across campus and an additional 22,000 ft² of office space. The total KUMC research laboratory space is more than 400,000 ft².

Our KU Cancer Center researchers grew federal funding 28% in fiscal year 2015, competing successfully against other prominent research institutions. KU Cancer Center researchers currently have more than 600 published papers, 75 NCI-funded studies and $69.8 million in extramural funding from government, private and national philanthropic organizations.

KU Cancer Center provides financial and administrative support for six shared resources: Biospecimen, Biostatistics and Informatics, Lead Development & Optimization, Transgenic and Gene-Targeting, Health Communications Research, and Clinical Pharmacology. These shared resources are fully equipped to provide KU Cancer Center investigators with access to state-of-the-art research technology, equipment, and technical support that would otherwise be too difficult or expensive for individual investigators or programs to develop. KU Cancer Center shared resources occupy more than 20,000 ft² of space located in a number of facilities on the KUMC campus, the KU Lawrence west campus, The University of Kansas Hospital's Westwood campus, and the University of Kansas Clinical Research Center.

KUMC Alzheimer’s Disease Center. The NIA-funded University of Kansas Alzheimer’s Disease Center (KU ADC) (P30 AG035982) spans the KUMC and Lawrence campuses. The ADC occupies about 10,000 ft² in the Clinical Research Unit, the Hemenway building, and the Higuchi Biosciences building (Lawrence), and employs 10 faculty and 30 other support staff, has the programmatic goal of supporting, facilitating, and enhancing research that provides insight in AD and brain aging. This is accomplished by providing access to consultation, human subjects, data, biospecimens, and technical services. Its main thematic goal is to advance our understanding of how brain bioenergetics change during AD and aging. The KU ADC actively encourages local, national, and international investigators to utilize its resources. KU ADC currently supports over 20 funded investigator-initiated studies and participates in 4 national multisite trials sponsored by the Alzheimer Disease Cooperative Study. The ADC’s Clinical Core follows 400 subjects (200 nondemented and 200 MCI / AD participants) with annual evaluations and assists investigators in recruiting these well-characterized participants into investigator-initiated studies. The KU ADC is also integrated with the Memory Care Clinic, the region’s tertiary referral center for memory disorders with around 4000 annual patient visits.

The ADC interacts with the Frontiers CTSA program through use of the Clinical Research Center clinical trials unit to support clinical trials in AD. The ADC also actively collaborates with the Frontiers Pilot Studies Core by co-funding of dual-interest pilot projects of mutual interest to both centers.

Kansas PKD Research and Translation Core Center. The mission of our PKD Center is to promote research leading to a better understanding of PKD through the discovery of therapy targets and development of clinical trials to improve patient outcomes. The National Institute of Diabetes and Digestive and Kidney Diseases at the NIH awarded the Kansas PKD Center a five-year Center Grant (P30 DK106912) that provides $5.4 million in funding to support our innovative biomedical research cores and a robust pilot and feasibility program. The PKD Center is comprised of four cores: Gene Targeting, Epigenetics, Biomarkers, and Clinical Research.
KUMC Kansas Intellectual and Developmental Disabilities Research Center. The Kansas Intellectual and Developmental Disabilities Research Center (KIDDRC) has been funded by the National Institute of Health and Human Development for the past 45 years (as P30 HD002528). Our recent renewal application (now U54 HD090216) scored well (23) and was recommended for funding for its 50-54th year to the NICHD Advisory Council in August 2016. Throughout its history, the KIDDRC has played a major role in elucidating the causes, prevention and treatment of intellectual disabilities and related secondary conditions. The center brings together researchers from the KU-Lawrence and Kansas University Medical Center campuses, as well as from the Juniper Gardens Children’s Project at the Children’s Campus of Kansas City. For more than four decades, the KIDDRC has served as a model of interdisciplinary collaboration across campuses and disciplines. More than 80 percent of KIDDRC investigators collaborate with one another on funded projects, and half of these represent collaborations across the three Center sites. Many KIDDRC investigators collaborate with investigators at other IDDRCs at Vanderbilt, UNC-Chapel Hill, the University of Washington, the University of Wisconsin, Washington University in St. Louis and Johns Hopkins University/ Kennedy Krieger Center. Core support services and facilities include: design and implementation of measurement tools for behavioral research; experimental design and analysis; bioinformatics; genomics expression analysis; histology and biological image acquisition and analysis; digital video acquisition and editing; and 3-D image manipulation and model output. The KIDDRC will have four cores: Clinical Translational Core (CTC), Preclinical Models Core (PMC), Clinical Outcomes/Biobehavioral Technology Core (CBC), and a Research Design and Analysis Core (RDAC).

KUMC Theo and Alfred M. Landon Center on Aging. In 1986, the Kansas Legislature approved a new appropriation to start an interdisciplinary Center on Aging at the KUMC campus to provide state-of-the-art educational, clinical and research facilities for faculty and the older adult patients they serve. In 1998, the legislature invested in a new building and committed a new state base line item. With the help of then-U.S. Sen. Nancy Kassebaum, a further $4 million federal grant paved the way for the 52,000 ft² complex building that stands at 36th Avenue and Rainbow on the medical center campus. Named for Sen. Kassebaum’s parents, the Theo and Alfred M. Landon Center on Aging includes: a Geriatric Medicine Clinic providing both primary care and consultative services facilities for researchers to study important aging-related issues such as prevention and treatment of disability, patterns of healthcare delivery and cognitive function; coursework for the next generation of healthcare providers to learn from faculty about the care of older adults in state-of-the-art classrooms; an optimal location for community participants to engage in a variety of outreach programs from fitness and exercise to elder law clinics and brownbag presentations. The Center on Aging research mission is to encourage, promote, and carry out research that is relevant to older adults in Kansas and around the country. Our goal is to build aging-relevant research programs, including collaborations within the University of Kansas Medical Center, and in the wider metropolitan community. Research since 2011 has focused on advancing the understanding of motor function through interdisciplinary research and education, primarily with regard to people with multiple sclerosis and Parkinson’s disease. Research resources include cognitive testing laboratories and a human performance laboratory dedicated to advancing the understanding of motor function through interdisciplinary research and education. The primary focus of the human performance laboratory is the study of age related changes in mobility, which includes the study of healthy elderly as well as those with age related pathologies. Human Performance Laboratory - a gait and balance assessment laboratory with state-of-the-art equipment for biomechanical and kinematic studies in neurological disorders. Major equipment includes six high speed digital cameras (Motion Analysis Inc.) six high speed digital cameras for upper extremity assessment (Vicon Motion Systems), Delsys wireless EMG systems, four AMTI 1000 force platforms, a Cybex 6000 Testing and Rehabilitation System, Biodex Rehabilitation Treadmill, GaitRite mat, an overhead harness system, Opal wireless inertial sensors, and a customized treadmill device for postural response testing. Data collection from the wireless inertial sensor system is synchronized with data collection from the motion capture system. Beyond the main laboratory space, three additional spaces house graduate student research offices, an electronics/design shop and equipment storage.
Center activities are carried out in partnership with other academic units of KUMC, including the schools of Medicine, Allied Health, and Nursing and with affiliated institutions, such as area geriatric care centers, VA Medical Centers, the Wichita branch of the School of Medicine, the University of Kansas in Lawrence, state agencies, and service organizations. Research protocols undertaken at the Center by KUMC faculty address a variety of problems related to aging, ranging from social concerns to cellular biology.

**KUMC RESEARCH INSTITUTES**

**KUMC Kidney Institute.** The Kidney Institute is a world-class, internationally recognized research center comprised of 44 doctoral level faculty investigators representing eight School of Medicine departments, including Internal Medicine, Molecular and Integrative Physiology, Biochemistry and Molecular Biology, Anatomy and Cell Biology, Pathology and Laboratory Medicine, and Pharmacology, Toxicology and Therapeutics, and two from the School of Health Professions (Clinical Laboratory Sciences and Dietetics and Nutrition). The Kidney Institute also has interactions with the NCI-Designated KU Cancer Center and Liver Center, and collaborates with other nearby entities including the Department of Molecular Biosciences at KU-Lawrence, the KC Veterans Administration Hospital, Children's Mercy Kansas City, UMKC and the Stowers Institute for Medical Research, all in Kansas City or nearby. Kidney Institute investigators occupy open-access laboratory space on two floors of Wahl Hall East and West, providing clinician-scientists and basic-scientists opportunities to closely interact on joint research projects and clinical trials. The Kidney Institute is active in training the next-generation of professionals through the T32 nephrology fellowship program (NIDDK T32DK071496) and weekly salt & water conferences, the nephrology fellows' journal club and Sullivan conferences. The Kidney Institute is home to the Kansas PKD Research and Translation Core, a P30 grant from the NIDDK (P30 DK106912). Research strengths in the Kidney Institute include polycystic kidney disease, glomerular development and disease, bone-kidney interactions, renal transport physiology, and health outcomes research.

**KUMC KU Diabetes Institute.** The KU Diabetes Institute was formed in 2007. It is a virtual Institute comprising diabetes researchers at the University of Kansas Medical Center (with campuses in Kansas City, Wichita, and Salina) and the University of Kansas-Lawrence engaged in a wide range of basic science, clinical and translational research projects centering around diabetes and its complications. The clinical arm of the KU Diabetes Institute is the Cray Diabetes Center. The KU Diabetes Institute supports the fundamental role of basic research, data collection, and outcomes research in order to improve the lives of people with diabetes.

**KUMC Cardiovascular Research Institute.** The Cardiovascular Research Institute (CVRI) provides an integrative framework for cardiovascular research conducted at the University of Kansas Medical Center and the University of Kansas Hospital. The CVRI connects investigators from a wide spectrum of cardiovascular research that includes cellular and molecular investigation, physiological experimentation in whole animals, investigator-initiated clinical research, population studies, large multicenter clinical trials, and translational research that brings discoveries from the bench to the bedside. In addition to pursuing excellence in science and innovation, training the future generation of scientists and physicians remains one of our primary goals.

**KUMC Institute for Neurological Discoveries.** The Institute for Neurological Discoveries, a regional resource for advancing neuroscience research based at KU Medical Center, focuses on team-based scientific discovery. The IND unites over 120 basic and clinical neuroscientists in different disciplines from nine institutions to work collaboratively as teams. Its mission is to work with patients and the community to identify and advance research in neuroscience therapies. Goals include: to find cures for neurodegenerative disorders, seek ways to repair the injured brain, and identify lifestyles that promote brain health. The Institute focuses on six specific neurological disease areas, selected because of their prevalence, personal and economic impact, and because they represent areas of exceptional strength: Brain Injury and Repair, Neuromuscular and Movement Disorders, Neurodegenerative Disorders, Hearing and Equilibrium Disorders, Women’s Pain Division, and Cognitive and Behavioral Health.
KUMC Institute for Reproductive Health and Regenerative Medicine. Research at the Institute for Reproductive Health and Regenerative Medicine (IRHRM) was established to focus on fertility and infertility, developmental origins of health and disease, and epigenetics and stem cell biology. The IRHRM is organized into three centers with overlapping research interests: the Center for Epigenetics and Stem Cell Biology (CESCB), the Center for Reproductive Sciences (CRS), and the Center for the Developmental Origins of Health and Adult Disease (CDOHAD). The research efforts of the centers include basic, translational, and clinical research. Furthermore the centers are highly interactive. Programs in faculty development, postdoctoral training, and graduate education are key activities of the Institute and its membership.

KUMC CENTERS

KUMC Center for Child Health and Development. The CCHD began at KU Medical Center in 1958 as the Children's Rehabilitation Unit (CRU). Throughout its 58 year history, the CCHD has been a distinct Center at the University of Kansas, with a history of interdisciplinary training that even predated University Affiliated Facilities. The CCHD is also a key component of the Kansas Center for Autism Research and Training (K-CART) which is a Center in the Schiefelbusch Institute for Life Span Studies (LSI) and is administratively under the KUMC Executive Vice Chancellor. The mission of the Center for Child Health and Development (CCHD) is to advance the health, development, and well-being of children at risk or who have developmental disabilities and supporting their families through the provision of: (1) exemplary clinical service; (2) interdisciplinary leadership training; (3) outreach training and technical assistance and (4) collaborative academic research. The Center for Child Health and Development provides diagnostic evaluation for Autism Spectrum Disorders using “gold standard” research tools. The current CCHD research database has over 6000 Intake records, over 4000 completed Patient Information Forms, over 1300 detailed psychological score measures and 1200 Developmental Pediatrics visits. With Russ Waitman (Informatics), the CCHD is in the process of mapping the current database into the Electronic Medical Record (O2), which will result in further integration between the clinical research database and our EMR system and better access for researchers across Frontiers. With Dr. Waitman, the CCHD will continue to develop the database for researchers using the Harvard ontologies developed to provide researchers a concept-based approach to identifying behavioral features of importance and for correlating these with genotypic data.

The CCHD contributes to the Frontiers Clinical and Translational research mission through a variety of activities and faculty contributions. The CCHD was one of the initial pilot clinics in the Frontiers Recruitment Registry and provided feedback to Frontiers regarding recruitment and consent procedures. Dr. Jamison, Clinical Associate Professor at CCHD, was an initial member of the Frontiers Recruitment Registry Request Committee (RRRC) and now serves as chair.

KUMC/CMKC Center for Children’s Healthy Lifestyles & Nutrition. The Center for Children’s Healthy Lifestyles & Nutrition represents an extension of the committed collaboration in the area of pediatric obesity research between two neighboring institutions who serve the health needs of children across the bi-state region of Missouri and Kansas. Supported by a state-of-the-art facility, researchers at the University of Kansas Medical Center and the Children’s Mercy Kansas City lead a wide range of childhood obesity treatment and prevention initiatives designed to benefit children, families and communities jointly houses clinical and research programs focused on activity and nutrition, as well as serving as home to a large community collaborative with over 400 members called Weighing In. This community collaborative helps tie (though our quarterly meetings) scientists to community members in working groups such as pregnancy and breastfeeding, early childhood, and healthy schools. The Center is poised to serve as a leader for pediatric obesity research in the Midwest and as a centralized resource for community members, academic and business leaders who are interested in arresting the current rates of childhood obesity and moving forward to ensure the healthy lifestyles and nutrition of all children.

KU Center for Telemedicine & Telehealth (KUCTT). The KUCTT provides the citizens of Kansas the best available health care while providing Kansas’ health professionals the best available health information and education, and is a recognized world leader in telehealth services and research. With a faculty of four and six
staff, KUCTT has provided more than 45,000 consults across 60 specialties from 1991 to present. KUCTT’s network connects some of the most clinically underserved communities, effectively enhancing Kansas’ quality of healthcare. Urban and rural telehealth partners include schools, area health education centers, hospitals, early intervention satellite sites, community health clinics, mental health facilities, and other venues. KUCTT is one of the most active outpatient telehealth programs in the country across secure room-based, PC-based, and mobile telemedicine platforms. KUCTT has been an integral piece of several national and international collaborations that have demonstrated the potential of telehealth across the lifespan to eliminate distance as a barrier to healthcare.

KUCTT also assists faculty with telemedicine and telehealth research across rural and urban settings. The community engaged research approach includes health services research, cost analyses, health communication research, patient/family outcomes research, and implementation research. Pre- and post-doctoral research trainees have participated across disciplines (e.g., medicine, nursing, health professions, psychology, health communication, health services administration). KUCTT is spearheading new models of patient-centered services, including home-based, mobile televideo services for homebound patients and their caregivers. In addition to clinical telemedicine, KUCTT also leads the institution’s replication and evaluation of the capacity building telementoring approach, Project ECHO (Extension of Community Healthcare Outcomes).

KUCTT assists researchers throughout the planning, implementation, and evaluation of telemedicine and telehealth projects, following community-engagement best practices. This includes: 1. Project development and application for funding (e.g., NIH, HRSA, SAMHSA, PCORI, and non-federal foundations); 2. Technology selection to fit project needs; 3. Project implementation, including ongoing evaluation and technical support consistent with telemedicine research best practices; 4. Project evaluation including telemedicine-specific domains; and 5. Results dissemination to participating communities as well as to national audiences through KUCTT’s federally funded Heartland Telehealth Resource Center. KUCTT also supports student research, ranging from semester-long participation in ongoing KUCTT research to independent student projects, including completion of Masters’ thesis and dissertation projects. The KUCTT Director and related Center faculty provide ongoing mentorship to support student completion of research tasks as well as numerous opportunities for presentations, publications, and grant submissions.

**KUMC Hoglund Brain Imaging Center.** The Hoglund Brain Imaging Center (HBIC) is under the direction of William Brooks, PhD. The HBIC is located at the KU SOM campus. It occupies a free-standing 11,500 square foot building and brings a combination of neuroimaging technologies and neuroscientists under one roof. It is supported through philanthropic, state, and federal monies. Center activities are primarily focused on research studies at basic and clinical translational levels. A major goal of the HBIC is to integrate structural and functional approaches for the assessment of the brain in both health and disease. It houses a 3T Siemens Skyra MRI system capable of high resolution structural and functional MRI, MR spectroscopy, and diffusion and perfusion imaging. Complementing this human system is a 9.4T Varian MRI system for animal studies. The HBIC also provides whole-cortex child and adult magnetoencephalography (MEG) and high-density electroencephalography and fetal magnetoencephalography and magnetocardiography.

**The Heartland Center for Mitochondrial Medicine (HCM).** The HCMM was established in 2014. It evolved through a series of meetings arranged between regional investigator stakeholders pursuing energy metabolism research. Russell Swerdlow, MD was elected the Director and Mission and Vision statements prepared. Quarterly general meetings of HCMM investigators are held at KUMC, with sub-committees meeting more regularly as needed. A current sub-committee is now meeting monthly to arrange a regional Mitochondrial Medicine Symposium to be held on May 2nd and 3rd, 2016, with Dr. Douglas Wallace as our keynote speaker. This symposium is being held with support from the KU ADC, KCUMB, the KU-L Higuchi Biosciences Center, and industry support we have procured from Seahorse Biosciences. The HCMM mission is to organize investigators with thematic interests in mitochondria and bioenergetics, and through this effort create a supportive and interdisciplinary environment that encourages a team-science approach and facilitates energy metabolism-related research. As envisioned, the HCMM will be a national/international leader known for cutting-edge, interdisciplinary research programs that advance basic science,
translational, and clinical research that focuses on mitochondrial dysfunction, disorders, and medicine. We will develop and sustain cross-disciplinary research programs that help us better understand the fundamental role of energy metabolism in biological systems and in disease. Specific vision statements are as follows:

- We will develop and sustain interdisciplinary innovative translational research programs that identify energy metabolism-related therapeutic targets, as well as novel therapeutic approaches that emphasize manipulations of mitochondria and energy metabolism pathways.
- We will develop and test next generation mitochondria and bioenergetics-based treatments that improve the lives of persons with defective or deficient energy metabolism.

**JUNTOS Center for Advancing Latino Health.** Over the past 8 years, KUMC has invested in the development of a dedicated center to address health disparities in the Latino community called the JUNTOS Center for Advancing Latino Health. The JUNTOS Center for Advancing Latino Health is focused on building community-based participatory research (CBPR) programs that translate research findings toward the elimination of health disparities and building healthier communities. JUNTOS involves a tight collaboration between highly successful teams at KUMC and a number of time-honored regional and national institutions.

A diverse, multidisciplinary team has collaborated on NIH clinical trials, smoking cessation with Latinos, evaluation of mobile health interventions, pharmacotherapy trials with underserved smokers, and evaluation of cultural and psychosocial aspects of tobacco use. Dr. Cupertino, Director of JUNTOS, has led federally and privately supported research, and has devoted efforts over the past 8 years to developing the JUNTOS community infrastructure to support clinical intervention research, primarily addressing tobacco use. Dr. Cupertino completed a NIH K01 (CA136993) focused on advancing understanding of smoking among Latino immigrants and pilot tested a novel intervention to enhance smoking cessation treatment for Latinos.

**Center for American Indian Community Health (CAICH).** The CAICH was funded in 2010 through a National Institute on Minority Health and Health Disparities Exploratory Center of Excellence (P20) grant (PIs: Daley/Greiner). CAICH began as the Program in American Indian Community Health in 2006, since which time member investigators have brought in nearly $30 million in externally-funded grants focused on AI community. CAICH is led by Dr. Christine Daley and conducts studies focused primarily on cancer prevention and control, including smoking cessation, weight loss, breast cancer screening, colorectal cancer screening, community education about cancer research and clinical trials, and health beliefs and behaviors. CAICH also has three Community Advisory Boards (CABs). We have an Executive CAB (7 members) who meets monthly to provide insight on day-to-day activities within the center, a longitudinal CAB (approximately 40 members) who meets quarterly, and a nationwide College and University (CU)CAB who meet regularly via social media. CAICH provides monthly cultural trainings and monthly in-service trainings focused on research methods and content. It has 6 Cores or shared resources, including an Administrative Core led by Dr. Christine Daley (PI) to help with grant administration; a Methods Core led by Dr. Byron Gajewski, a co-investigator on this application, to help with biostatistics and informatics needs; an Education Core, led by Dr. Won Choi, with paid graduate assistants and an educational pipeline; an Environmental Health Core led by Dr. Charles Barnes of the Children’s Mercy Kansas City in Kansas City, MO; a Law and Policy Core, that provides oversight of all appropriate approvals and ethical research questions through a Cultural Review and Monitoring Committee that is part of the KUMC Human Subjects Committee; and a Community Outreach Core that assists with recruitment, advertisement, and dissemination efforts, as well as overall community engagement.

**KUMC Liver Center.** The primary mission of the liver center is to be a multidisciplinary intellectual focus for liver researchers by bringing the Basic Science, Translational Science, Clinical Research, Pathology, Radiology, Clinical Hepatology, and Surgery communities together. The liver center is a research center and its focus is on research. It aims to collaborate closely with the clinical care components of the Liver community, the Liver Treatment Center and the Center for Transplantation in a mutually supportive relationship that will allow both clinical and research aspects of the liver enterprise to reach their full potential.
KUMC Midwest Stem Cell Therapy Center. The Midwest Stem Cell Therapy Center (MSCTC) was created by the Kansas Legislature in the 2013 session, with a state appropriation. The MSCTC helped establish a systematic mechanism for Kansans to receive adult stem cell therapy in the state and region and served as a coordinated center to translate basic stem cell research findings into clinical applications. The MSCTC faculty and staff include physicians, scientists, and trainees representing the fields of adult stem cell biology, neurology, oncology, hematology, cardiacl and vascular, endocrine, and other sub-specialties. These individuals represent several local and regional institutions, enabling the formation of a stem cell network of knowledge and information. This synergy among various institutions also fosters productive collaborations that may result in faster translation of basic science discoveries into the clinic. The MSCTC houses an FDA-registered GMP facility with the demonstrated capability to provide clinical grade adult stem cells for use in clinical trials. Several clinical trials with adult stem cells are in the start-up phase within KUMC and external research collaborations are being discussed. In addition, cutting edge molecular stem cell research is being conducted by MSCTC scientists. These ongoing studies involve induced pluripotent stem cells, regulation of cellular differentiation, cord blood cells, as well as various transcription factors and other molecular pathways in adult stem cells. For patients interested in stem cell studies going on around the country, there is a set of "ready-made" searches that automatically search ClinicalTrials.gov for the latest studies. In addition, the MSCTC is planning to expand the training of postdoctoral fellows in basic research in adult stem cell biology, as well as clinicians in adult stem cell-related topics.

COMMUNITY RESOURCES

The Kansas Patients and Providers Engaged in Prevention Research (KPPEPR) Network. The Kansas Patients and Providers Engaged in Prevention Research (KPPEPR) Network is a collaborative of patients and professionals from geographically diverse communities across Kansas. All KPPEPR Network members are primary care patients, providers, public health and/or agency professionals involved directly in health-related activity on a daily basis. The network is led by an Executive Director, Anthony Wellever, at the University of Kansas Medical Center (KUMC), where an additional group of senior research faculty (Drs. Allen Greiner, Kim Kimminau, Edward Ellerbeck, Christie Befort and Joseph LeMaster) provide support and technical assistance on all projects. The network is further supported by the Frontiers translational science program and its Community Partnership for Health initiative. Over the past 15 years, the KPPEPR Network has relied on collaborative involvement of over 60 primary care practices, thousands of patients and scores of public health and other health service agencies.

Prior projects have utilized patient and physician surveys, office assessments, direct observation of primary care, key informant interviews, and qualitative data collection methods. Nearly all of these projects have been initiated by academic researcher faculty at KUMC. The projects have resulted in a host of scientific publications and abstracts since Drs. Greiner and Ellerbeck became involved in 1999. The KPPEPR Network has been utilized to study the delivery of preventive services in physician’s offices, including colorectal cancer screening, counseling on diet and physical activity and smoking cessation counseling. In 2004 and 2005, KPPEPR practices participated in a NIH-funded study to examine the impact of disease management on smoking cessation in rural primary care practices. This study recruited 50 rural clinics, 63 health care providers, and 750 participants for a 2-year trial using motivational interviewing for smoking cessation (CA101963). Several NIH and HRSA funded intervention studies followed over of the next four years. In 3 other separate studies (HS14857, CA121016, HL87643) 68 rural clinics and 1,340 participants were recruited and delivered health related interventions via phone and telemedicine. Most recently, in 2015 KPPEPR became the primary network for a $10 million dollar PCORI funded intervention (Befort, PI) to study the comparative effectiveness of 3 practice change strategies for weight loss among rural primary care patients.

The KPPEPR Network has utilized several unique research methodologies over the years. These include home visit data collections by research assistants, hospital and primary care practice interventions and the involvement of medical students in research activities and intervention delivery. In 2014, KPPEPR leaders,
began a network reorganization to systematically involve patients, and an interdisciplinary group of health care providers and public health professionals as network leaders and active participants. The intention of these changes is to begin conducting projects that are instigated at the behest of patients and providers, rather than as conceptualized by full time researchers. The reorganization should result in a shared decision-making process whereby all parties have an equal voice and are valued as contributors throughout the research process. By reorienting the network to more fully serve the needs of patients and “on the ground” service providers, KPPEPR is poised to make significant contributions to evolving health care reform and new research initiatives such as the Federal Patient Centered Outcomes Research Institute, which seek to answer health research questions with immediate application for improving patient oriented outcomes.

**K-State Research and Extension.** K-State Research and Extension is a statewide network of educators sharing unbiased, research-based information and expertise on issues important to Kansas. It has established local, state, regional, national, and international partnerships. It is dedicated to a safe, sustainable, competitive food and fiber system and to strong, healthy communities, families, and youth through integrated research, analysis and education. With more than 125 years of research and 100 years of extension, K-State Research and Extension has been improving the quality of life and standard of living for Kansans for a century. This integrated system connects the university to every county through locally based educators who serve as sources of objective information. In partnership with the Community Engagement function, researchers are working to collaborate with K-State Extension agents to increase enrollment in clinical trials, participation in community health initiatives and to encourage enrollment in Frontiers’ patient registry, "Pioneers."

**The American Academy of Family Physicians National Research Network (AAFP NRN) and MOSAIC Center of Excellence.** The American Academy of Family Physicians National Research Network (AAFP NRN) and MOSAIC Center of Excellence was established in 1999 to conduct, support, promote, and advocate for primary care research in practice-based settings.

The AAFP NRN assists in realizing overall strategies for achieving improved primary care for the nation. These include: supporting initiatives in advancing the Patient Centered Medical Home, promoting an ongoing effort for practice change through improved use of technology, education and communication; assisting our members to achieve financial success through optimal practice management; involving family physicians in targeted public health activities; and increasing member and patient awareness of resources through educational programs.

Within the American Academy of Family Medicine National Research Network (based locally in Leawood, KS) we have 1 of 8 national centers of excellence in practice-based research (Kimminau, P30 HS21647) that provide access for Frontiers investigators to nine regional and three national PBRNs that include primary care, dental, pharmacy, and dietetics research networks.

The AAFP NRN is working to gain a broader perspective from the patients’ point of view as it relates to the focus of family medicine and family medicine research. This perspective will provide better insights into the concerns and needs of patients and further help us to understand and improve the patient/physician relationship. AAFP members work with the patient/family dynamic every day. Engaging patients in their own care is the foundation of what family medicine does. Including the patients’ view throughout our research processes is a key component if we are striving for improvements in health care and health outcomes. Getting their perspective throughout the various phases will provide us with insights into health concerns, important areas for research and benefits to the patient, and ultimately improved care.

**Center for Excellence in Health Communication to Underserved Populations (CEHCUP).** Health disparities constitute a major problem for the United States. More focused research, as well as advanced training for communicators (be they journalists, advertising or public relations practitioners) is needed. The William Allen White School of Journalism and Mass Communications has established the Center for Excellence in Health Communication to Underserved Populations on the KU-Lawrence campus to promote dedicated student training as well as collaborative research and service to the community to address health disparities in the state of Kansas and abroad.
CEHCUP has three major roles:

- Educate and train undergraduate and graduate students in journalism and strategic communication about health communication practices to underserved populations and CBPR-driven approaches.
- Function as a research hub to facilitate interdisciplinary, multidisciplinary and cross-disciplinary research into communication practices for health campaigns addressing underserved populations.
- Provide support, assistance and know-how for community-based organizations that want to engage in health promotion or disease prevention activities.

KUMC Office of Rural Health Education. KUMC Office of Rural Health Education partners with health care providers, Kansas employers, and stakeholders to increase access to quality health care for the people of rural and urban underserved Kansas. We do this by advancing the health care workforce through recruitment, retention, research and education. Let us help you find Kansas health care jobs, loan forgiveness and repayment options, temporary coverage for medical professionals, committed providers for your hospital or clinic, and more.

KCK Community Health Council. KCK Community Health Council (CHC) exists to improve health and health care for the people of Wyandotte County. We believe that residents have the ability, and an inherent right, to provide leadership in the shaping of physical spaces and public policies which impact their health. CHC’s responsibility is to ensure the collective experiences and expertise of Wyandotte County residents are represented in matters of health design and policy, as well as identify and maximize opportunities for collaboration, planning and implementation of effective community health improvement initiatives.

CHC is a non-profit, 501 (c) (3) community health collaborative of hospitals, safety net clinics, federally-qualified health clinics (FQHCs), mental health providers, public health departments, academic research institutions and health care funding organizations. CHC member institutions support the work of the organization on a pre-determined pledge that is renewed each fiscal year.

The University of Kansas Cancer Center has been selected for National Cancer Institute (NCI) designation. NCI designation enhances the long-standing relationship of the Cancer Center with the Midwest Cancer Alliance, providing opportunities to expand research and link discoveries made in the lab at the University of Kansas to the MCA network of hospitals and health care organizations and enhance the quality and delivery of cancer care at all levels. KPPEPR (Kansas Patients and Providers Engaged in Prevention Research) is a practice-based research network that is also part of the MCA.

All MCA-member medical professionals have access to second opinion and consultation services with multi-disciplinary cancer experts, conferences and other networking events, outreach programs, patient navigation support, communication materials, web resources, and continuing education programs. For the convenience of our affiliated medical professionals, the MCA provides many of these services at member locations, thanks to technology like Interactive Televideo (ITV).

Genesis Health Care Network, Garden City, Kansas (Finney County, KS). The Genesis Health Care Clinic Network is the operator of the largest rural primary care network serving Hispanics and refugees in Kansas. Serving over 9,500 patients annually through six clinics throughout southwest Kansas, with more than 90 percent of these individuals below the 200% poverty level and as the leading ambulatory “safety-net” care provider for these underserved individuals and families in the region, Genesis recognizes the importance of health care and social services for clients. The flagship Genesis clinic, in Garden City, rests in a region where 5 large counties now have majority minority populations. Meat packing, and feedlot growth over the past 30 years has led to an influx of Latinos and refugees from across the globe. The incredible diversity in the region has shaped Genesis. All programs -- dental and medical clinics, oral health screening and education, social services such as the food bank, clothing room, emergency assistance, citizenship classes, immunizations, early literacy, health education and outreach -- are designed to improve the lives and health status of individuals and families.
KUMC faculty began collaborative work with Genesis over 14 years ago. Dr. Kimminau, while Vice President of Research at the Kansas Health Institute in 2002, conducted the Minority Health Disparities in Kansas project and completed focus groups and health assessments at Genesis clinics. For over 12 years, we have placed medical students in the Genesis Garden City Clinic for a six week summer practice/research experience. We worked with Genesis to recruit smokers from the clinic for the NCI-funded KanQuit smoking cessation study (PI, Ellerbeck) in 2005-2007. We partnered with Genesis and other primary care clinics on the tablet computer delivered Healthy Living colorectal cancer screening program in 2007 (NCI, PI, Engelman). In 2009, we began working with Genesis to deliver state of the art telemedicine smoking cessation counseling services in the Connect to Quit study (NHLBI, PI, Richter). The past six years the Genesis network has been a subcontracted primary partner in the NCI-funded Community Networks Program Center to reduce cancer disparities (U54 CA154253, PI, Greiner). Through this we worked with Genesis to develop a Community Health Worker program that is now self-sustaining. We have new partnership funding from CMS to conduct health promotion across the region. We expect our research partnership with Genesis to continue and to allow work on vulnerable and understudied rural populations.

Institute for Community Engagement (ICE). ICE is the KUMC outreach and service delivery infrastructure that spans over 100 staff across five departments (Area Health Education Centers, Center for Telemedicine & Telehealth, Continuing Education, Rural Health, and Research & Scholarship). ICE coordinates outreach across the School of Medicine, School of Nursing, and School of Health Professions and there is a strong interprofessional focus across activities. Collectively, the Institute departments and its extensive internal and external partners provide needs-driven educational and clinical services that span the entire state and reach into each of Kansas’ 105 counties. The Institute’s mission is to "improve the health of Kansans through communication, collaboration, and statewide partnerships." The mission spans enhancing student education, strengthening the health care workforce, researching to improve health, advancing health care access, and serving communities. The Institute works closely with KU Hospital to advance integration and health system models. ICE’s departments and partners work with and help CPH facilitate community engaged research from concept to proposal implementation, including site/practice recruitment and retention, training, as well as reporting findings back to communities.

KU Center for Telehealth and Telemedicine (KUCTT). Using the range of telehealth technologies, KUCTT provides Kansans access to the best available health care while providing Kansas’ health care professionals access to the best available health information and education. Kansas is the ideal state for telemedicine, with half of its population in two population centers and the other half located throughout 88 rural counties. From the very first consult in 1991 to present day, the KUCTT continues to expand its clinical services for children and across the lifespan. With more than 40,000 consults across 60 specialties from 1991 to present, KUCTT is a leader in the telemedicine field. The existing network connects some of the most clinically underserved communities, effectively enhancing Kansas’ quality of healthcare. Urban and rural telehealth partners include schools, area health education centers, hospitals, early intervention satellite sites, community health clinics, mental health facilities, and other venues. KUCTT is one of the most active outpatient telemedicine programs in the country, with over 4,000 clinical consults per year across secure room-based, PC-based, and mobile telemedicine platforms. KUCTT also oversees the federally funded Heartland Regional Telehealth Center, spanning telehealth services across Kansas, Missouri, and Oklahoma.

Area Health Education Centers (AHECs). The AHECs are academic-community partnerships that train health care providers at sites and in programs that are responsive to state and local needs around health topics. The AHECs enhance the quality and accessibility of health care services in Kansas through partnerships with communities, health care professionals and organizations, educational institutions and other interested individuals and agencies. The three offices are geographically distributed across the East (Pittsburg, KS office), West (Hays, KS office), and Northeast (Lawrence, KS office). Rural Kansas has a diverse underserved population, with high poverty in southeast rural areas, a population faced with economic challenges related to downturns in farming and oil in central and northwest Kansas, and a new immigrant population associated with meat packing and other industries in southwest Kansas. The AHECs have a strong
local presence in each of these regions to meet needs unique to the area. AHECs link the resources of university health science centers with local planning, educational, research, and clinical resources. This network of health-related institutions provides multidisciplinary educational services to students, faculty and local practitioners, ultimately improving health care delivery in medically underserved areas. From 2009-2011, the AHECs completed 468 education/training initiatives with 1,980 sessions and processed 29,792 continuing education enrollments from every county in Kansas. The AHECs have leveraged their strong rural relationships to support recruitment and retention of rural practices in previous rural primary care research related to epilepsy, pediatric cancer, smoking cessation, and other topics.

**KUMC Continuing Education and Professional Development (CE/PD).** CE/PD’s goal is to develop and deliver education that makes a positive difference in practice and patient outcomes. CE/PD provides continuing education directly related to the top practice concerns of Kansas’ primary care providers, and provides interprofessional education with a growing emphasis on team-based medicine. CE/PD is nationally accredited by the Accreditation Council for Continuing Medical Education and the American Nurses Credentialing Center. CE/PD is the largest provider of continuing medical education in Kansas. In FY 12, CE/PD offered 81 courses, conferences or event series with an enrollment of 4,706. In addition, they supported 1,629 grand round sessions at KUMC, including broadcast via televideo of a number of sessions to metropolitan and rural sites across Kansas. Of note, CE/PD has accredited one of the most attended regional pediatric obesity conferences for the last decade, in addition to numerous grand rounds around obesity. CE has spearheaded two statewide initiatives that utilized training and performance improvement methodologies similar to the proposal in order to support adoption of national evidence-based guidelines in our rural and frontier communities. In particular, televideo technology supported team-based performance improvement activities and shared team learning because teams were geographically distributed across the states. One performance improvement initiative resulted in increased practice adoption of diabetes management practices and the second, while ongoing, is promising related to system-wide adoption of best practices in sepsis management.

**Department of Family Medicine.** This growing department is housed within three separate areas of the KU Medical Center complex. The research division, under Dr. Greiner’s direction, occupies a 2400 square foot office suite within the KUMC Endowment Building. The Division has seven full time faculty investigators and over twenty staff with experience in health disparities research and community outreach. The Department now ranks within the top ten family medicine departments in the U.S. in NIH funding. Two research division faculty members maintain clinical practices and each of the other five members is experienced in partnering with organizations and agencies to improve health. All research division staff have been hired with the intent of building a translational health disparities program studying prevention, social determinants, cancer and chronic diseases. These staff have expertise in health informatics, community based participatory research, minority participant recruitment, and biospecimen collection. The research division has been the primary home for the community engagement program within the KUMC Clinical and Translational Science Award, *Frontiers*, for over five years. The clinical portion of the Department of Family Medicine resides on the entire first floor of the recently completed medical office building. A large suite of faculty offices and educational program offices is housed separately in the Delp Building. This area also provides additional conference room and small classroom space for meetings and training sessions.

**Wyandotte County Safety-Net Clinic Coalition.** The Wyandotte County Safety-Net Clinic Coalition is a group of clinics serving low income individuals in Wyandotte County. The group has collaborated with multiple KUMC investigators on NIH funded projects over the last fifteen years. It includes two federally qualified community health center clinics run out of the Swope Health Services central location in Kansas City, Missouri. The clinics provide the vast majority of health care needs for the uninsured population of Kansas City, Kansas. This population segment is predominately minority with a rapidly growing Latino component. The coalition meets monthly and is currently working on collaborative programs to test the impact of community health workers on patient outcomes. The group has a shared patient database and referrals system. A number of local physicians and community leaders regularly attend coalition meetings and contribute to joint projects. The coalition works closely with the Wyandotte County Community Health Council. Swope Health Services has been extensively
involved with coalition activities and has moved their largest Kansas City, KS clinic to a new location to facilitate expansion of services. Swope Parkway Health Center, Kansas City, Missouri is a federally qualified community health center with Pediatric, OB/GYN, General Medicine, Ophthalmology, Mental and Behavioral Health, and Community Outreach clinics. The Center also has a full service on-site pharmacy. Services are provided to patients with Medicare, Medicaid, and to the uninsured on a sliding scale fee schedule. Swope Central had 16,324 total visits and 7,138 unique patient visits in 2004. Swope Wyandotte Clinic, Kansas City, Kansas is a satellite office for Swope Central and serves as the primary federally qualified community health center in Kansas City, Kansas. The Clinic has recently moved into new office space and has expanded services. Services are provided to patients with Medicare, Medicaid, and to the uninsured on a sliding scale fee schedule. Swope Quindaro Clinic Kansas City, Kansas is a satellite office for Swope Central and serves a very low income section of the urban core in Kansas City, Kansas. Services are provided to patients with Medicare, Medicaid, and to the uninsured on a sliding scale fee schedule. Duchesne Clinic Kansas City, Kansas is a clinic operated by the Sisters of Charity of Leavenworth, a non-profit health care services organization that also runs several hospitals in the plains and western plains regions of the United States. The clinic only sees patients who have no insurance coverage. Southwest Boulevard Family Health Care Kansas City, Kansas is a full service primary care clinic. The clinic serves patients with Medicare, Medicaid, private insurance, and those with no insurance on a sliding scale fee schedule. The Wyandotte County – Kansas City, Kansas Unified Government Health Department operates Pediatrics, OB/GYN, Family Planning, Immunization, and STD clinics for those with Medicare, Medicaid, and the uninsured. Dr. Greiner serves as the health department’s medical officer.

**Kansas City CARE Clinic.** The KC CARE Clinic was formed in 1971 as a private 501(c)(3) organization to promote health and wellness by providing quality care, access, research, and education to the underserved and all people in our community. The clinic provides health care services in general medicine, HIV prevention and primary care, behavioral health, and dentistry with a full-time staff of 105 as well as over 1,200 volunteers. Full- and part-time staff includes two full-time physicians, six nurses, five nurse practitioners, 22 case managers, six behavioral health providers, seven community health workers, one dentist, one dental assistant, and seven prevention specialists. In 2014, 8,000 patients received primary care, mental and/or dental services at two clinic locations, both in underserved areas of the city. KC Care maintains relationships with many academic institutions in the area, allowing medical students from KUMC, KCU, UMKC, and other schools to gain experience in the clinic under professional supervision.

**Silver City Health Center.** Silver City Health Center offers affordable, high-quality primary care, in-depth clinical evaluation, and a range of program-specific health services to English and Spanish-speaking residents of Wyandotte and Johnson counties. The Center provides primary health care and health education resource access to individuals without insurance, as well as to those with government or private health insurance coverage. Located in the Argentine community of Kansas City, Kan., the center employs skilled health care professionals from the KU Schools of Health Professions, Medicine and Nursing.

**Haskell Indian Nations University.** Haskell Indian Nations University (HINU) is the premiere tribal university in the United States, offering quality education to Native American students. Haskell’s student population averages about 1000 per semester, and all students are members of federally recognized tribes. Haskell’s faculty and staff is predominantly native. Haskell offers Associate and Bachelor’s degrees. Haskell’s historic campus is centrally located in Lawrence, KS in what is known as Kaw Valley. The mission of Haskell Indian Nations University is to build the leadership capacity of their students by serving as the leading institution of academic excellence, cultural and intellectual prominence, and holistic education to address the needs of Indigenous communities.

**Mid-America All Indian Center.** The Mid-America All-Indian Center serves as a cultural center and museum dedicated to educating people about and preserving the heritage of the American Indian.
Heart of American Indian Center. The mission of the Kansas City Indian Center is to encourage social, educational, and economic advancement of the American Indian community by promoting traditional and cultural values.

The Kansas City Indian Center (Heart of America Indian Center), a 501(c)3 non-profit corporation, has been serving the Kansas City's American Indian population since 1971.

Today the Center remains dedicated to the following goals:

- provide health, welfare and cultural services to American Indian individuals and families of our community;
- promote fellowship among the American Indian people of all tribes living in the Kansas City Area;
- stimulate the natural integration of the American Indian into the community;
- encourage artistic and vocational pursuits by American Indian people; and
- preserve and foster traditional American Indian cultural values.

Services Available - Emergency Services for Low-Income American Indians, including Food Pantry and Holiday Baskets, emergency telephone calls to Reservation or Nation and referrals to additional services; and the Morningstar Substance Abuse Outpatient and Prevention Program.

Mexican Consulate. JUNTOS, Drs. Paula Cupertino and Allen Greiner collaborate with the Mexican Consulate and the Ventanilla de Salud program in Southwest Kansas. They provide health fairs, screening services and health assessments of individuals seeking services from the Consulate and thereby keep a high level of surveillance on this vulnerable population’s health status.

ALS Mid-America Chapter. Leading the fight to treat and cure ALS through global research and nationwide advocacy while also empowering people with Lou Gehrig’s Disease and their families to live fuller lives by providing them with compassionate care and support.

Muscular Dystrophy Association. The Muscular Dystrophy Association (MDA) is an American organization which combats muscular dystrophy and diseases of the nervous system and muscular system in general by funding research, providing medical and community services, and educating health professionals and the general public. The organization was founded in 1950 by a group of concerned parents of children with muscular dystrophy.

Leukemia/Lymphoma Society. The Leukemia & Lymphoma Society (LLS) is the world's largest voluntary health agency dedicated to blood cancer. The LLS mission: Cure leukemia, lymphoma, Hodgkin's disease and myeloma, and improve the quality of life of patients and their families. LLS funds lifesaving blood cancer research around the world and provides free information and support services.

Community Living Opportunities. Community Living Opportunities, Inc. (CLO) is a non-profit community organization that provides community living, day habilitation, in-home support and targeted case management services for over 300 people with developmental disabilities and employs more than 400 staff members. It was formed in 1977 as an alternative to state institutions and became one of the pioneers in providing community-based services to people with developmental disabilities. Their services include targeted case management, residential services, which includes family-teaching and extended family-teaching homes, day services, behavioral consultation, children’s services, health care services, training and staff certification and organizational behavior management consulting. CLO operates seven group homes in Johnson County, Kansas (the metropolitan Kansas City area) and seven group homes in Douglas County, Kansas (Lawrence). CLO’s Early Childhood Autism Program (ECAP) provides in-home, intensive early intervention for 22 children with autism.

Cottonwood, Inc. Cottonwood Inc. is a not-for-profit community organization that provides services to people with developmental disabilities in Douglas and Jefferson County, Kansas. In their dual role as community
service provider and the Community Developmental Disabilities Organization, Cottonwood is the single point of referral for people with developmental disabilities seeking services. Cottonwood provides services and support to people with developmental disabilities in their living and work environments in the community. Residential services encompass group living, supported living, semi-independent living, and recreation/leisure activities. Support Services include medical care, mental health care, advocacy, habilitative therapies, financial entitlements, transportation, employment, housing, recreation, and adult education. Employment services and work services assist people to obtain and maintain jobs in the Cottonwood Work Services Department and in the community. Cottonwood’s residential services include 48 living arrangements. Cottonwood promotes persons with developmental disabilities as qualified workers to employers, while offering incentives to employers for their cooperation in supported employment. Life enrichment services offer enhancement of job, social, cultural, and leisure skills. Transition services include helping the Lawrence School district provide for a smooth transition from school to adult living for students with disabilities. Cottonwood provides direct or indirect services to over 650 people, ranging in age from 18 to more than 60 years old. Finally, Cottonwood helps fund the Early Childhood Coordinating Council in Jefferson County for families with children in need of early intervention.

**Kansas Association for the Medically Underserved (KAMU)** is the primary care association for the state of Kansas, and consists of a network of 40 primary care and 13 dental clinics that provide health services to low-income and uninsured people throughout the state. KAMU serves as a connecting point for clinicians working in safety net clinics and participates in extensive workforce development programs. Recently, KUMC faculty assisted KAMU in designing a dental hub model for delivering dental care to counties and communities that either lack sufficient dentists and dental hygienists to meet their need or who have no dental providers at all. Funding to support the development of the dental hub represents a collaborative effort on the part of health philanthropies who wanted trusted, academic expertise from KUMC investigators during the design phase to ensure that the model would permit effective delivery of dental care services to those most in need.

**Communities Creating Opportunity.** Communities Creating Opportunity (CCO) is a longstanding organization in Kansas City that arose from the work of the Kansas City Organization Project (KCOP). KCOP began in 1977 with religious and community leaders to respond to the rapid racial transition and financial changes in the city’s Southeast neighborhoods. As black families moved into these communities in the mid-70’s, white families moved out in droves. Subsequently, real estate values dropped, lending in the area froze, and insurance rates skyrocketed. Increases in poverty and crime rates followed. KCOP provided community residents with the organizational tools and leadership training to address these trends and enhance their communities. In 1984, KCOP became Kansas City Church Community Organization to reflect its congregation and neighborhood-based model of community organizing. While continuing in its tradition of faith-based community organizing, CCO adopted a new name in 2007, Communities Creating Opportunity, to include all religious traditions and other community partners. The well-recognized acronym, CCO, continues as the organization’s principal signature. Over the past ten years the group has been heavily involved in health equity work. The organization received funding to conduct “hotspot” mapping projects with Truman Medical Center and KUMC in an effort to identify unmet health care need. More recently CCO received funding from the Kansas Health Foundation to study how social factors influence health outcomes in Wyandotte County. KUMC researchers have worked with CCO leaders on data analysis and grant submissions for over five years.

**Mid-America Regional Coalition (MARC).** MARC is a regional nonprofit group of city and county governments that works to bridge governmental divides created by a state line and various city and county borders across metropolitan Kansas City. It is the metropolitan planning organization for the bistate Kansas City region. Directed by a Board of Directors made up of local elected officials, and serves nine counties and 119 cities. They provide a forum for the region to work together to advance social, economic and environmental progress. MARC is funded by federal, state and private grants, local contributions and earned income. A major portion of their budget is passed through to local governments and other agencies for programs and services. The organization developed a health policy agenda in 2009. Most recently MARC has
become the home base of a regional community health worker collaborative initiative. This group meets monthly and works to support and help expand the activities of lay health workers through Kansas City. Various Frontiers researchers have worked with MARC to organize and build capacity for health improvement and bioscience in the region.

**El Centro.** El Centro began in 1976 with a small amount of funding from the Archdiocese of Kansas City in Kansas. Church leaders and a group of energetic and caring community members saw a need for an organization to address the needs and concerns of Kansas City, Kansas’ rapidly growing Latino population. With in-migration accelerating, *El Centro de Servicios para Hispanos* was born.

El Centro has grown from a single location to three locations in Kansas City, Kansas and Olathe, serving more than 12,000 individuals and families per year. Our programming has evolved from our first program for elders – the Senior Day Program – to include The Academy for Children – a dual-language Pre-K program, workshops on money-management and homeownership, health education and healthy living outreach through our *Promotores de Salud* (Health Promoters) volunteers, health navigation and intervention, and our policy and advocacy efforts for issues of special interest to our community. The organization launched a community health worker program in 2008 and has been a close partner of KUMC’s JUNTOS, Center for Advancing Latino Health. *El Centro* has also assisted in recruiting participants in research and has partnered with KUMC researchers in the Department of Family Medicine and with the Alzheimer’s Disease Center.

**Johnson County Department of Health and Environment.** Since 1943, the Johnson County Health Department has been the official public health agency for the County, with the Board of County Commissioners serving as the Board of Health. In March 2012, the Health Department merged with the Johnson County Environmental Department to become the Johnson County Department of Health and Environment (JCDHE). The Director is Lougene Marsh and the Deputy Director is James Joerke. JCDHE is comprised of six divisions: Business Operations, Childcare Licensing, Community Health, Environmental, Health Services, and Strategic Planning. There are approximately 150 department employees. In June 2014, JCDHE became the first accredited health department in Kansas.

Services include: immunizations, communicable disease surveillance, TB testing, refugee health testing, prenatal, WIC, reproductive health, STD screening, HIV testing, child care facilities’ licensure, health education classes, workshops & trainings, injury prevention activities (Safe Kids Johnson County), chronic disease risk reduction activities, community wellness activities. Programs include: Outreach Nurse, Public Health Emergency Program, Targeted Case Management, ‘Making a Difference’, Air Quality, Household Hazardous Waste, Solid Waste Management, On-site Sewage Treatment, Ozone Reduction and Pool Inspections. Services are provided at three sites, 11875 S. Sunset and 11811 S. Sunset in Olathe and 6000 Lamar in Mission.

Dr. J. LeMaster, family physician at KUMC, serves as the medical director for JCDHE. His position facilitates research activities to engage residents seeking services to also participate in community based research. Most recently, researchers in family medicine conducted a comprehensive assessment of micro-food deserts in Johnson County to inform local policymakers, and the team collaborated with JCDHE’s WIC and immunization programs to interview residents about food insecurity, access and need.

**Johnson County Developmental Supports.** Johnson County Developmental Supports (JCDS) was established in 1972 as an agency of Johnson County (Kansas) government to provide community-based services for people with developmental disabilities. JCDS is headed by a seven-member governing board composed of parents, community advocates and professionals who are appointed by the Johnson County Board of County Commissioners. An executive director and a staff of 260 trained professionals lead daily operations. JCDS programs and services are partially funded on a contractual basis with the Kansas Department of Social and Rehabilitation Services. Additional funding sources include a county tax levy, state
block grants, subcontract income, contracts with companies for workers, private grants and donations. JCDS provides office space, Internet access, and some clerical support for MRRC investigators working on site. Today, as a Community Service Provider (CSP), JCDS directly serves nearly 500 people daily. Through a person-centered planning process and within available resources, services are shaped to fit individual needs, preferences, goals, abilities and interests. Some examples of available services include Residential Supports (ranging from a few hours of support for those living independently to live-in, around-the-clock care), Day Supports (facility-based or community-based employment opportunities for paid work, or other activities including volunteer work), Alternative Supports (professional resources for nursing, occupational therapy and assistive technology), Behavior Supports (applied methods to maximize adaptive behavior) and Case Management.

In addition to being a service provider in Johnson County, JCDS has another, equally important role: that of Community Developmental Disabilities Organization (CDDO). As CDDO, JCDS provides a single point of contact and entry for all of Johnson County, Kansas and maintains a county-wide service needs list for those waiting for certain services. Johnson County Developmental Supports accomplishes its direct service mission by developing, linking, and monitoring services, supports, and resources for approximately 700 people. In addition, JCDS works with over 360 affiliates who are agencies and individual service providers to assist access to quality, cost-effective services.

**COMMUNITY ENTREPRENEURSHIP RESOURCES**

The Bioscience & Technology Business Center at the University of Kansas Medical Center The Bioscience and Technology Business Center (BTBC) was a unique creation in 2006 by the City of Lawrence (City), Douglas County (County), the University of Kansas (KU) and the Lawrence Chamber of Commerce (Chamber). Its missions are to create, grow, recruit, and retain bioscience and technology companies from within the region and spun out from the University and build a sustainable economic development infrastructure and tax base for the region.

Beyond the unique BTBC stakeholder structure and strategic partnerships, the BTBC has developed a dynamic and successful environment for innovation and entrepreneurship, and an engine for creating and accelerating high-tech and bioscience businesses. These successes have been accomplished through:

- Startups based on research and technology from KU and the KU Medical Center;
- State-of-the-art BTBC facilities with advanced amenities such as gigabit fiber internet;
- BTBC resources including business services and the expansive BTBC network;
- Competitive incentive packages to worthy companies starting new business operations; and
- Strong coordination with KUIC in accessing KUMC academic and technology resources for BTBCMC companies.

BTBC will continue to build and leverage its assets and other resources for further development of its footprint at KUMC and KUMC’s relationships and value to the region’s economy.

**Digital Sandbox KC** provides proof-of-concept resources to support early-stage commercialization processes including access to technology, business and market experts and funding for early stage market validation, prototyping and beta testing services.

**Kansas City Area Life Sciences Institute (KCALSI).** As a nonprofit institute with a goal to stimulate and coordinate regional life sciences initiatives, KCALSI is:

- Fostering relationships between the academic and private sector life sciences communities
Assisting scientific collaborative research efforts through identifying funding opportunities, proposal review facilitation, resource allocation, and maintaining accountability

Raising awareness of the life sciences and the value it brings to people, the region and institutions

Assisting in life sciences advocacy efforts at the local, state, and national levels

Providing support to economic development and technology transfer & commercialization organizations.

KUMC CORE FACILITIES

KU Clinical Research Center (Figure FR-TL1.6). Designed unlike any other research facility in the country, the 82,400 ft² building, which was donated by the Hall Family Foundation, has been remodeled with state-of-the-art features and a more efficient use of space, resources and manpower to best accommodate patients and researchers:

- Easily accessible outpatient exam and treatment rooms, office space and specimen collection laboratories
- A pavilion for gatherings and community events
- Clinical research functions combined into one location

The Clinical Research Center is home to the Clinical and Translational Science Unit (see next) and the NIA-designated Alzheimer’s Disease Center (described above).

Clinical and Translational Science Unit (CTSU). The Clinical and Translational Science Unit (CTSU) provides state-of-the-art space for researchers to see patients who are enrolled in clinical trials. The CTSU is staffed by experienced registered nurses and medical assistants who provide routine care, complex protocol procedures and help record research data in study flow sheets. The space features an exercise physiology laboratory and a commercial-quality metabolic kitchen.

The CTSU does this through:

1) **Physical infrastructure** and resources to support all aspects of research from patient involvement to complex multidisciplinary, multi-institutional collaborations.
2) A **team-based environment** with established methods and processes to stimulate collaborative research and support increasingly complex trials.
3) **Training opportunities** for the translational science workforce in an integrated, continuous-learning environment.
4) **Physical infrastructure** and resources to support all aspects of research from patient involvement to complex multidisciplinary, multi-institutional collaborations.

The CTSU currently supports 137 approved protocols: 86 investigator-initiated and 51 industry-sponsored studies. In 2015 we had 4887 participant visits to the CTSU (non-unique), up 140% over our first year in 2011 (n=2055) and a 60% increase over the 2014 (n=3061 participants). We attribute this recent growth (Figure FR-TL1.7) to the increasing user-base as investigators have adapted to our new location in the Clinical Research Center.
Center. Currently, the CTSU’s 137 protocols are directed by 68 different PIs from 27 different KUMC departments and centers. Additionally, we support PIs from various campuses in the region including the University of Missouri-Kansas City (Dr. Lundgren), KU-Wichita (Drs. Collins and Redmond in Preventive Medicine), KU-Lawrence (Dr. Storkel, Life Span Institute) and a local physician (Dietz) with the Kansas City CARE Clinic. Our increasing user base from regional institutions underscores our usefulness to a broad and varied research base and the unifying, collaborative mission of the CTSU as a site for team science.

**CTSU Infrastructure:** The CTSU (25,000 ft$^2$) is housed on the third floor of the KU Clinical Research Center. The Clinical Research Center is a unique regional resource supported by the Johnson County Education and Research Triangle (JCERT) initiative, a 1/8th cent sales tax passed in 2008 to create economic stimulus through new facilities for clinical research, animal health, engineering, business, science and technology. This new, 75,000 ft$^2$ facility is located near the KU campus with easy access for all HICTR network institution investigators and research participants.

- **Clinic Space:** The CTSU contains 17 clinic rooms, 2 cognitive testing rooms, and open workspaces for up to 5 visiting study coordinators (Figure FR-TL1.8).
- **Infusion Center:** The CTSU’s infusion center has 11 infusion bays supported by two nursing stations and activity in the center has steadily grown. We have supported seven phase 1 first-in-human studies (Pompe’s disease, Fabry’s, myotonic dystrophy, multiple sclerosis, and pancreatitis). The center also supports research infusions (480 infusions in 2015) and intensive and complex metabolic research assessments such as hyperinsulinemic-euglycemic clamps (n=70).
- **Overnight Stay Unit / Sleep Lab:** The Overnight Stay Unit (1,200 ft$^2$) consists of 3 dedicated rooms supported by a nursing station. The unit also is a fully functional sleep lab supporting both clinical and research sleep studies when research overnight stays are not scheduled. We have supported 42 overnight stays since moving into the new building.
- **Bionutrition Unit:** The CTSU’s bionutrition unit includes an 830 ft$^2$ metabolic kitchen and a 600 ft$^2$ demonstration kitchen. The kitchen is fully equipped to provide meals required by study protocols, including regular, therapeutic, modified, and calculated and weighed research meals.
**Exercise Physiology Laboratory:** The CTSU’s dedicated Exercise Physiology Lab contains two metabolic carts (ParvoMedics TrueOne 2400), treadmills, bicycle ergometer, and electrocardiogram. The CTSU has a Dual Energy X-ray Absorptiometry (iDEXA, GE Healthcare) for detailed body composition assessments. The exercise physiology laboratory is currently supporting 17 studies and in 2015 conducted 84 treadmill tests and 179 DEXA scans.

**Clinical Laboratories:** The CTSU has a sample processing lab that contains a glucose analyzer (YSI STAT Plus), refrigerated centrifuge (Heraeus Labofuge 400 R), and three –80 degree freezers (Thermo Electron Forma). The Clinical Research Center also has a state-of-the-art Bioanalytical Lab equipped with two Waters UPLC-Xevo TQ-S LC-MS/MS systems.

**CTSU Team-based Environment:** The CTSU adheres to (and develops as needed) high-quality methods and processes to support complex trials and procedures. This infrastructure and expertise enables investigators to avoid developing these costly resources on their own and provides them with the team-based environment essential to performing these complex studies.

**Research Nursing Team:** The CTSU team is composed of an administrative director, nurse manager, 6 research nurses and a medical assistant. This flexible team provides staffing for any needed assessments, phlebotomy, complex procedures, overnight stays, and processing of lab samples.

**Research Coordinators:** The CTSU maintains a pool of research coordinators who can conduct all aspects of research coordination. The pool is currently composed of 2 full time coordinators and 2 part time coordinators (CTSU research nurses “flex” between the research nursing team and coordination, as needed). The coordinators have supported a total of 48 trials (28 different PIs) since 2011 and are currently supporting 20 trials (from 14 different PIs).

**“CTSU without Walls” Program:** The CTSU offers a CTSU without Walls program to increase access to CTSU resources by supporting research outside the structured unit. Deployable research nurses are available to assist investigators with 1) drawing blood; 2) performing IV infusions; 3) collecting and processing specimens; 4) administering study drugs; 5) monitoring for adverse events; and 6) performing other protocol procedures such as oral glucose tolerance tests.

**Investigational Pharmacy:** The Investigational Pharmacy (1200 ft²) is located on the second floor of the Clinical Research Center and is staffed with a director and two pharmacists. The Investigational Pharmacy stores, handles, and prepares all the study drugs and infusions for CTSU protocols.

**Medical Monitoring:** The CTSU offers medical monitoring as needed for studies needing clinical oversight. Medical monitoring includes two nurse practitioners and a physician who are available to monitor procedures such as treadmill exercise testing or infusions, perform physical exams, and provide AE assessments when needed. This service lowers barriers to conduct complex, intensive procedures such as exercise testing in high risk patients.

**PCI Clinical Research Satellites.** The CTSU maintains 3 satellite spaces on the main KUMC campus. This enables participants or researchers who need basic support offsite to conduct research visits and access to some of the resources of the CTSU.

**Swope Health Services Satellite:** The PCI program also has a site at the Swope Health Center in Kansas City, MO, a safety-net clinic that enhances access to a largely minority, underserved research population. Swope is a patient-centered medical home that provides primary health care and behavioral health services in Kansas City. Swope Health Services mission is to improve the health and wellness of the community by delivering accessible, quality, comprehensive patient care. Today, Swope Health Services provides care for more than 40,000 patients in western Missouri and eastern Kansas. The PCI program has dedicated research space at Swope that includes 2215 ft² of space that includes 10 offices and 3 workstations. The space enhances access to the patient population served at Swope and provides the space to accommodate over 2400 research
assessments annually. Currently, there are three smoking cessation projects including two R01 funded projects led by Drs. Nollen (DA031815) and Cox (DA035796) and a PCORI-funded project (AD-1310-08709) led by Dr. Nollen. Additionally, the satellite presence created opportunities for the KU AD Center to participate in an NIA funded multi-site trial of aspirin in reducing clinical events in older adults.

Delp Satellite (KUMC Main Campus): The Delp satellite is located on the main KUMC campus and consists of 250 ft² of dedicated research space. This basic unit is outfitted with a calibrated centrifuge, lab collection supplies, desk top computer, exam table, crash cart, scale, stadiometer, and vitals machine. Utilization averages 28 subjects per month.

Hoglund Brain Imaging Satellite: The Hoglund satellite space is located at the Hoglund Brain Imaging Center to support clinical research procedures such as phlebotomy, clinical assessments, and cognitive testing that may accompany brain scanning protocols. The space is 150 ft² and outfitted with centrifuge, exam table, and phlebotomy supplies. Utilization averages 28 subjects per month.

KUMC Laboratory Animal Resources. The Laboratory Animal Resources (LAR) is charged with housing and care of research animals at KUMC. The LAR is comprised of 99,388 gross assigned sq. ft. in 4 buildings located on the KUMC campus in Kansas City (independent of the University of Kansas, Lawrence campus facilities). The LAR employs 37 staff. The entire centralized animal care program was fully accredited by the Association for Accreditation and Assessment of Laboratory Animal Care International (AAALAC) in February 1992 and has maintained its accreditation since that time. Housing facilities are available for a wide variety of animal species, including the usual laboratory animals. The facilities include a variety of dual purpose animal rooms. Animals are housed separately by species and, when possible, by source and/or microbiological status. Research support also includes model development assistance, technical assistance, and IACUC protocol review. The principal site is the Research Support Facility (RSF), which includes conventional rodent rooms, biohazard suites, isolation cubicles, surgical suites, cagewash and support facilities. This facility totals ~75,896 sq ft and houses all species of animals. The second animal facility occupies the fifth floor of the Smith Building, including cagewash and support space as well as conventional rooms for housing rodent species and monkeys. The Smith Building animal facility totals ~6170 sq ft. A third animal facility is in the ground floor of the KLSIC building and totals ~14,340 sq ft. This facility includes housing and support space, cagewash, procedure rooms, the transgenic core facility, a rodent behavioral core, and an ABSL3 laboratory. This is a barrier facility equipped with bulk autoclaves and ventilated racks. The animal care facilities are integrated into a comprehensive program for animal care and use and have reporting responsibilities to two major organizational components of the university administration. Animals for specialist purposes are also housed in several small satellites.

The financial and policy management falls under the office of the School of Medicine Senior Associate Dean for Research as a core facility and the Director of Laboratory Animal Resources reports to the Senior Associate Dean for Research. The regulatory and compliance management falls under the Animal Research Protection Program (ARPP) in the Office of Compliance. The Institutional Official for the program is the Vice Chancellor for Administration, who oversees the Office of Compliance. The institutional official appoints the Institutional Animal Care and Use Committee (IACUC). The IACUC is managed by the ARPP program, which is independent of the LAR (to eliminate any conflict of interest). The director of ARPP is a certified IACUC administrator.

KUMC Rodent Behavior Facility. The Facility assists researchers in incorporating and executing sensorimotor behavioral research techniques using rodents in their individual research projects. The Rodent Behavior Facility provides both equipment and services, and is available for use with the appropriate training and approval.
KUMC Transgenic and Gene-targeting Institutional Facility. This Facility is an animal genetic model development and research facility that supports transgenic and gene-targeting research endeavors, promotes technology development, and serves as a resource for these technologies. It provides "3D" service for design, development, and depository of mouse models for researchers at KUMC and their collaborators at other academic institutions.

KUMC Confocal Imaging Center. This facility provides affordable, readily accessible, user-friendly state of the art laser confocal microscopy services to researchers at KUMC and other area institutions.

KUMC Electron Microscopy Research Laboratory. The Electron Microscopy Research Laboratory office is well equipped for routine electron microscopy applications and technical personnel are available to assist investigators. This technology is available to researchers by appointment.

KUMC Genomics Core. The Genomics Core was formed with the merger of the Genome Sequencing Facility and the Microarray Facility. By combining these core resources investigators have access to both Next Generation sequencing technology and Microarray technology in a centralized core. The Genomics Core provides access to both deep sequencing and array technologies to Institutional Investigators who participate in the Frontiers Clinical and Translational Research mission. Participating investigators receive affiliate pricing for all services provided by the Genomics Core. The Genomics Core has worked closely with Frontiers Investigators to provide deep sequencing and array data sets for the advancement of the research efforts.

The Genome Sequencing Facility provides deep sequencing services using the Illumina HiSeq2500 sequencing system. Full service library preparation services are also available. The Microarray Facility features microarray services using the Affymetrix GeneChip system. The Agilent Bioanalyzer services and nucleic acid isolation services provided through the Microarray Facility supports both the Next Generation sequencing and GeneChip microarray services provide through the Genomics Core. The Genomics Core also provides the following services: Paired end or single read Genome sequencing using the HiSeq 2500 Sequencing System with multiple sequencing cycle strategies. Sequencing library preparation services for a wide range of sequence interrogation strategies. Affymetrix GeneChip array interrogation for expression analysis (mRNA and transcriptome) and genome wide studies. Agilent Bioanalyzer QC analysis of RNA isolates. RNA / genomic DNA isolation services. Access to discounted Sanger sequencing and oligonucleotide synthesis through outsourcing agreements with GENEWIZ and Integrated DNA Technologies (IDT).

KUMC Histology Imaging Analysis Core. The Histology Services facility houses sample preparation areas, including a fume hood and equipment for sample preparation for light and electron microscopy. The facility is supervised by a histology specialist who is responsible for maintaining all equipment and for training investigators and personnel in equipment use. The Histology laboratory is fully equipped for paraffin histology, including automated processing, embedding, sectioning and staining. Facilities also are available for the embedding and sectioning of frozen specimens. For viewing sectioned material, the histology laboratory is equipped with dissecting and light microscopes.

KUMC Hypoxia Core Laboratory. This Laboratory contains two profiling chambers located inside a glove box as well as two mobile chambers that can be set up in individual labs. The profiling chambers are controlled for temperature, humidity, CO₂ and oxygen. These chambers are operated by computer and allow for set point and profiled oxygen concentrations. The glove box is a controlled environment that can be used to change media and work with cells in an oxygen controlled workspace. Mobile chambers can operate in any temperature-controlled environment at any single oxygen set point. A computerized controller maintains the oxygen concentration by infusing a mixed gas that effectively dilutes the oxygen concentration to the set point.

KUMC MicroArray Facility. This Facility provides centralized access to gene expression microarray technology for advancing research conducted by investigators from KUMC, Kansas Reagents Institutions, and member institutions of the Kansas City Area Life Science Initiative (KCALSI). Using the GeneChip® expression arrays, researchers can monitor gene expression in multiple modeling systems. Expression data can be
analyzed using the expression analysis software. The Microarray Facility operates in conjunction with the KUMC Bioinformatics Core which serves as a resource for data analysis.

**KUMC Flow Cytometry Core.** The mission of the Flow Cytometry Core Laboratory is to provide access to state-of-the-art flow cytometry and related technologies to researchers at the University of Kansas Medical Center and other area institutions. The FCCL has served more than 70 researchers at KUMC, including support of projects in the basic, translational, and clinical sciences. Programs that heavily use the core include the Cancer Center and the Institute for Reproductive Health and Regenerative Medicine and the Departments of Microbiology, Hematology/Oncology, and Pathology. Core Staff provide assistance in experimental design, protocol development, sample preparation, data acquisition, and data analysis. In addition, staff perform all cell sorting experiments. Staff train users in the proper use of the instruments with level of service depending on the experience and wishes of the user. Experienced users receive training related to the specifics of our instruments and are able to operate the instruments independently. Novice users receive more extensive training and often choose to pay an hourly rate for staff to perform aspects of the experiments.

An extensive array of instrumentation is available in a suite of 775 ft². The **BD LSR II** which was present when the core was founded in 2005, has been upgraded and now is a four-laser, eighteen-parameter instrument. **Attune NxT** is the newest instrument in the core. It is a two-laser, nine-parameter instrument that has features that offer flexibility for our users. Specifically, the autosampler allows the acquisition of data from a 96-well plate in as little as 15-20 min. In addition, the Attune is automated to allow simpler start-up and shut-down procedures and 24/7 access. **FACSAria IIIu** has undergone two major upgrades that included the addition of lasers and detectors, as well as a new fluidics system. **Celigo** can take brightfield or fluorescence images of tissue culture plates and flasks. **Luminex** allows multiplex analysis of cytokines, chemokines, and other small molecules from small samples. The technology combines the concept of an ELISA with flow cytometry detection of beads bound to analytes. The instrument is often used as a screening tool for investigators to choose the analytes of interest and then pursue the findings with less expensive technology. **RoboSep** is an automated magnetic bead-based separation assay purchased from the funds provided by individual users.

**Shared Glassware Facility.** The Shared Glassware Facility (380 ft²) provides shared glassware washing and autoclaving, media preparation and other services as requested by faculty at KUMC. Facility is operated by the Microbiology Department and is available to any KUMC investigator who chooses to participate by paying a portion of the technician's salary and supply costs. This facility has been part of the Microbiology Department for more than 20 years and continues to provide services as requested by KUMC faculty. The SOM has been involved with purchase of equipment and service contracts along with the glassware facility manager cap for salary. In recent years, salary support for the technician has been partially provided through the Microbiology Department COBRE Phase III grant.

**Biospecimen Repository.** This is a cancer focused but non-disease or site specific collection resource for highly annotated human samples. Specimens are available to qualified researchers at KUMC and vetted collaborating institutions. Services include Fresh frozen tissue (1mL aliquots) in monitored liquid nitrogen vapor phase freezers; Formalin-Fixed Paraffin-Embedded (FFPE) tissue; Blood products (1mL aliquots of buffy coats, plasma, viable lymphocytes and serum) in -80°C freezers; Isolated DNA; Urine; Saliva. The Biospecimen Repository is an established biospecimen bank of the University of Kansas Cancer Center that supports sample processing and storage for a wide variety of investigator-initiated studies on the KUMC campus. The BRCF coordinates the ethical collection, storage, annotation, and distribution of tissue and peripheral blood samples to support translational research. The BRCF supports the KU ADC sample processing and storage of whole blood, plasma, serum, buffy coat, platelets, DNA, and RNA. The laboratory is equipped with three -80°C Harris upright freezers (Model SLT-25V-85SIA37), installed with a Revco CO2 back-up system (Model 6593-1); and two Custom Biogenics liquid nitrogen vapor phase freezers (Model ASC24T); a Sensaphone alarm system (Model 1104). These freezers are available for the purpose of storing tissue and blood samples. The BSR will support the processing and storage of blood samples for this study.
KU Program in Integrative Medicine. KU Integrative Medicine focuses on biomedical based therapies, combining the best therapies from conventional medicine with an integrative medicine approach. Practitioners at KU Integrative Medicine include physicians, a naturopathic doctor, nurse practitioner, nurse, certified neurofeedback technicians and registered dietitians. Research at KU Integrative Medicine is moving forward in both the basic science lab and in the clinical realm, with research on intravenous vitamin C leading the country.

KU SCHOOL OF MEDICINE-WICHITA

KUSM-Wichita Campus. KUSM-W is a community-based campus with offices spread across Wichita. The main campus building houses all administrative units and the Departments of Family and Community Medicine, Internal Medicine, Psychiatry and Behavioral Sciences, and Preventive Medicine and Public Health. Other departments are housed at one of the local community hospitals, including Pediatrics, Radiology, Orthopedics, Obstetrics and Gynecology, Surgery, and Anesthesiology (Figure FR-TL1.9). Resources also include the Farha Medical Library and the Office of Rural Health Education and Services. The KU Wichita School of Pharmacy is co-located with the School of Medicine. The School of Pharmacy provides unique opportunities for interprofessional education and research in Wichita.

KUSM-W Clinical Services. The KU School of Medicine-Wichita has considerable clinical and patient care facilities and resources. As a community-based medical school, faculty and staff have access to three major community hospitals for education, clinical practice, and research.

- Wesley Medical Center, part of Hospital Corporation of America, is an acute-care center licensed for 760 beds and 102 bassinets. Wesley treats more than 24,000 patients annually and delivers more than 6,000 babies, more than any hospital in a 13-state region. Wesley provides the most extensive emergency network in Wichita. Wesley also houses a resident continuity clinic for Obstetrics and Gynecology and Family Medicine.

- Via Christi Health is a member of Ascension Health, the largest Catholic and largest nonprofit health system in the US. Via Christi Health is the largest provider of healthcare services in Kansas. It serves Kansas and northeast Oklahoma through its doctors, hospitals, senior villages, and health services. Via Christi includes more than 245 physicians and more than 175 advanced practice professionals employed through Via Christi Clinic, hospitals, and community sites. More than 1,200 physicians have medical privileges at Via Christi Hospitals. Via Christi also houses a resident continuity clinic for Family Medicine.

- The Robert J. Dole VA Medical Center is a Joint Commission accredited, complexity level 2 facility. The Medical Center serves over 30,000 Veterans living in 59 counties of the state. The Medical Center is a primary and secondary care facility. It is a teaching hospital, providing a full range of patient care services, with state-of-the-art technology. Comprehensive health care is provided through primary care, secondary care, and long-term care in areas of medicine, surgery, psychiatry, physical medicine and rehabilitation, cardiology, neurology, oncology, dentistry, visual impairment and low vision rehabilitation, spinal cord dysfunction, traumatic brain injury, polytrauma, pain management, post-traumatic stress
syndrome, homeless, mental health intensive case management, prosthetic laboratory/orthotics, and extended care services. In addition to the main facility in Wichita, they offer services in six community-based outpatient clinics.

The KUSM-W Medical Practice Association was established to provide medical education, research, and medical care through its members who are full-time faculty at the University of Kansas School of Medicine-Wichita. It includes the KU Wichita clinics: Adult Medicine (an internal medicine clinic), Internal Medicine Midtown (an internal medicine clinic), Center for Breast Cancer Survivorship, Center for Internal Medicine (the residency continuity clinic), Endocrinology, Gastroenterology, General Pediatrics, Subspecialty Pediatrics, Psychiatry, and Psychology.

**KU Wichita Clinical Trial Unit.** The KU School of Medicine-Wichita Clinical Trials Unit (CTU) is dedicated to determining the safety and optimal dosing of significant new medications to relieve the burden of mental illness on patients and families. This involves testing novel mechanism of action drugs and biologics for the most serious neuropsychiatric illness including Major Depression, Alzheimer’s disease, and Schizophrenia.

CTU investigators have between 8 and 30 years of experience covering the spectrum from trial design to study operationalization and execution across all phases of human testing. This includes development of study protocols, ensuring compliance with federal guidelines for good clinical practice, and analysis of results. The research group includes three investigators, four full time staff, and one site manager and has been funded by private foundations, pharmaceutical companies, and the National Institutes of Mental Health.

Site resources include fourteen fully furnished research and clinical offices with telecommunications capabilities, two examination rooms, two centrifuges, one refrigerator, one full size -20 freezer, one full size -80 freezer, one half size -80 freezer, one reception area, one patient waiting area, one conference room, and one record-storage room.

Because of the group’s background in biological psychiatry and neuroscience, the CTU’s efforts have focused on central nervous system drug development. In addition, the expertise and resources of the CTU are being utilized to expand the research efforts of other clinical departments on the Wichita campus. This involves oversight of study startup and operationalization including administrative oversight and training of investigators and site staff.

In addition to growing the academic mission of the campus, this work directly relates to the Universities teaching and clinical missions because health care providers must understand the process of drug development so they can critically evaluate the literature and judge whether and how to introduce new medications and devices into the treatment of patients.

**KUSM-W Laboratory.** The KU School of Medicine-Wichita (KUSM-W) does not have laboratory resources. However, laboratory resources are available through Wichita State University.

**KUSM-W Animal.** The KU School of Medicine-Wichita does not have animal facilities. However, animal facilities are available through Wichita State University.

**KUSM-W Computer.** Computer resources are provided by the KUSM-W Office of Information Technology (IT). These resources are linked to the information technology department at KUMC in Kansas City. Thus, KUSM-W has full access to all institutional IT resources. Locally, the Office of Information Technology develops computer-based tools and provides IT education and support in the areas of data retrieval, storage, manipulation, composition, production, and distribution. They support mobile and remote technology including interactive television, smartphone applications, and audience response systems.

The Wichita Community Clinical Oncology Program (CCOP) is affiliated with KUSM-W. The CCOP includes 11 medical oncologists; 6 radiation oncologists; 2 gynecologic oncologists; 1 pediatric oncologist; and
16 surgeons, urologists, and primary care physicians. The program receives patient referrals from more than 175 additional physicians. It first received funding through NCI in 1983.

KUSM-W publishes the Kansas Journal of Medicine, an online general medical journal (kjm.kumc.edu). The Kansas Journal of Medicine publishes original research, reviews, commentaries, and case studies on all aspects of clinical medicine, health care delivery, health policy, and medical education.

UNIVERSITY OF KANSAS – LAWRENCE

University of Kansas. The University of Kansas is a major public research and teaching institution that operates through a diverse, multi-campus system. This multi-campus system is comprised of the University of Kansas Campus in Lawrence, the University of Kansas Medical Center (KUMC) in Kansas City, the University of Kansas School of Medicine in Wichita and in Salina, and the University of Kansas Edwards Campus in Overland Park. KUMC houses the School of Nursing, the School of Allied Health, and the School of Medicine.

The University of Kansas (KU) is a comprehensive educational and research institution with more than 28,000 students and 2,800 faculty members. More than 98% of the faculty hold terminal degrees in their field. The University offers more than 360 academic degree programs.

KU occupies 1,000 acres at five principal locations in Kansas. The main campus is in Lawrence (KU-L; Figure FR-TL1.10), a thriving city of 90,000 in eastern Kansas. The KU Medical Center (KUMC) in Kansas City, Kan., about 45 miles east of Lawrence, is home to the academic schools of the health professions, medicine and nursing, as well as clinics and research centers. The KU Edwards Campus (KU-E) in Overland Park offers courses primarily for working adult students. The KUMC Wichita campus offers a four-year degree program, as does the KUMC campus in Salina. In addition, the University has numerous educational and research facilities throughout the state.

Institutional Excellence Highlights. The Carnegie Foundation classifies KU as one of 115 R1: Doctoral Universities: Highest Research Activity institutions. KU has been a member of the prestigious Association of American Universities since 1909. University of Kansas graduate programs continue to excel nationally, with 44 ranked programs, according to the 2016 U.S. News and World Report rankings. Ten KU programs appear in the top 10 among public universities nationally, and 38 are in the top 50.

Research at the University of Kansas. As noted above, KU is classified as an R1: Research Universities: Highest Research Activity institution. This designation reflects the breadth and depth of its graduate programs,
particularly its doctoral programs. KU is a national public research university and the state's flagship institution, as measured by the broad range and global impact of its research enterprise and its high level of research funding.

As a comprehensive research university, the University of Kansas has outstanding research programs across the range of academic disciplines. Research efforts are organized through major multidisciplinary research centers at the KU-L and KUMC campuses. These major centers reflect KU strengths and provide resources necessary to build these strengths. The Lawrence campus also houses two state surveys that conduct research and provide vital service to the state of Kansas. Many additional research centers, institutes, and other non-academic units reflect the breadth of its research enterprise.

Research Rankings. For FY2013, the annual National Science Foundation survey of federally funded research and development expenditures ranked KU 72nd overall and 38th in the country among comparable, national, public, research universities.

Recent Notable Research-Related Awards. Since 2010, large, new and renewed, externally funded research and development awards at KU include:

- Frontiers Clinical and Translational Sciences Award (2011), $20 million, NIH
- Alzheimer’s Disease Research Center (2011), $8.7 million, NIH
- School-Wide Integrated Framework for Transformation (SWIFT) (2012), $24.5 million, ED
- NCI-Designated Cancer Center, $7.5 million (NIH)
- Alaska Assessments Program (2014), $25 million, State of Alaska
- Center for the Remote Sensing of Ice Sheets (2010 Renewal): $17.9 million, NSF
- Dynamic Learning Maps Alternate Assessment System (2010): $22 million, ED
- COBRE: Protein Structure and Function (2014 renewal): $5.6 million, NIH
- Kansas IDeA Network for Biomedical Research Excellence: $19 million, NIH
- The SWIFT Center became one of 14 affiliated centers of the Life Span Institute in April 2015 and is closely associated with the Department of Special Education at KU

The School of Pharmacy ranks second in the nation among pharmacy schools for the amount of research funding received from the National Institutes of Health.

KU Strategic Planning. During 2010-11, KU undertook a major strategic planning initiative at the Lawrence Campus. The result was a five-year plan known as Bold Aspirations. It features six overarching goals and four strategic initiative themes built around existing and emerging KU research strengths. Outcomes of the plan include the formation of a Research Investment Council for competitive internal grants that support the themes, as well as the hiring of 12 Foundation Distinguished Professors in strategic categories. Greater emphasis is being given to community-engaged research, innovation and doctoral education. The Changing for Excellence program has identified opportunities for cost-savings that can be reallocated to high priority areas. Bold Aspirations continues through 2017. On the Lawrence campus, this has resulted in the awarding of a number of Strategic Initiative Grants at various levels, several cluster hires, and the hiring of 17 Foundation Professorships. The recent recruitment of translational scientists such as Steven Soper, PhD, a biomedical engineer, biomarker expert and entrepreneur who engages clinicians on CTR projects, adds new depth to the Frontiers.

PHYSICAL INFRASTRUCTURE

KU Information Technology (KU IT). at the Lawrence campus supports the academic and research missions of the University of Kansas by providing a broad range of technology services, tools and infrastructure that
Support research, learning, scholarship and creative endeavor. KU IT includes a 24/7 enterprise data center and knowledgeable staff with expertise in server and desktop support, application support, software development, IT security, networking, customer support and project management.

Collaboration and communications among KU researchers and colleagues at other institutions is paramount. KU IT has completed a number of projects in recent years to support research and facilitate collaboration on campus and around the world:

- Significantly expanded Wi-Fi on the Lawrence campus, including in core research buildings.
- Joined the eduroam global consortium, which allows KU researchers to use their KU credentials for logging in to Wi-Fi at eduroam partner institutions around the world, and allows visiting researchers from eduroam partners to access KU’s fast and secure Wi-Fi network.
- Upgraded older optical fiber backbone cabling to modern single-mode fiber in a number of buildings, allowing for gigabit connectivity and room for future expansion and growth.
- Upgraded bandwidth to multiple 10Gb connections within and between research buildings, as well as from campus to the outside world.
- Completed a redundant optical fiber loop on KU’s West Campus to provide speed, bandwidth and capacity for growth to support discovery and innovation in up to 20 current or future buildings.
- Partnered with KU’s Information & Telecommunications Technology Center and the Office of Research to create the Center for Research Computing, which identifies and delivers cross-functional technology services and support to meet the needs of researchers.
- Provides high-performance, easily accessible file sharing and storage for KU research projects, research groups and service labs that need terabytes of secure, scalable data storage.
- KU has a dedicated team to provide workstation and other technology support to researchers. In addition, a Research Dashboard in KU’s portal provides 24/7 access to IT and other information needed for completing successful research grant applications. The dashboard includes a PI Proposal Checklist and links to other important resources.

**The University of Kansas Libraries.** The KU Libraries are committed to supporting the teaching, research and outreach efforts of the University and to serving the state of Kansas, the nation, and the world through the acquisition, preservation, application and dissemination of knowledge. Resources include 10 library facilities on 4 campuses, holding more than 4.7 million volumes, including photographs, maps, current serial subscriptions, and access to information through hundreds of electronic databases. Among university libraries nationwide, in terms of holdings KU ranked 49th overall and 27th among public institutions in 2013.

- **Libraries supporting science and medicine.** The main Watson Library on the Lawrence campus houses the University’s collections in the social sciences, humanities and professional fields of journalism and social welfare.
  - **Anschutz Library**, constructed in 1989, houses collections in the sciences, business, education, U.S government and international documents and maps
  - **A.R. Dykes Medical Library**, located at the University of Kansas Medical Center, is one of the premier medical libraries in the Midwest
  - In 2010, KUMC launched Meet Our Experts, an online service based on BibApp software to facilitate collaboration and public information access to the Medical Center’s faculty and staff
New, Recent or Renovated Research-Related Space

- The Biodiversity Institute Genomics Complex (2013) is a $2.8-million project in historic Dyche Hall that provided major laboratory renovations, advance and modernize research facilities, and increased the capacity for training graduate students in biodiversity science.

- The Measurement, Materials and Sustainable Environment Center (2012) is an $18.8-million, 35,000 ft² facility for the School of Engineering. It provides space for engineering and other research groups to cooperate on developing projects in biofuels, remote sensing technologies, commercial avionics, and materials fracture and fatigue.

- The Learned Engineering Expansion Phase 2 (LEEP2) opened in 2015. It integrates with Learned Hall, Spahr Library and the Measurement, Materials and Sustainable Environment Center, adding more than 135,000 ft² to KU’s engineering facilities. Features include six active-learning classrooms, teaching and research labs, a remodeled library and numerous new collaboration and study spaces. Elsewhere on the Lawrence campus, the School of Engineering’s Structural Testing and Student Projects Facility also opened in 2015. Nearby is the Hill Engineering Research and Development Center (2013), which houses student projects related to sustainable energy approaches for automobiles and infrastructure.

- The Bioinformatics Computing Facility (2011) is a $4.6-million, 6,000 ft² renovation in Nichols Hall, home to the Information and Telecommunication Technology Center. The project supports a 20-fold boost in computing power and a 15 percent reduction in the building’s energy consumption. Business, Engineering, The Earth, Energy and Environment Center is currently under construction at Lawrence. It will be a multidisciplinary facility for programs in geology and engineering. Nearby, KU is preparing the site for a new Integrated Science Building, housing both research and teaching that is part of the Central District Redevelopment and the “Innovation Way” initiative.

- The Business, Engineering, Science and Technology Building (2011) at the KU-Edwards Campus in Overland Park is a component of the Johnson County Education and Research Triangle project. Funded by a special sales tax, the $25-million, 75,000 ft² facility is part of a partnership involving the Kansas State University Innovation Campus in Olathe and the KU Clinical Research Center in Fairway.

- The Children’s Campus /Educare of Kansas City (2010) is a $15.5-million, 72,000 ft² facility in Kansas City that serves as a collaborative model for education, research and service. It houses KU’s Juniper Gardens Children’s Project and Kansas Center for Autism Research and Training, KUMC’s Project EAGLE Community Programs and the non-profit Family Conservancy. KU Medical Center Pediatrics offers clinical services.

- The School of Pharmacy observed its 125th anniversary in 2010, making it the third-oldest program west of the Mississippi River. The school ranks second nationally in the amount of research funding it receives annually from NIH. Also, in 2010, the school opened a new $45 million, 110,000 ft² teaching and practice building in Lawrence, adjacent to the West Campus Research Circle laboratory facilities. That year a $5-million satellite teaching facility opened at the KU Medical Center campus in Wichita.

- The Shankel Structural Biology Center (2004, 2008) is a $30-million, 60,000 ft² facility that houses 70 researchers on two levels and is home to the NIH-funded Center of Excellence in Chemical Methodologies and Library Development and NIH-funded Specialized Chemistry Center, as well as the High-Throughput Screening Lab and two COBRE centers: Cancer Experimental Therapeutics and Protein Structure and Function.

- The Multidisciplinary Research Building (2006) is a $40-million, 106,000 ft² facility featuring group lab space, a shared BSL-3 facility, and Class 100 and 1000 clean rooms for researches in medicinal chemistry,
bioanalytical chemistry, pharmaceutical chemistry and other programs. It is designed to accommodate approximately 200 researchers on three levels.

**Recent major equipment investments**

- An 800-MHz nuclear magnetic resonance (NMR) spectrometer was installed in the new Structural Biology Center as well as a second NMR, a mass spectrometer, and an X-ray diffractometer. This state-of-the-art instrument array is used to analyze proteins and provides additional capabilities for KU scientists not available at other universities in the region.

- The Microscopy and Electronic Imaging Laboratory acquired a LEO 1550 field-emission scanning electron microscope. In addition to the usual secondary and backscatter electron detectors, this high-resolution microscope is equipped with additional detectors that provide elemental analysis, mapping of zonal variation and chemical composition in materials, identification of phase changes and crystal deformations, and nanostructure device fabrication.

- The Mass Spectrometry Laboratory installed a dedicated HPLC/MS instrument with a triple quadrupole analyzer (Micromass Ultima) and another high performance tandem instrument of quadrupole-time of flight configuration (Micromass Q-TOF2). Together with other instruments already in place, the new equipment supports a wide range of research from small-molecule synthesis to analysis of whole proteins isolated from organisms.

- A High Throughput Screening Laboratory was established in 2002. Equipment in this laboratory allows a large number of small organic compounds to be screened against biochemical and cell-based assays. The systems provide the technology necessary for advancing drug development in the pharmaceutical industry.

- A Rigaku/MSCW X-Ray diffractometer was acquired in 2003. This equipment enhances the capabilities of KU researchers for determining the bonding arrangement of atoms in a crystalline solid.

- An Applied Biosystems Model 4700 MALDI/TOF/TOF mass spectrometer was acquired in 2003 as well as a ThermoFinnigan Model LTQ ion trap FT-MS hybrid mass spectrometer with electrospray source. These instruments will extend KU’s ability for proteomics research.

**Haworth and Malott Halls.** Both Haworth Hall and Malott Hall, connected by skywalk, house office and laboratory space for many Frontiers scientists.

*Haworth Hall* is the home of the Division of Biological Sciences comprising the departments of molecular biosciences (biochemistry; microbiology; molecular, cellular and developmental biology; neurobiology; and genetics) and of ecology and evolutionary biology (undergraduate biology; graduate programs in ecology and population biology, entomology, plant biology and systematics, macroevolution and biodiversity). Haworth also houses the offices of the Life Span Institute affiliated center, the Beach Center on Disability, the Kansas University Center on Developmental Disabilities, as well as the KU Genetics Program.

*Malott Hall* houses the departments of chemistry and of physics and astronomy and its observatory; the Molecular Structures Group of laboratories in mass spectrometry, nuclear magnetic resonance, protein structures and other specialties; administrative offices; faculty and staff offices; classrooms; specialty laboratories and research facilities; and the main Lawrence campus Animal Care Unit.

*Smissman Laboratories* is located on KU-L’s Campus. Housed in this laboratory is the locus for KU-L’s Affymetrix GeneChip-based microarray gene expression profiling, for broad applications such as pharmacogenomics and toxicogenomics, SNP (single nucleotide polymorphisms) based whole-genome association studies, Real-time quantitative PCR for nucleic acid sequence detection and quantitation, High-throughput genomics data generation, curation, biological knowledge extraction, Integration with high-throughput proteomics data through bioinformatics algorithms and genomics data storage (Dell PowerEdge 2850 Microarray Data Server and Dell PC Data Analysis Workstations).
Wakarusa Research Facility. In 2011, the Wakarusa Research Facility, built in 1994 at 1315 Wakarusa Dr., was acquired by the KU Center for Research Inc., the university’s not-for-profit research foundation. The 20,432 ft², two-story building had been leased by the center since 1999 and houses a variety of KU researchers. The facility lends itself to social sciences research because it affords easy access for families due to its off-campus location and plentiful parking. The Wakarusa Facility houses the offices of the School-Wide Integrated Framework for Transformation (SWIFT) Center.

High Throughput Screening Laboratory (HTS). The High Throughput Screening Laboratory provides researchers with high throughput technologies and compound libraries to assist in identifying biological probes and to provide hits and leads for drug discovery. High throughput screening of large chemical libraries of compounds is a proven way to identify novel chemical entities that target a biological system of interest. In order to have this technology available to biomedical researchers in Kansas and beyond, the HTS laboratory was established in 2002 at the University of Kansas, Lawrence with support from a NIH COBRE grant, the State of Kansas and KU. There are no other HTS facilities within a 250 mile radius of KUCC member laboratories. KU-HTS is a state-of-the-art facility dedicated to providing exceptional services in advancing drug discovery research initiatives, as well as assistance in preparing grant applications. HTS personnel have extensive experience in executing biochemical, cell-based, siRNA as well as high-content screening campaigns against a plethora of target classes. KU-HTS is a fee-for-service facility dedicated to providing exceptional quality services at the lowest cost. HTS staff partners with the investigators collaboratively to expedite their drug discovery efforts. The 4500 sq. ft. state-of-the-art High Throughput Screening Laboratory is housed in the Structural Biology Center new addition on the West Campus. It houses two cell culture laboratories, and the main laboratory with a variety of liquid handlers (6), bulk reagent dispensers (8) and microplate readers (8) to facilitate screening of compounds in a high-throughput mode. Several common signal detection technologies are also available, including UV-visible light absorbance, fluorescence, time-resolved fluorescence, FRET, TR-FRET, BRET, fluorescence polarization, AlphaScreen, Label-Free, radiometric and luminescence. The laboratory is fully equipped for conducting, cell-based, biochemical and siRNA assays and screens. There are two separate cell culture laboratories within the HTS main laboratory that house 5 BSL2 cell culture hoods and 6 Thermo Forma Series II CO₂ Incubators. Two separate rooms, with a total of 500 sq ft of space house the ImagXpress Micro and BD Pathway, the two high-content imaging systems. The personnel have access to Medline, Current Contents, CAB, PubMed, PubChem and Biosis. The laboratories have access to SciFinder and other on-line capabilities for database searches. Compound libraries are stored in a state-of-the-art Nexus Labstore compound management system for compound storage and retrieval. The HTS office space (740sq.ft) houses the office of the Director, and also has office space available for 10 researchers and a conference room. HTS staff has individual desks, bookcases, filing cabinets and internet connections in rooms separated from the laboratories. HTS currently has 3 people on staff plus an open position. Melinda Broward provides project management and administrative support for the group. The HTS-ready assays can be used to screen the KU-HTS compound collection of approximately 296,672 compounds. Chemoinformatics analysis has shown the presence of 61,980 scaffolds across the entire collection. KU HTS charges for compound usage and approximately 50-80% of these charges are placed in a designated compound library account to periodically purchase compounds to update and expand the library. The compound library was obtained from the following sources: (1) Repurposing library collection of 5,292 FDA approved compounds derived from Prestwick, Enzo, TimTec, Selleck, and BioFocus NIH clinical collection. All of the FDA-approved compounds have well-characterized bioactivity, safety and bioavailability and hits from this set of compounds will ensure accelerated drug development and optimization processes. (2) Diversity sets representing a diverse scaffold collection include: (A) 5,197 unique compounds, not commercially available, from the KU CMLD Center (Chemical Methodology and Library Development Center) synthesized within the KU CMLD Center Synthesis Core as well as ~200 legacy compounds synthesized by the KU Medicinal Chemistry Department staff; (B) ChemBridge Library (43,736 compounds); (C) ChemDiv Library (56,232 compounds); (D) Life Chemicals Inc. Diversity Subset (15,040 compounds), and (E) Orthogonally Compressed Library (OCL) collection of 104,000 compounds from The Lankenau Institute for Medical Research (LIMR) Chemical Genomics Center (LCGC). Importantly, chemoinformatics analysis has demonstrated that at least 45,000 of the 104,000 compounds from
the LIMR are unique to the collection and are not represented in ChemBridge and ChemDiv diversity sets. These KU-HTS libraries have been used extensively in screening various targets and have resulted in valuable hits. (3) Bioactives Compound Library: a collection of 1902 structurally diverse and cell permeable bioactive compounds and peptides which include inhibitors, natural products and chemotherapeutic agents. (4) GreenPharma Natural product library of 480 purified, chemically diverse and drug-like compounds, a subset of much larger 150,000 natural compound structures. Compounds like amino acids, peptides, nucleic acids, long fatty chains and metals were discarded and different phytochemical families were selected carefully in order to have as many family representatives as possible. (5) Anti-Infectives Library (TimTec) includes 960 low molecular weight, drug-like molecules with scaffolds found in antiseptic agents with anti-bacterial (Gram+ve and Gram-ve), anti-fungoid, anti-microbial activities. (6) ChemDiv CNS set (26,136 compounds), compounds that can cross blood-brain barrier. (7) ChemDiv Beyond the Flatland (33,864 compounds) sp3-hybridized carbon scaffolds and (8) Life natural product like compounds (8,128 compounds) with amenable scaffold synthesis. In 2015, KUCC Laboratory for Early Stage Translational Research (LESTR) program purchased the NCI 60 human tumor cell line panel. The panel is available to cancer center researchers to identify and characterize novel compounds (natural products or synthetic) for growth inhibition anticancer activity across the entire panel. Human tumor cell lines that are represented include breast, brain, colon, kidney, leukemia, lung, and prostate. The individual cell lines are also available to expand and for HTS to perform a primary cell line screen against the selected compound libraries as well as secondary screening assays or counter screens.

**Biotechnology Innovation and Optimization Center (BIOC).** The Biotechnology Innovation and Optimization Center (BIOC) is approximately 5,000 ft² composed of 7 laboratory areas and associated supporting office space on two floors of McCollum Laboratories and in the Higuchi Laboratories animal facility on KU’s West Campus. The BIOC has provided drug delivery, solubilization and stabilization services to researchers since its inception in 1989 as the Center for Drug Delivery Research. Additional services include analytical chemistry and bio-analytical method development, physical/chemical characterization of drug candidates, preparation of dose formulations, animal pharmacokinetic studies and early-stage pharmacology testing. The BIOC conducts development projects for solid oral, liquid oral, topical and injectable (liquid and lyophilized) dosage forms, including development of pediatric dosage forms. More specifically, the BIOC conducts solubility and stability screening of compounds in pH=7.4 PBS, 0.1 N HCl and a representative analytical mobile phase (50:50 acetonitrile:water) using a UV analysis. If needed, HPLC can be used for the analysis of the stability screening samples. The saturated solutions used for solubility testing are diluted to avoid precipitation problems and these diluted solutions are evaluated for the 48 hour stability evaluations. Additional pharmacology screening testing including hepatic microsomal stability, plasma stability and plasma protein binding are all conducted using validated LCMSMS bio-analytical testing. These same LCMSMS bio-analytical methods are applied for the analysis of blood and tissue samples obtained from pharmacokinetic studies. The BIOC routinely conducts both PK screening studies and more comprehensive PK studies with mice and rats. Analysis of tissue extracts including brain tissue for blood-brain-barrier penetration studies is also available. Plasma data is evaluated using WinNonLin software for the determination of routine pharmacokinetic parameters. The major instrumentation and equipment includes fully equipped analytical laboratories containing 4 Shimadzu HPLC systems with UV, fluorescence, diode array and/or evaporative light scattering detectors. Additional analytical/bio-analytical equipment includes a Shimadzu GC, Perkin Elmer differential scanning calorimeter, a Perkin Elmer TGA7 thermogravimetric analyzer, a Varian UV/Vis spectrophotometer and two Applied Biosystems Sciex 3200 LC-MS/MS systems. In the formulation laboratories, we have a Glatt Air Technologies UniGlatt fluid bed coater / drier, a Retsch mill, a Turbula shaker/mixer, a Stokes instrumented tablet press, a NicaSystem AB extruder, a Luwa Model QJ-320 maurrenizer, a Vitris Genesis tray lyophilizer and several isolation glove boxes for hazardous chemicals. The staff at the BIOC (8 people) is a mixture of formulators, analytical and bio-analytical chemists, and preclinical/pharmacokinetic specialists with many years of pharma industry, CRO and academic research experience. Approximately half of the staff have Ph.D. degrees and the remaining half have either MS or BS/BA degrees. The mix of expertise, experience and equipment provide for a unique capability and the ability to handle projects quickly and efficiently.
Medicinal Chemistry. The Medicinal Chemistry function is led by Frank Schoenen, Ph.D., a synthetic organic chemist, with 15 years’ experience as Medicinal Chemist and Manager at GlaxoSmithKline (GSK) and as Vice President at Nuada Pharmaceuticals, working in the inflammation and cancer therapeutic areas, and in high-throughput chemistry at the early stages of drug discovery. In 2005, Schoenen joined the University of Kansas (KU) Chemical Methodologies and Library Development Center as the Associate Director for the Administrative Core and the Director for the Synthesis Core, where he was responsible for imagining, creating, and operating high-functioning compound-library construction, library design, analysis & purification, and compound management cores, and for directing the synthesis and distribution of thousands of compounds to academic, government, and private-sector biological collaborators throughout the world. This led naturally in 2008 to his position as Associate Director, Project Manager, and Chemistry Team Leader for the KU Specialized Chemistry Center, one of only two laboratories funded by the National Institutes of Health (NIH) Molecular Libraries Probe Production Centers Network (MLPCN) to support synthesis and medicinal chemistry aspects of hit-to-probe optimization. In these roles, Schoenen provided scientific leadership and management for a diverse portfolio of over 40 MLPCN projects leading to 23 probe compounds. Currently, Schoenen is Associate Research Professor in the Higuchi Biosciences Center at the University of Kansas, and Medicinal Chemist on the Target Acceleration Group sponsored by the D3ET within the KUCC. Schoenen brings expertise to consultations and collaborations with KUCC members including compound screening collection building, chemical tools for biological target identification, compound identity and purity quality control, identification of Pan Assay Interference (PAINS) and PubChem Promiscuity compounds, compound physicochemical property assessment, compound and biological data deposition to PubChem, compound scale-up for in vivo studies, identification of commercial sources for compound sample purchase, identification of contract research organizations for compound scale-up, hit confirmation and prioritization, hit-to-probe optimization, probe-to-lead optimization, lead-to-preclinical-candidate optimization and preclinical-candidate to clinical-candidate optimization. In June 2008, the KU Chemical Methodologies and Library Development Center (CMLDC) moved into new laboratories in the Delbert M. Shankel Structural Biology Center (SBC) on the University of Kansas West Campus. Schoenen operates within the KU CMLD Center, directed by Professor Thomas E. Prisinzano, which has all of the laboratory space required to support the medicinal chemistry activities of the LDOSR. In addition to the facilities available to the Schoenen team for synthesis and medicinal chemistry, the CMLD Center contains a number of core laboratories which perform specialized functions, and all of these facilities are available for use on the present grant on a shared basis. Schoenen’s office is located adjacent to the CMLDC labs in the SBC building.

RESEARCH ADMINISTRATION

KU- Lawrence Research Administration. KU-L, KUMC, and the KU-E campuses are united under the leadership of Chancellor Bernadette Gray-Little. The entire research portfolio at the Medical Center is related to the life sciences. While research on the Lawrence campus is more diverse, life sciences research still accounts for nearly 60 percent of all sponsored project expenditures. Because of this shared focus, cross-campus collaborations are widespread and increasing. These collaborations are facilitated by major equipment and services available to researchers on all campuses.

Sponsored Project Expenditures. During FY2010, KU’s externally funded sponsored project expenditures for science and engineering research, training, service and other research exceeded $224 million. A new record was achieved in FY2012, at $275 million, including ARRA funding. The comparable figure during FY2014 was $238.8 million, the same amount as in FY2015.

Collaborative Research Culture. Major research endeavors often require a community of scholars. The University of Kansas is dedicated to fostering collaborative relationships among researchers at its several campuses, as well as encouraging research partnerships with other institutions. KU has a long and successful record of coordinating researchers and resources through integrative research centers and institutes such as
the KIDDRC and the Life Span Institute. These centers transcend traditional disciplinary boundaries and allow multiple perspectives and expertise to focus on broad research programs with far-reaching consequences.

**KU Innovation & Collaboration.** The University of Kansas Innovation and Collaboration (KUIC) is a 501(c)(3) with a thirteen-member Board chaired by the Provost and Executive Chancellor of the University of Kansas with the purpose of partnering with corporations and bringing KU innovation to the marketplace. Serving both the Lawrence and Medical Center campuses. KU has a strong tradition of effective technology transfer built on research in such fields as drug development and delivery; education and human development; biosciences, biofuels and bioengineering; information technologies and informatics; and remote sensing. Total staff: 4.

**On-Campus Business Incubators.** In 2010, the Bioscience & Technology Business Center (BTBC) opened its Main Facility Phase I building on KU’s West Campus Research Circle in Lawrence. BTBC is a partnership involving the university, KU Endowment, the City of Lawrence, Douglas County, the Lawrence Chamber and the Kansas Department of Commerce. Phase II opened in 2014, and there is also an expansion facility elsewhere in Lawrence. The BTBC system is designed primarily to assist the development of start-up and emerging companies, as well as foster industry-funded research collaborations with KU faculty. At the Medical Center, the BTBC is located in the renovated Breidenthal Research Building. Among all of its locations, the BTBC hosts 41 tenant companies employing more than 180 people.

**Patenting, Marketing, Licensing.** The product development-focused translational research methods and processes established by IAMI to develop and demonstrate medical innovation technologies are novel and unique in the context of the larger KU research portfolio. To support IAMI in its execution of medical innovation projects, a Memorandum of Understanding (MOU) between IAMI and the University of Kansas Innovation and Collaboration organization (KUIC) was established in August 2014. Specific to medical innovation projects receiving IAMI investment, the MOU defines the roles and responsibilities of KUIC and IAMI in developing and executing patenting, marketing and licensing strategies. Unique to IAMI is its for-profit partner, BioNovus Innovations LLC. A group of Kansas City investors and community leaders recognized the value of this Frontiers core to the region. The investors also recognized the challenges IAMI faced in finding private sector partners with the resources and expertise necessary to further develop, demonstrate and disseminate promising medical innovations de-risked by IAMI. As a result, the investors formed BioNovus Innovations LLC in 2015. Through a preferred partnership agreement, IAMI and BioNovus jointly invest in promising projects with IAMI’s partner granted an exclusive to exercise pre-negotiated licensing terms.

**KU-Lawrence CENTERS AND INSTITUTES**

**Schiefelbusch Institute for Life Span Studies (Life Span Institute)**

The Schiefelbusch Institute for Life Span Studies, located on the KU Lawrence campus, was created in 1990 out of the 67-year-old Kansas Bureau of Child Research. Today it is one of the largest and most highly regarded human development and disabilities research centers in the country. The LSI brings together scientists of diverse disciplines including psychology, psychiatry, speech pathology, sociology, education, biology, pharmacology, physiology and medicine to study human development from its genetic origins through the final stages of life. The LSI supports basic and applied research, treatment and assessment clinics, service coordination and delivery, consultation, and training. The Life Span Institute’s 12 centers have more than 130 programs and projects active at any one time in Kansas and other states, directly serving individuals, families, and communities in underserved Kansas City neighborhoods and rural Kansas counties.

The Life Span Institute, which is directed by Dr. J. Colombo, is integral to Frontiers. The Institute commands the largest external funding support of any research center on the Lawrence campus, a rarity for behavioral sciences centers. The success of the Life Span Institute is a reflection of the campus’ long-time strengths in child development and disability research and intervention, a commitment that spans several academic units,
many clinical and research settings, and three campuses of the University. The Life Span Institute brings together 176 scientists who are affiliated with 20 academic departments to study human development from its genetic origins through the final stages of life. These investigators are supported by 175 research and administrative staff members, including 66 graduate research assistants and 114 student assistants. The Institute has two affiliated multidisciplinary graduate/doctoral programs, as well as several post-doctoral training programs. The Life Span Institute’s 14 centers and Peruvian affiliate currently have 135 active grants that constitute basic and translational research, training, direct services, consultation, and technical assistance. Last year, some 30,500 Kansans also benefited from the Institute’s direct services, training and technical assistance. The Institute’s central office is in the Robert Dole Human Development Center in Lawrence with components at the John T. Stewart Children’s Center and Malott Hall and Wakarusa facility. The Institute also operates in Kansas City at the University of Kansas Medical Center, the Children’s Campus of Kansas City, the University of Kansas Edwards Campus, and at the Life Span Institute in Parsons, Kan.

Much of the work of the Institute is accomplished in and directly benefits underserved Kansas City neighborhoods and rural Kansas counties. Several projects are collaborations with researchers in other parts of the state, region, country, and world, and are regional, national, or international in scope. The Life Span Institute attracts more combined federal, state, and private dollars than any other designated research center at the University of Kansas, drawing $32.8 million in sponsored project support in FY 2015.

- **Beach Center on Disability.** Through excellence in research, training, technical assistance and public service in Kansas, the nation and the world, the Beach Center on Disability seeks to make a significant and sustainable difference in the quality of life of families and individuals affected by disability. Research focuses on access to the general curriculum, assistive technology, deaf-blindness, disability policy, employment, family supports and services in early childhood, family quality of life, individual control of funding, positive behavior support and self-determination. Founded in 1988 by KU Distinguished Professors Ann and Rud Turnbull, the Beach Center honors Ross and Marianna Beach for their long-standing efforts on behalf of families affected by disability and was inspired by the Turnbulls' son, Jay, who had several disabilities.

- **The Center for Biobehavioral Neurosciences in Communication Disorders (BNCD) was founded in 2002 when the National Institute on Deafness and Other Communication Disorders awarded a core grant to establish the center. The BNCD is a natural outgrowth of the Life Span Institute’s long-standing focus on communication and language development and intervention. The BNCD’s research spans a wide range of issues relevant to the causes and treatment of communication disorders from infancy to old age including studies on infant attention, the genetics of language impairments, language intervention, the decline of working memory in old age as reflected in speech and more precise measures of hearing loss to aid cochlear implant design.**

- **The Center for Research on Learning (CRL), joining the Life Span Institute in 2014, has a long history as an internationally recognized research and development organization noted for creating solutions that dramatically improve quality of life, learning, and performance, especially for those who experience barriers to success. The CRL encompasses six divisions, each with a slightly different research emphasis. Researchers study problems in education and work to place solutions that make a difference into the hands of educators, learners, employers, and policy makers.**

- **The Child Language Doctoral Program was established in 1983 as the first specialized degree program in the emerging field of child language acquisition. The program focuses on the interdisciplinary academic preparation and research training of child language specialists. The internationally recognized faculty brings diverse approaches to the study of how children communicate and speak. The program offers students a wide choice of research tools, facilities and field sites including the Child Language Acquisition Studies Lab that has the largest known archive of transcribed spontaneous samples from a longitudinal study of preschool children diagnosed as specific language impaired (SLI). The Life Span Institute, the Language Acquisition Preschool and the clinical and research facilities of the Speech-Language-Hearing Clinic provide research sites and practica.**
The Gerontology Center's affiliation with the Bureau of Child Research in 1990 paved the way for an extended research agenda of the newly formed Life Span Institute. Center researchers are interested in all areas of aging but are distinguished by seminal research in cognition, communication and aging, long-term health care and housing alternatives and decision making in later life. The Center coordinates a multidisciplinary graduate program that offers both masters and doctoral degrees in gerontology, as well as dual-title doctoral degrees that combine training in gerontology with certain social and behavioral sciences.

The Juniper Gardens Children's Project (JGCP) began in 1964 when citizens from northeast Kansas City, Kansas joined with faculty from the University of Kansas to devise solutions to specific problems in educational achievement and parenting in that low-income community. The JGCP has grown over the years from a small, community-based research initiative housed in the basement of a liquor store to a unique, internationally recognized research center which includes local and national community sites in projects and investigations housed at the Children's Campus of Kansas City, four blocks from where it began. The Children's Campus of Kansas City is a joint community initiative in Kansas City, Kansas—an effort that the JGCP has been supporting for the past decade. The JGCP is particularly recognized for its contributions to the development of effective approaches for accelerating learning and reducing classroom conduct problems in both special and general education. In 1996, the JGCP was awarded the Research Award of the International Council for Exceptional Children in recognition of its outstanding research contributions.

More than 40 years ago, as the Life Span Institute's research on developmental disabilities took root, efforts began to translate this research into practice through what is now known as the Kansas University Center on Developmental Disabilities (KUCDD). Virtually all of the Life Span Institute's direct service, technical assistance and post-doctoral, pre- and in-service training are associated with KUCDD. These include clinics to diagnose and treat children with disabilities, a statewide project that provides assistive technology to people with disabilities and their families and training childcare providers and social workers to support individuals with disabilities. In addition, investigators affiliated with the KUCDD conduct research that has state, national and international impact in areas like self-determination, positive behavior supports, inclusive educational practices, early childhood education, community and workplace supports, family systems and supports and other areas critical to the lives of people with developmental disabilities and their families.

Three KUCDD projects should be mentioned in that they function much as LSI centers and exemplify how the KIDDRC has translated its behavioral and biobehavioral research strengths to impact social programs and professional practice:

- **Kansas Institute for Positive Behavior Support (KIPBS).** KIPBS is a rigorous statewide training program for practicing professionals in developmental disability, child welfare, and mental health organizations to learn how to implement positive behavior support for children with serious behavioral problems.

- **The Center for Child Health and Development.** The Center for Child Health and Development (CCHD) at KU Medical Center diagnoses and develops treatment recommendations for children with developmental disabilities. The clinic assists families, teachers, doctors and others who work with these children and recommend the most effective treatment as described below in the Kansas City campus: Other complementary research centers.

- **Assistive Technology for Kansas Project.** The Assistive Technology for Kansas Project planned and oversees a model statewide program to deliver services and equipment to people with disabilities in Kansas with centers in Oakley, Salina, Wichita, Lawrence, and Parsons. Related projects have established an assistive technology loan cooperative, equipment loan bank, equipment consignment and reuse system, and a rehabilitation program for farmers injured in agriculture-related accidents.
As the founding center of the Schiefelbusch Institute for Life Span Studies (Life Span Institute), the University of Kansas Life Span Institute at Parsons has partnered with national, state, regional and community partners to conduct research, develop model service programs and provide training for professionals involved in services to young children, youth and adults with disabilities and their families. Located in a rural community in southeast Kansas, the Parsons LSI includes a component of the Kansas University Center on Excellence in Developmental Disabilities. Current research focuses on individuals with autism, novel intervention strategies for challenging behavior, hearing assessment with individuals who are difficult to test, effects of toxic stress on children and families and maladaptive and challenging behavior. Additionally, the Parsons LSI provides significant service and training across the nation and state of Kansas on assistive technology, early childhood and training for community organizations and agencies serving persons with developmental disabilities.

The Merrill Advanced Studies Center, established in 1990 with an endowment from Virginia Urban Merrill and Fred Merrill, is a catalyst for scholarship on disabilities and policies that shape university research. Merrill conferences and publications establish new directions and build collaborative projects in both science and policy. World-class experts often meet as a group for the first time at Merrill conferences and go on to develop national projects that answer key questions in science. The Center publishes books on topics relevant to developmental disabilities and makes policy papers available online and in print. The Merrill web site at KU has fact sheets and discussions on science and policy for the general public.

The Research and Training Center on Independent Living (RTC/IL) has a 35-year history of conducting disability research, providing training and transferring knowledge to practice. The Center furthers independent living for people with disabilities through scientifically sound, theoretically driven sustainable interventions and measures that lead to effective community living solutions and policy change. Center researchers work closely with consumers and service providers to develop research and products that meet their critical needs. The Center also partners with other universities and agencies to improve the health and participation of people with disabilities.

SWIFT Center was launched in 2012 with a $24 million grant from the U.S. Department of Education Office of Special Education Programs—one of the largest in KU history. SWIFT is a national K-8 technical assistance center that builds school capacity to provide academic and behavioral support to improve outcomes for all students through equity-based inclusion. SWIFT assists districts and state educational agencies to implement its successful model for educating general and special education students together while leveraging existing resources, breaking down administrative silos and improving schoolwide academic outcomes. SWIFT is currently partnered with five state agencies and 17 districts in Maryland, Mississippi, New Hampshire, Oregon and Vermont.

Centro Ann Sullivan del Perú (CASP) is a nonprofit educational institution that serves children and adults with intellectual disabilities, autism and behavioral problems, as well as their families and professionals from Peru and other parts of the world. Under the direction of its founder, Liliana Mayo, Ph.D., CASP is recognized and honored worldwide for its contributions as a model research, demonstration and training center. Mayo has been supported by a steady stream of her KU colleagues who have volunteered as consultants, trainers, administrators and fund raisers; notably, Judith Le Blanc, who has served as CASP Research Director for more than 30 years, and retired Life Span Director Stephen Schroeder and Carolyn Schroeder. CASP has a formal agreement with the Life Span Institute and receives much of its staff education through university faculty from the KU departments of Special Education and Applied Behavioral Science.

Higuchi Biosciences Center. Like the Life Span Institute, the Higuchi Biosciences Center is a designated research center of centers engaged in biomedical research at the University of Kansas. These include the COBRE in Protein Structure and Function; COBRE in Molecular Analysis of Disease Pathways; Center for Chemical Methodologies and Library Development Legacy; and KU Alzheimer’s Disease Center -
Mitochondrial Genomics and Metabolism Core. The Higuchi Biosciences Center seeks to enhance both the environment for interdisciplinary, basic research and the commercial development of resulting technologies. To those ends, the Center provides research support and administers funds from a variety of sources, including the NIH, NSF, industrial partners, and private foundations. The Higuchi Center is directed by William Picking, Foundation Distinguished Professor of Pharmaceutical Chemistry and lead researcher for the Kansas Vaccine Development Center.

Established in 1989, the Higuchi Biosciences Center (HBC) is a center engaged in biomedical research at the University of Kansas. As a designated research center of the KU Center for Research (KUCR), the Higuchi Biosciences Center seeks to enhance the environment for interdisciplinary, basic research. To that end, the Center provides research support and administers funds from a variety of sources, including the NIH, NSF, industrial partners, and private foundations. The Higuchi Biosciences Center mission is to foster an environment conducive to interdisciplinary, biomedical research. In practical terms, this means:

- Relieving participating researchers of the non-scientific work involved in grant submission and administration, providing funding incentives for multi-investigator, interdisciplinary projects.
- Offering personnel services, including assistance with searches and visa applications.
- Providing laboratory space and opportunities for equipment sharing.
- Promoting translational research in the biomedical sciences.

The HBC includes a Genomics Facility that consists of 1,600 ft² of lab space. Services performed are high-throughput genomics analysis from RNA extraction and quantification to synthesis of labeled cRNA, microarray hybridization, array washing and staining, microarray image scanning and data collection. For downstream bioinformatics data mining, the facility is equipped with a number of commercial and open source software packages for complete multi-dimensional microarray data analysis, including identification of differentially expressed genes, gene clustering, biological pathway analysis, Gene Ontology analysis and gene network construction. In addition, the facility provides full service for real-time quantitative PCR for confirmation of microarray results or stand-alone gene expression analysis. Major equipment in the genomics facility includes a complete Affymetrix GeneChip microarray system, a microfluidics based Agilent 2100 Bioanalyzer and NanoDrop ND-1000 spectrophotometer, an Applied Biosystems 7500 Fast Real-Time PCR System, a Beckman Biomek NX laboratory automation workstation, and an Arcturus PixCell IIe Laser Capture Microdissection (LCM) System. Software packages available include Gene Chip Operating Software (GCOS), Gene Spring, Spotfire Decision Site for Functional Genomics, Gene Traffic, Pathway Assist, and the open source software dChip and GenMAPP.

Other Related Core Research Resource Laboratories

Clinical Pharmacology. The Clinical Pharmacology Core, directed by Dr. Gregory Reed, professor in the Department of Pharmacology, Toxicology and Therapeutics, KUMC, supports clinical proof of concept studies evaluating drug and diagnostic technologies advanced to patients. Located in the Clinical Research Center on the Fairway campus of KUMC, the Bioanalytical Core provides GLP bioanalysis support to early phase clinical trials. The bioanalytical core is equipped with: Shimadzu LC-20-Waters Quattro Premier LC-MS/MS, Waters Acuity -Quattro Premier XE UPLC-MS/MS, Shimadzu LC-20 binary gradient HPLC system, with UV, fluorescence, and radiometric detectors, auto sampler, and column oven and Shimadzu VP-Chrom computer-based data acquisition and data processing system; Agilent 6890N gas chromatograph with FID and ECD detectors. The core develops and validates bioanalytical methods to quantify drug and metabolites in biological matrices as well as biochemical-based biomarkers. The core provides design support to early phase clinical trials including biological sample sampling schemes, sample collection, processing, storage and shipment requirements, as well as pharmacokinetic and pharmacodynamics data analysis. Clinical Pharmacology works closely with the BIO Center to seamlessly and efficiently transfer validated bioanalytical methods from animal
to human matrices. Parametric and non-parametric pharmacokinetic data analysis is performed using WINNONLIN™ software.

**Animal Care Unit.** The ACU is comprised of more than 33,000 ft² of dedicated animal and procedure space dispersed in nine buildings across the Lawrence campus. Housing facilities are available for common laboratory animals, including but not limited to rodents, rabbits, fish, reptiles and amphibians. Specialized facilities, including a modified rodent barrier and surgical, ABSL-2 and necropsy suites are available. KU-Lawrence maintains an Assurance (A3339-01) with the NIH Office of Laboratory Animal Welfare (OLAW). It also adheres to standards prescribed in the Public Health Service Policy on Humane Care and Use of Laboratory Animals and the OLAW Guide for the Care and Use of Laboratory Animals for all activities involving laboratory animals. Additionally, KU-Lawrence is a U.S. Department of Agriculture SDA-registered facility (48-R-0002) and complies with provisions of the Animal Welfare Act and Regulations for all activities involving regulated species. The animal care program has maintained full accreditation by the Association for Assessment & Accreditation of Laboratory Animal Care since 1982.

**Department of Environment, Health & Safety - Laboratory Safety Services.** EHS is responsible for managing and monitoring the laboratory safety program efforts at the University of Kansas - Lawrence Campus to prevent and/or minimize occupational and environmental exposure from hazardous materials usage and hazardous activities being conducted in the laboratory environment.

**Instrumentation Design Laboratory.** The IDL is an Analytical Resource Laboratory that provides collaborative support to research scientists in the natural sciences in order to enhance their research through custom instrumentation and laboratory automation. That instrumentation and automation is often based on small computers and workstations. Instrumentation solutions to laboratory problems may be developed as “turnkey” systems in which the IDL develops all hardware and software or as a coordinated project where the IDL both consults with a member of a research group and provides hardware and software modules as needed.

**Kansas Center for Advanced Scientific Computing.** The Kansas Center for Advanced Scientific Computing (KCASC) is a statewide interdisciplinary research infrastructure initially funded in April 1996 by the NSF EPSCoR Cooperative Agreement through the Kansas EPSCoR program. An Origin2400 system is an all-purpose supercomputer and has the capability of performing both shared and distributed memory parallel computing at the same time. Since 1996, the system has served as a major supercomputing resource for state-of-the-art computational researches in sciences, mathematics, and engineering in the State of Kansas and at KU.
CHILDREN’S MERCY KANSAS CITY

Overview
Children’s Mercy Kansas City (CMKC; Figure FR-TL1.11) is the only free-standing children’s hospital between St. Louis and Denver and provides comprehensive care for patients from birth to 21. Children’s Mercy consistently is ranked among the leading children’s hospitals in the nation. CMKC is the first hospital in Missouri or Kansas to earn the prestigious Magnet designation for excellence in patient care from the American Nurses Credentialing Center.

Clinical Care
- Medical staff of more than 700 pediatric specialists
- More than 40 pediatric specialties
- First hospital in Missouri or Kansas to receive Magnet designation in 2003 from the American Nurses Credentialing Center for superior nursing quality
- First hospital in the region to receive re-designation in 2007 and again in 2012

Education
- Affiliation with University of Missouri-Kansas City School of Medicine
- Principal teaching hospital for The University of Kansas Medical Center
- More than 400 medical students each year.
- 60 doctors take part yearly in our fellowship programs
- Home of the nation’s first Pediatric Emergency Medicine Fellowship
- Nursing students from dozens of schools in the Kansas City area receive training at Children’s Mercy

Research
- More than 100 physician scientists, basic scientists, nurses, fellows and residents involved in research projects, representing millions of dollars in multi-year awards
- Co-leading the largest nephrology research project in North America
- More than 140 clinical trials on-going at any one time
- The largest Pediatric Clinical Pharmacology program in North American and one of four U54 Centers for Research in Pediatric and Developmental Pharmacology (RPDP) supported by NICHD
- The Center for Pediatric Genomic Medicine, established in 2011 as the first genome center in the world entirely inside a children’s hospital with a focus on the diagnosis of inherited pediatric diseases. One of the 10 leading institutions in the Kansas City Area Life Sciences Institute, which also includes the University of Kansas, Midwest Research Institute, University of Missouri-Kansas City and the Stowers Institute.

CMKC is a 355 bed academic pediatric hospital and medical center located in Kansas City, Missouri that provides comprehensive primary and tertiary specialty care to children from Missouri and Kansas. It is the only pediatric medical center between St. Louis and Denver. Comprehensive care is provided in 50 pediatric subspecialties including Adolescent Medicine, Allergy/Immunology, Developmental and Behavioral Pediatrics,
Cardiology, Clinical Toxicology, Clinical Pharmacology, Craniofacial Reconstructive Surgery, Critical Care, Emergency Medicine, Endocrinology/Metabolism, Gastroenterology, Genetics, Infectious Diseases, Hematology/Oncology, Bone Marrow Transplantation, General Pediatrics, Neonatology, Nephrology/Dialysis, Neurology, Ophthalmology, Otolaryngology, Orthopedics, Pulmonology, Rehabilitation Medicine, Rheumatology, Pediatric Surgery, Pediatric Sleep Clinic, Pediatric Cardiovascular Surgery, Solid Organ Transplantation, Urology, and a Fetal Health Center for the delivery of high-risk pregnancies. The Hospital is the only Level 1 pediatric trauma center in the region, and is the primary pediatric teaching hospital for the University of Missouri - Kansas City (UMKC) School of Medicine. CMKC's primary service area consists of 18 counties, nine each in the states of Missouri and Kansas, with an additional 20 counties in Kansas and 30 counties in Missouri constituting its secondary service area. The area served by outreach clinics includes a further 21 and 22 counties in Kansas and Missouri, respectively, within a maximum three hour drive of the main campus in Kansas City, MO.

CMKC Ambulatory Care. Ambulatory pediatric care is predominantly delivered in a 7-story ambulatory building adjacent to and connected to the main hospital; in a specialty clinic facility located at the Children’s Mercy Kansas City South Campus in Overland Park (Johnson County), KS; a facility that also has 54 inpatient beds staffed by Hospitalist members of the CMKC pediatric faculty; at Children’s Mercy Northland, located in Kansas City, MO (approx. 14 miles from the main campus); and at Children’s Mercy Clinics on Broadway (approx. 2 miles from the main campus). Urgent and emergent ambulatory care is provided in the Emergency Department facility located in the main hospital and the suburban urgent care centers. The Emergency Department is staffed 24 hours/day, 365 days/year by board certified pediatric emergency medicine physicians.

Of these beds, 115 are special care beds comprised of pediatric intensive care (PICU; 41) and neonatal intensive care (NICU; 74). During FY 2014, there were 13,649 inpatient admissions with 82,688 total patient-days, including 22,510 NICU patient days and 10,078 PICU patient-days. During this same reporting period there were 471,441 outpatient visits, including 212,330 at the main campus; 98,956 at Children’s Mercy South Specialty Clinics in suburban Johnson County, KS; 47,005 at Children’s Mercy North Specialty Clinics, 70,204 in the Primary Care Clinics; and 6,609 visits to Outreach Clinics. There were also a total of 162,611 emergency/urgent care visits.

The demographics of the population served by CMKC (from fiscal year 2014) are as follows:

<table>
<thead>
<tr>
<th>Age Range</th>
<th>% Total</th>
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<tbody>
<tr>
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<tr>
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<th>Race</th>
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<tr>
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RESEARCH ADMINISTRATION

Children’s Mercy Kansas City Office of Research Integrity Children’s Mercy has a Federalwide Assurance (FWA) with the Department of Health and Human Services, in which we assure Federal officials that any research project, whether it is a chart review or administration of investigational drugs, is conducted in
accordance with Federal regulations. The Office of Research Integrity assists investigators in every step of the research process. The CMKC Institutional Review Board (IRB) is a completely electronic process through MARS, Mercy's Automated Research System. Researchers use the MARS system to gain access and submit IRB submissions for review. Submissions are entered, routed, reviewed and finalized electronically. This tool improves efficiency for the IRB review and investigators.

**CMKC Clinical Research Infrastructure and Assets.** Pediatric Clinical Research Unit (PCRU): Brand new facilities to admit children for research protocols and to accommodate outpatient visits for clinical research opened in January, 2013 in 5,500 ft² located on the ground level of the Hall Inpatient Tower, immediately adjacent and connected to the Division of Clinical Pharmacology and Therapeutic Innovation offices and Developmental Pharmacology and Experimental Therapeutics research laboratory. The facility is a self-contained clinical research nursing unit with accommodations for both inpatient and outpatient studies. It is comprised of three single patient rooms and one three-bed patient room, an ambulatory study room, examination/treatment room, specimen processing laboratory, conference room/library, play room, and secure document storage and offices to accommodate 9 clinical coordinators, as well as an office for the PCRU Medical Director. Recreational items such as games, crafts, TV, Nintendo, and videos are available to entertain children during their stay. In addition, the Child Life staff may assist with constructive activities for children. The facility is equipped with age-appropriate examination equipment, storage space, crash cart, and monitoring equipment. Facilities are available for phlebotomy, urine collection, initial specimen processing, and temporary specimen storage prior to delivery to the laboratory. This unit has been constructed to meet all applicable FDA/ICH guidelines for a phase I study unit and also, fully meets accreditation standards by JCHAO.

**CMKC Clinical/Integrated Pharmacology Infrastructure and Assets.** The Developmental Pharmacology and Experimental Therapeutics Laboratory is a 3,112 ft² space within the Division of Clinical Pharmacology, Toxicology and Therapeutic Innovation that previously served as the NICHD Pediatric Pharmacology Research Unit (PPRU) core laboratory throughout the Network’s existence. The laboratory supports the clinical and basic research programs of the Division of Clinical Pharmacology and Therapeutic Innovation, including pharmacogenetic and analytical (HPLC) support for phase I and phase II clinical studies. In addition, specific areas within the facility are designed for and devoted to cell culture, protein biochemistry and molecular biology for applied research related to the pathogenesis of idiosyncratic drug reactions, ontogeny of drug metabolism,
and pharmacogenetics. In the past two years, research infrastructure has been increased as described in detail below.

**CMKC Analytical Resources.** The analytical facilities of the Division of Clinical Pharmacology, Toxicology and Therapeutic Innovation occupy approximately 1280 square feet in the CMKC Pediatric Research Center and contains several analytical instruments, including two triple quadrupole mass spectrometers (a Waters Xevo TQD and a Waters Xevo TQ-S), a Waters Xevo G2 QToF mass spectrometer, each with Acquity UPLC front end systems, three Agilent HPLC systems, two of which are equipped with fluorescence and uv/vis detectors and the third with a diode array detector, and two POC-One infrared spectrometers for analyzing $[^{13}C]O_2$ breath test samples.

**CMKC Pharmacogenetics and Pharmacogenomics Resources.** The Pharmacogenetics and Pharmacogenomics Core Laboratories, under the direction of Andrea Gaedigk, Ph.D. and Roger Gaedigk, Ph.D., conduct genotype analysis utilizing a variety of platforms including TaqMan, High-Resolution Melt Curve analysis and traditional PCR-RFLP for SNP detection and long-range PCR to detect major gene arrangements. GeneMapper and simple agarose gel electrophoresis is employed for the detection of length variations and DNA sequencing for a variety of DNA variations. Genotyping panels have been established for many CYP genes, including CYP2D6 (one of the most comprehensive genotyping panels for this highly polymorphic enzyme that is notoriously difficult to accurately genotype), CYP2C9 and CYP2C19, CYP2B6, the CYP3A gene locus, as well as multiple genes in the folate pathway and several drug transporters and receptors. Quantitative multiplex PCR procedures have also been established to determine gene copy number for CYP2D6, SULT1A1 and UGT2B17. For the purposes of the current proposal, the primary genotyping platform will be TaqMan assays using custom-designed OpenArrays. The arrays will be run on a recently obtained QuantStudio 12K. This analysis will be complemented with quantitative multiplex-PCR (analyzed on a 3730 DNA analyzer instrument using GeneMapper) and long-range PCR to aid in the detection and characterization of gene rearrangements and DNA sequencing.

The Division is equipped with standard and real-time PCR instruments, a 3730x DNA sequencer (Applied Biosystems) that serves multiple purposes (including sequencing and copy number assays), and a Kodak DS Image Station 440CF (PC-controlled) for photodocumentation, data analysis and storage. All other necessary equipment, such as centrifuges, electrophoresis and blotting systems, and -20ºC and -80ºC storage are available to perform the described tests with DNA, RNA and protein isolated from a variety of sources such as blood, tissue and saliva and store specimens appropriately. The unit has nine 96-well PCR instruments, three quantitative real-time PCR cyclers (ABI QuantStudio 12K; ABI 7900HT real time thermocycler; an Eppendorf realplex4 epgradient S Mastercycler and an MJ Research Opticon 2 Q-PCR instrument) as well as two EcoRealTime PCR instruments (Illumina) to facilitate HRM analysis. The laboratory also has a dedicated MiSeq platform that is housed in the Center for Pediatric Genomic Medicine.

**CMKC Center for Pediatric Genomic Medicine.** The Center for Pediatric Genomic Medicine at Children’s Mercy Kansas City was formed in January 2011, moved into approximately 16,000 ft² of space at the Crown Center office complex, which is immediately adjacent to the Hospital, in the fourth quarter of 2012.

**Genome Center Lab Capabilities.** All sequencing operations are performed in a custom-designed, CLIA-accredited, new (2012), 3105 ft² genome center with versioned, written protocols. Office space is in a new 3000 ft² suite for the Center for Pediatric Genomic Medicine. The Center has three HiSeq 2500 sequencers (two of which have the v4 1TB upgrade), one HiSeq 2000, and two MiSeqs.

**Computational and analysis resources.** Dedicated computational resources are located in a new (2012) data center with environmental controls, air conditioning, conditioned power, emergency back-up power and UPS. As of November 2012, the computational resources are a 368-core Intel Xeon X5670/E5-2650 cluster (2TB of DDR3 RAM and 14TB SATA hard drives), a pipeline server (12-core Intel Xeon X5670 with 48GB RAM and 1TB SATA hard drive), Isilon IQ 36000 storage system (454TB usable capacity), tape backup server, Quantum Scalar i500 23U tape backup system, web server (6-core Intel Xeon X5670 with 6GB RAM and 1TB SATA drive), and database server (12-core Intel Xeon X5670 with 48GB RAM and 16TB SATA drives) on which are deployed the
Grindstone LIMS, GATK, GSNAP, Casava, SSAGA, CMH Variant Warehouse, RUNES, and VIKING software systems. Computational resources increase by ~$400,000 annually.

**Genome Center Laboratory Equipment:** The major Center capital equipment items include one Illumina HiSeq 2000 DNA sequencer three Illumina HiSeq 2500 DNA sequencers, two Illumina MiSeqs, two Illumina cBots, one PerkinElmer Sciclone NGS, one Janus NGS Express, and one Janue 8-Tip with Gripper liquid handling robots for sequencing library preparation, qPCR, and hybridization enrichment and washing incorporating Agencourt SPRI magnetic bead separation; a PerkinElmer Chemagic MSMI robot for nucleic acid isolation, a Life Technologies ViiA7 Real-Time PCR System capable of running 96-well and 384-well plates, a Bio-Rad CFX96 real-time PCR detection system, PerkinElmer Lab Chip GX, Agilent Bioanalyzer 2000, Agilent TapeStation 2200, Covaris LE220 96-well plate DNA sonication system, Nanodrop S2000 spectrophotometer, a Qubit 2.0 Fluorimeter, a PerkinElmer DropSense 96 instrument equipped with cDrop software, two Eppendorf MasterCycler Pro thermal cyclers, four Bio-Rad S1000 thermal cyclers, five vortex mixers, seven minicentrifuges, eight temperature dry baths, one digital water bath, one upright -80°C freezer, six -20°C freezers and five 4°C refrigerators, and compute resources.

**CMKC Computational Infrastructure.** CMKC has a 10MBit/s Internet-2, 45MBit/s DS3 (T3) and 100MBit/s SureWest fast internet links for high speed transmission of large data files between CMKC investigators and collaborators. The hospital has site licenses for Grindstone, GATK, GSNAP, HGMD, Microsoft Office, JMP Genomics, Photoshop 7, Illustrator 10.0, Sigma Plot 2000, ChemDraw Office and EndNote X.

**Primary WGS Analysis, file hierarchy and structure.** Primary analysis of HiSeq 2000/2500 WGS and exome and MiSeq targeted panel data, to produce sequence reads, is performed with Illumina Real Time Analysis (RTA) software and CASAVA 1.8.2. Results of primary analysis are stored in the Center sequence archive, in which each sequence run has a single top level directory that stores the sequences and quality scores from that run. After the completion of primary analysis, raw sequence run data (intensity files, BCL files) are discarded. Quality control for each sequence run is achieved through review of sequencing metrics produced by the Illumina sequencing control software. HiSeq 2000/2500 and MiSeq v.2 runs are passed or failed according to a written protocol.

**Tertiary Sequence Analysis Pipeline.** Symptom- and sign-assisted genome analysis (SSAGA) is the centerpiece software developed for analysis. SSAGA is a clinicopathological correlation tool that maps clinical terms (such as SNOMED-CT) to genetic disease terms (e.g. OMIM) to causal gene symbols (e.g. ENTREZ genes). Other STAT-seq software components are as follows: Basecalling uses standard Illumina software. Sequences are aligned to the reference nuclear and mitochondrial genomes [Hg19 and GRCH37 with BWA, ELAND (Illumina) or GSNAP (Genentech), and variants are identified and genotyped with the GATK. Nucleotide variants are annotated with RUNES, our variant characterization pipeline, which incorporates VEP (Variant Effect Predictor), comparisons to NCBI dbSNP, known disease mutations from the HGMD, and additional in silico predictions of variant consequences from ENSEMBL and UCSC. RUNES assigns each variant a composite ACMG pathogenicity category and allele frequency from the Variant Warehouse. Interpretation of RUNES-annotated variants is performed with VIKING. For each sample, VIKING (Variant Integration and Knowledge Interpretation in Genomes) displays SSAGA information (patient phenotypes, corresponding genes and diseases), and RUNES-annotated variants from that patient, organized by gene. VIKING allows dynamic sorting, selection and prioritization of displayed variants with a menu of filters. These include inheritance pattern, variant frequency, genotype, and ACMG pathogenicity category. The variant attributes displayed can be modified. The variants displayed can be changed by altering the SSAGA information. The likelihood of each variant being disease causative is manually tagged. VIKING sessions can be saved. Interpreted findings can be exported into a standard report format that includes OMIM and HGVS nomenclature (genome, transcript and protein coordinates), ACMG-guided transcript ID, ACMG pathogenicity category, predicted functional consequence, SSAGA terms, RUNES annotations and VIKING settings for final report generation. Variants (both primary and secondary findings) and their RUNES and SSAGA annotations are de-identified and stored in our Variant Warehouse, which is updated with the results of each sample. To date it contains 19.1 million variants and 1,237 samples.
**Computer Resources.** The Center’s computer resources are located within a dedicated data center with environmental controls, 15 tons of air conditioning, conditioned power, hospital emergency back-up power and 45kVa UPS capability. The compute resources comprise a 608-core Linux compute cluster with 6TB of DDR3 RAM and 20TB SATA hard drives (20 x 12-core Intel Xeon X5670, 8 x 16-core Intel Xeon E5-2650 and 12 x 20-core Intel Xeon E5-2660), redundant head nodes (12-core Intel Xeon X5670 with 48GB RAM and 500GB SATA drive), a pipeline server (12-core Intel Xeon X5670 with 96GB RAM and 1TB SATA hard drive), Isilon X400 storage system with 810TB usable capacity, SGI Infinite Storage Gateway disaster recovery and backup appliance with 160TB usable capacity, Spectra Logic T950 tape library with 2.4PB uncompressed usable capacity, redundant web servers (12-core Intel Xeon X5670 with 48GB RAM and 500GB SATA drive), and database server (12-core Intel Xeon X5670 with 96GB RAM and 16TB SATA drives) on which are deployed the LIMS, GATK, GSNAP, CASAVA, SSAGA, CMH variant warehouse, RUNES and VIKING software systems. The data center is adjacent to the room housing the DNA sequencers, which also features environmental controls to maintain ambient temperature at 65 degrees C, conditioned power, hospital emergency back-up power and substantial UPS capability.

**Translational Genetics Research Facility.** The CMKC Translational Genetics Research Facility is directed by Shui Qing Ye, MD, PhD. Dr. Ye has more than 25 years of experience in biomedical research. Previously, he served as the Director of the Gene Expression Profiling Core in the Center of Translational Respiratory Medicine at Johns Hopkins University School of Medicine (2001 to 2005) and as the Director of the Molecular Resource Core in a NIH funded Program Project Grant on Lung Endothelial Pathobiology at the University of Chicago Pritzker School of Medicine (2005 to 2007). Major equipment in the facility includes an Illumina HiSeq 1500 next generation sequencing system; a 7th generation real-time PCR system, Viia™ 7 Real-Time System (Applied Biosystems), Experion™ System (Bio-Rad) for assessment of RNA and DNA quantity and quality, Epoch Microplate Spectrophotometer(BioTek); an ECIS Z Theta electric cell-substrate impedance sensing (ECIS) instrument and its accessories (Applied BioPhysics) to automate tissue culture research by measuring the impedance of mammalian cells cultured on small electrodes; New Lab Alliance APLC system for the purification of recombinant proteins and cellular protein; TriStar LB 941 (Berthold Technologies) for absorbance, luminescence, and fluorescence detection, Alphaimager (Alpha Innotech) for documenting DNA-, RNA- agarose and protein SDS-PAGE gel images and western blotting results; an Olympus IX 71 fluorescence microscope, Olympus CKX31 inverted and a Leica Dissecting Microscope as well as Sanger sequencing capabilities (Applied Biosystems 3130 sequencer).

The CMKC Research computer resources are located within a dedicated data center with environmental controls, conditioned power, and hospital emergency back-up power. There is one head node with six compute nodes installed in a dedicated rack with room for several more nodes. The compute resources comprise a 96-core cluster with 384GB of DDR3 RAM and 48TB SATA hard drives (6 x dual 8-core Intel Xeon E5-2670 “Sandy Bridge” 2.6GHz processors), Quantum SuperLoader3 2U 16 tape library for backups. Deployed on the cluster are the latest versions of GATK, CASAVA, Bowtie, TopHat, Cufflinks, R with CummeRbund, Python with NumPy and SciPy, BreakDancer, Plink, and Haplovie software applications.

**CMKC/KUMC Pediatrics Department.** The combined Department of Pediatrics across KUMC and Children’s Mercy Kansas City (CMKC) are highly focused on enhancing innovation, access, and quality in a measurable way through translational research. Both Departments offer annual Departmental Research Grants focused solely on translational research in children. These grants have led not only to larger externally funded studies, but also to innovations in the way we care for our pediatric patients. The IRB reciprocity and other tools that are already in place make it easy for the two sites to collaborate and recruit large groups of children for translational efforts (such as recent grants in Pediatric Diabetes R01 DK100779, and R21 HD081502 and in Pediatric Autism R21 HD076116). Both sites also participate in the PCORI CDRN effort, allowing for integration of our medical records for tools such as patient recruitment, subject size calculations, and engagement of relevant clinics and personnel in translational research efforts.

CMKC and KUMC also have several Centers focused on translational efforts. For example, the Center for Children’s Healthy Lifestyles & Nutrition jointly houses clinical and research programs focused on activity and
nutrition, as well as serving as home to a large community collaborative with over 400 members called Weighing In. This community collaborative helps tie (though our quarterly meetings) scientists to community members in working groups such as pregnancy and breastfeeding, early childhood, healthy schools. As part of a recent strategic planning process, CMKC has also founded a Division focused on Health Services and Outcomes Research, which capitalizes upon the strong clinical programs to strengthen translational research. A Director has been hired and efforts are underway focused on partnerships with inner city faith based organizations focused on health disparities (RC4 MD005738; R01 MH099981) and several health service innovations studies (R01 MH104086, R01 HD076673, R01 DK93592, R34MH107337, R34 MH108393) among others efforts. A world renowned genome center, the first of its kind with a pediatric focus, provides clinical genomic services while simultaneously conducting state-of-the-art genomic research, seeking to become a leader in pediatric genomic translational research (U19 HD077693). The Center for Child Health and Development provides diagnostic evaluation for Autism Spectrum Disorders using "gold standard" research tools. The current CCHD research database has over 6000 Intake records, over 4000 completed Patient Information Forms, over 1300 detailed psychological score measures and 1200 Developmental Pediatrics visits. With Russ Waitman, PhD, the CCHD is in the process of mapping the current database into the Electronic Medical Record (O2), which will result in further integration between the clinical research database and our EMR system and better access for researchers across Frontiers. With Dr. Waitman, the CCHD will continue to develop the database for researchers using the Harvard ontologies developed to provide researchers a concept-based approach to identifying behavioral features of importance and for correlating these with genotypic data.

The joint Departments offer multidisciplinary training programs at all of their sites, focused not only on medical students and residents, but also on graduate students in psychology, exercise physiology, public health and related fields, as well as providing regular trainings to community members through talks, health fairs, and other community events.

UNIVERSITY OF MISSOURI-KANSAS CITY

Overview The University of Missouri-Kansas City (UMKC, Figure FR-TL1.12) is one of four University of Missouri campuses and is a doctoral research public university offering traditional and interdisciplinary programs serving approximately 15,746 students. The University of Missouri-Kansas City has a broad and inclusive educational mission with specific emphasis in three areas: visual and performing arts, health and life sciences and urban affairs. UMKC’s unique profile includes the College of Arts and Sciences and Schools of Education, Nursing and Health Studies, Management, Medicine, Law, Computing and Engineering, Biological Sciences, Dentistry, Pharmacy and the Conservatory of Music and Dance.

The University’s 11 academic units include Schools of Medicine, Pharmacy, Nursing & Health Studies and Dentistry, all located adjacent to one another on the Health Sciences (Hospital Hill) Campus and are also adjacent to

Figure FR-TL1.12. University of Missouri-Kansas City
three of our main clinical partners, The Truman Medical Center, Children’s Mercy Kansas City, and the Center for Behavioral Medicine. In addition, the University is home to the School of Biological Sciences, the School of Computing and Engineering, and the Colleges of Arts and Sciences, all of which have faculty members that maintain active joint appointments, as well as research and programmatic collaborations with each of the Health Professional Schools.

**RESEARCH ADMINISTRATION**

**Office of Research and Economic Development.** Research at UMKC is coordinated through the activities of the Office of Research and Economic Development, encompassing the Office of Research Services (ORS), the Office of Research Compliance, the UMKC Innovation Center, the Office of Technology Commercialization, the Institute for Human Development and the Laboratory Animal Research Center (LARC). Annually, the ORS processes approximately 250 awards totaling $35.5 M. Approximately 70% of the award total comes from federal sources for Life and Health Sciences-related research activity.

**Office of Research Services.** ([http://ors.umkc.edu/home](http://ors.umkc.edu/home)) The Office of Research Services provides faculty with pre-award services including proposal and budget development support, application concept review, non-technical and technical review, and application submission support. The Office also provides assistance in finding relevant sponsors for research through an institutional subscription to PIVOT as well as through other more individualized activities and efforts. Once an award is received the post-award staff members assist researchers in setting up spending accounts and provide the back-end support necessary for budget management, compliance with University, federal, and other sponsor requirements as well as timely and accurate reporting. The Office also works seamlessly and in collaboration with the Office of Research Compliance and the Office of Technology Commercialization ([http://ors.umkc.edu/otc](http://ors.umkc.edu/otc))

**Office of Research Compliance** ensures that researchers and their proposed research are in compliance with governmental regulations and university requirements. The Office coordinates our efforts to comply with Animal Care and Use (IACUC), human subject research (Institutional Review Board), Laboratory and Biosafety (Institutional Biosafety Committee), Radiation Safety regulations, and HIPAA accountability and training. Specifically, The UMKC Research Compliance Office provides the following services: helps researchers navigate complex federal and state compliance regulations; reviews and manages conflicts of interest to ensure the researcher's personal interests do not influence their primary obligations to science, university, colleagues, students, and sponsors; provides for the humane care and use of all animals in research and teaching; oversees research protection as it relates to human participants, recombinant DNA, and bio-hazardous material; provides oversight to research investigators and serve as liaisons to the review boards and committees; coordinates the radiation safety program; and, offers education and training to faculty and staff.

**UMKC LIFE AND HEALTH SCIENCES RESEARCH CENTERS AND INSTITUTES**

**Center for the Study of Dental and Musculoskeletal Tissues, UMKC-CEMT.** The UMKC CEMT is a multidisciplinary and interdisciplinary center that includes investigators from the Schools of Dentistry, Medicine, Nursing, and Computing and Engineering to focus on dental and musculoskeletal health. This UMKC Center of Excellence integrates all investigators, whether basic or clinical, into powerful translational teams to prevent and treat diseases of mineralized tissue which includes teeth, cartilage, bone, and muscle. This goal aligns with the NIH roadmap initiative and focuses on mineralized tissue research with regards to obesity, cancer, osteoporosis, bone trauma, aging, metabolic bone disease, and diseases of oral tissue. Not only can findings be applied to biomaterials and composite research, medical devices, diagnostics, and clinical imaging, but also be expanded to veterinary practice and diagnostics and treatment of animal dental and bone disease.

There are four major objectives for this center;

- Develop a world-class basic science research program in mineralized tissues.
Create an outcomes science platform and clinical trial networks.

Provide education from graduate students and clinicians.

Establish an infrastructure to develop biotechnology and technology transfer.

Partnerships have been forged with the School of Medicine, School of Nursing, School of Computer and Engineering, and the School of Dentistry. This Center brings together and facilitates collaboration not only among faculty from several of UMKC’s life and health sciences schools but also their Kansas City clinical partners. UMKC’s health professions schools are located on Hospital Hill, adjacent to several of the region’s top clinical care facilities. Primary clinical partners include Truman Medical Center, Children’s Mercy Kansas City, and Saint Luke’s Hospital. Together, with the UMKC School of Medicine (SOM) and School of Nursing (SON), they offer a unique patient base that provide rich information for research and clinical applications into diseases of mineralized tissue. Researchers in the School of Nursing provide experience in implementation of clinical findings to practice and assessment of the impact of changes in clinical practice on health outcomes.

Bioengineers at the School of Computing and Engineering (SCE) have generated significant numbers of patents and devices in biometrics and the school is developing a program in biomedical engineering that integrates with the health professional schools. The UMKC School of Dentistry is the only dental school in either Missouri or Kansas. The Bone Biology and Biomaterials/Bioengineering research programs are recognized nationally and internationally and have researchers with long histories of competitive federal support for their work. Investigators in Bone Biology include molecular biologists, engineers, protein chemists, and geneticists with expertise in the area of the genomics, proteomics, and transgenics in the study of mineralized tissue. The Biomaterials program includes investigators with international reputations in biomaterials for the repair and regeneration of tissues. http://cemt.umkc.edu/default.shtml

**Vision Research Center.** The goal of the Vision Research Center is to accelerate new discoveries and convert these discoveries into therapies serving those afflicted with these eye diseases. The Vision Research Center’s members from the UMKC Schools of Medicine and Pharmacy and from other affiliated institutions leverage existing resources and established extramurally funded programs in three key areas of research: 1. discovery of novel basic science mechanisms that underlie the function of the normal and diseased visual system and that generate the urgently needed rationale for novel innovate high-impact therapies; 2. development of novel therapies and drugs through translational research resulting from extramural support by the National Institutes of Health and other agencies supporting eye research, from collaborations with companies targeting eye diseases and from formal collaborations with the life science community in the Kansas City area; 3. Development of novel diagnostic strategies and their incorporation in state-of-the-art clinical research building on the VRC’s national leadership status in these areas and fast-tracking outcomes-validated new medicines and therapies.

**Shock Trauma Research Center.** The Shock Trauma Research Center was founded in 2001 as a UMKC multidisciplinary research center. It includes basic scientists, clinicians, and translational scientists. Laboratories in the Center conduct research into shock, inflammation, and trauma, all of which are critical areas of medical research. Work from the Center enriches the educational and academic programs, especially in surgery and in the basic medical sciences. Trauma, with its sequela of shock and inflammation, is a leading cause of death among young people. It is in fact the leading cause of death in people under 44 years of age. For this and a variety of other reasons, it is a major urban public health issue. The incidence of trauma in the centers of the largest cities - including Kansas City - is a major national problem. For this reason, the work of the center is especially important in the urban environment, and is a highly appropriate activity for a major urban university. The focus of the Center continues to be on the development of innovative treatment strategies for shock and injury, and for sepsis, two of the most lethal clinical problems today. The Center has received continuous extramural funding for the past 10 years. Scientists in the Center present their work locally, nationally, and internationally, and publish in high quality medical and scientific journals. They have served on national advisory groups and have served in national office in medical and scientific organizations. Dr. Charles Van Way has served as Vice Chair of the Residency Review Committee of the ACGME, and
continues to serve as President of the A.S.P.E.N. Rhoades Research Foundation.

Collaborative for Excellence in Behavioral Health Research and Practice (The Collaborative) is located in the UMKC School of Nursing and Health Studies (SoNHS). The Collaborative is a group of professionals working to advance health and wellness by bringing behavioral health research to practice and by supporting people, organizations and systems through change processes. The Collaborative accomplishes this through a variety of projects in collaboration with local, state and federal partners. Members of the Collaborative lead or partner on a range of federally and locally funded projects, including the Centers for Disease Control and Prevention (CDC) funded Capacity Building Provider Network National Resource Center, which coordinates the CDC’s flagship program of 21 grantees that train health departments, community-based organizations and healthcare organizations to deliver high-impact HIV prevention strategies; the Substance Abuse and Mental Health Services Administration (SAMHSA) funded Addiction Technology Transfer Center (ATTC) National Office, which coordinates SAMHSA’s network of 14 ATTC centers that identify and promote evidence-based practices for addiction treatment, and helps to integrate addiction treatment into healthcare settings; the SAMHSA-funded Mid-America ATTC Regional Center, which serves Iowa, Kansas, Missouri, and Nebraska by developing and conducting online and in-person trainings and assists states and healthcare systems to implement evidence-based addiction treatments; and the SAMHSA funded UMKC SBIRT grant that provides health and behavioral health students and professionals with training to screen and intervene with patients who use alcohol and drugs.

Center for Health Insights (http://chi.umkc.edu/). The UMKC Center for Health Insights (CHI) provides biomedical researchers with investigators to accelerate their research. The CHI supports the UMKC REDCap research instance, Ingenuity for biological pathways analysis, the UMKC/Truman Medical Center i2b2 installation and the UMKC Insights High Performance Computing Platform, which includes a national de-identified data set derived from electronic health records. The CHI also innovates through our portable motion capture platform, our development of novel web resources to enhance information about patient context and initiatives related to the “Internet of Things”.

Institute for Human Development (http://www.ihd.umkc.edu/). The UMKC Institute for Human Development (IHD), a University Center for Excellence in Developmental Disabilities, is an Applied Research and Interdisciplinary Training Center for Human Services. IHD exemplifies the University’s goals by practicing engaged scholarship supporting research to practice so that people, agencies, and the community can benefit from the application of new knowledge and practices generated by the university.

IHD conducts and collaborates on a wide variety of applied research projects to develop, implement, and demonstrate as well as evaluate new ideas and promising practices that support healthy, inclusive communities. Through our interdisciplinary university training we infuse best practices into the curriculum of graduate and undergraduate students in a wide range of professional disciplines. Through community services and supports, IHD assists individuals, community and state agencies, and university faculty to build the capacity of their programs through needs assessments, technical assistance, grant development, demonstrations, and program evaluation. IHD is also a vital information link through the dissemination of products and the establishment of information resource centers. These resource centers become vital assets to the community as demonstrations of research to practice.

IHD focuses its work on seven broad priority need areas: health and wellness promotion; early childhood and youth; individual advocacy and family support; adult community living; aging and developmental disabilities; interdisciplinary university training; and policy, program development, and quality assurance. Every project at IHD falls into one of these categories. While the projects may change, the priority areas stay constant and serve to guide the larger vision of IHD.

IHD partners with university, community, state, and federal level organizations. IHD generates over $9 million in extramural funding through demonstration programs and leverages an estimated $20 million for other community agencies. 37% of IHD’s funding was from Federal sources, 39% from state, and 24% from local
and university funds. In the past year, projects and initiatives continue to focus on youth, families, and adults with developmental disabilities, as well as underserved populations (i.e. low-income minority youth and urban Latino communities).

**Mid America Heart Institute.** The Mid America Heart Institute is a vertically-integrated entity residing within Saint Luke’s Hospital, winner of the 2003 Malcolm Baldridge Award for Quality, and one of the 2 primary teaching facilities for the University of Missouri - Kansas City. In addition to its cutting-edge clinical services, MAHI created the Cardiovascular Research Center over 30 years ago to manage and analyze clinical data. A unique feature of MAHI is the commitment to translating findings into clinical practice. We have successfully pilot-tested and disseminated personalized consent forms and screening programs for depression and diabetes. The commitment of the health system to innovate and participate in research to further improve care means that our trainees will have extraordinary access to patients across a broad spectrum of disease and throughout a broad continuum of care. In Outcomes Research, the ‘laboratory’ refers to the data resources from which important clinical questions can be answered and the clinical environment in which novel interventions can be implemented and pilot tested. We hold an extraordinary array of unique databases in such areas as National Quality Databases, Multi-Center Outcomes Databases, Clinical Trial Databases which are used for clinical outcomes research. Importantly, each of these databases is actively used by investigators, enabling efficient use and extension of these data to support clinically important projects of our trainees.

**Outcomes Research Center, Mid-America Heart Institute** houses the Cardiovascular Outcomes T32 (NHLBI 5T32HL110837) and is one of the leading centers in cardiovascular outcomes research in the United States. Many of the current methods used nationally for quantifying and analyzing patient-centered health status outcomes were designed by faculty in this Center. Members of this group have developed new techniques for performance measurement and have applied methods of cost-effectiveness and decision analysis to novel cardiovascular technologies. The Outcomes Research Center has a strong record of interdisciplinary collaboration between cardiologists, nephrologists, internists, nurses, economists, psychologists, and pharmacists from both UMKC and KU. This Center provides critical support to training efforts in interdisciplinary outcomes research and precision medicine.

The cardiovascular research program not only mentors and collaborates with researchers throughout Frontiers, other CTSA's and internationally (China’s National Center for Cardiovascular Disease, Australia and Europe), but it has a strong commitment to training the next generation of translational scientists. In particular, our T32 in Cardiovascular Quality and Outcomes Research has become a leading training center for young investigators interested in the terminal phase of translational research. Beyond our own accomplished faculty, we create collaborations for our trainees with leading outcomes researchers at Yale (Harlan Krumholz), Duke (Eric Peterson, Lesley Curry, Adrian Hernandez), and the Universities of Colorado (John Rumsfeld, Fred Masoudi, Larry Allen) and Michigan (Brahmajee Nallamothu, Rodney Hayward). Trainees are able to exploit existing data from >30 clinical trials and registries led by MAHI/UMKC faculty and the national registries of the AHA and ACC (for which MAHI/UMKC is one of 3 analytic centers, along with Yale and Duke, for the ACC NCDR registries). In addition, our trainees are able to participate in the newly-established Saint Luke’s Center for Healthcare Innovation, which support novel interventions to achieve the triple aim of healthcare. These resources thus support access to the latest analytic approaches (supported by 12 biostatisticians at MAHI alone), deep experience in the increasingly important analysis and interpretation of patient-reported outcomes measure and in the challenges and evaluation of implementation research. One hundred percent of our trainees have remained in academia, either as clinical trainees or as Assistant Professors with a research emphasis.

**UMKC RESEARCH CORE FACILITIES**

**Laboratory Research Animal Center.** The UMKC Laboratory Animal Research Center is an AAALAC-accredited facility located in the ground floor of our Health Sciences Building on Hospital Hill. The facility is
carefully climate-controlled, secured and remotely monitored for safety and security. The facility is equipped to house rats, mice, rabbits, and zebra fish. There are separate clean- and dirty-side cage washing and sterilization facilities as well as multiple housing rooms, a quarantine area, a cross-breeding and fostering facility and operation as well as well as procedure rooms. The LARC is staffed by well-trained and competent employees including a licensed veterinarian. Usage rates are published on our website and use is available to our faculty as well as those of our affiliate organizations. The facility is inspected semi-annually by members of the IACUC as well as annually by AAALAC and the USDA. For rates and a full listing of available equipment and service see our web site: http://ors.umkc.edu/office-of-research-services/larc

**Proteomics and Mass Spectrometry.** The Proteomics Core lab is equipped with state of the art mass spectrometers and routinely assists faculty investigators and regional corporate biotech/agritech interests, acquiring MS data to support translational and basic research, grant development, student learning objectives, quality control, and molecular verification tasks. Assistance with experimental design, sample preparation, and data interpretation are provided. Recently, the facility began an instrument upgrade strategy in order to expand our capabilities and services to include the newest available methods for systems biology research and human disease biomarker discovery. http://sbs.umkc.edu/research_proteomics.cfm.

**Confocal and Microscopy Facility.** Located in the UMKC School of Dentistry, this university core is available to all researchers. The goal is to support the research programs of a diverse group of NIH funded users located in the UMKC Schools of Dentistry and Nursing as well members of the UMKC Center of Excellence in the Study of Dental and Musculoskeletal Tissues (CEMT), NIH funded investigators, and other researchers at UMKC. This confocal microscopy core resource is also available to the greater academic and commercial community in the Kansas City area. The core is capable of accommodating a wide range of high-resolution microscopy project applications and fluorophores. The UMKC School of Medicine also supports a Confocal Imaging Center providing access to staff supported, state-of-the-art confocal imaging equipment for UMKC researchers and scientists from affiliated research institutions in need of advanced high-end microscopy imaging support on the Hospital Hill Campus and the region.

**Musculoskeletal Structure/Property Characterization Core.** The mission of the Musculoskeletal Structure/Property Characterization Core is to develop methods to improve the quality of life for people who have experienced loss of oral and craniofacial tissues because of age, cancer or trauma. Effective collaborations between the basic science investigators and clinical researchers promotes the translation of the fundamental laboratory results into techniques, procedures and materials that can be used to replace tissues that have been damaged or destroyed by disease, injury or age. Specific initial aims will be to develop a "lab bench-to-clinic" research effort featuring the integrated practice of discovery, application, and clinical assessment. The Musculoskeletal Structure/Property Characterization Core laboratories are located on the 3rd floor of dental school building and provide a wide range of analytical techniques for research and training in life science and biomaterials / bioengineering fields. The laboratories are open for use by UMKC students, faculty and those of our partner institutions. http://dentistry.umkc.edu/Department_Organizations/crisp/index.shtml

**Cryo-Electron Microscopy Facility.** The cryoEM laboratory consists of a JEOL 1200 EX II transmission electron microscope, equipped with a cryo-shield and a Gatan cryo-sample holder, as well as the room-temperature specimen rod used for negatively-stained specimens. Users have access to a rotary evaporator and plasma discharge stations for initial substrate preparation and cleaning. A manual freeze-plunger is available for preparation of cryoEM samples of particulate specimens, rapidly frozen in liquid ethane. A liquid nitrogen dewar is used for storing cryoEM specimens prior to use in the electron microscope. http://sbs.umkc.edu/research_em.cfm

**High Field NMR Facility.** The High Field NMR Facility at MKC is equipped with a state of the art Oxford AS 600/51 spectrometer equipped with cryo and RT probes for high-resolution structural determinations. The facility is equipped through the affiliated Protein Interaction and Dynamics core to assist researchers with isotopic labeling, purification and characterization of target peptides and proteins as well as other biophysical
properties determinations relevant to NMR analysis including isothermal titration calorimetry, circular-dichroism, dynamic light scattering, surface plasmon resonance, analytical ultracentrifugation, and microcalorimetry. http://sbs.umkc.edu/research_nmr.cfm

X-Ray Crystallography Facility. UMKC is a member of the Southeast Regional Collaborative Access Team operating two beam-lines at the Advance Photon Source at the Argonne National Laboratories. The UMKC Crystallography Laboratory is also equipped to assist researcher with protein crystallization, crystallization and preliminary screening of samples for signature protein diffraction with in-house instrumentation prior to beam-line analysis. http://sbs.umkc.edu/research_xray.cfm

Libraries. The University Libraries at UMKC consists of three libraries: the Health Sciences Library, the Miller Nichols Library and the Dental Library. This library system provides the researchers at UMKC many important resources including: over 250 multi-disciplinary databases, including Alt Health Watch (complimentary medicine) Medline, BIOSYS, Web of Science, Scopus, Embase, and International Pharmaceutical Abstracts; online books from respective publishers like ScienceDirect, Wiley InterScience, and McGrawHill; and, online journals from leading publishers, including the American Chemical Society, Nature Publishers, and Springer. If a needed document is not found in the Libraries’ collection, the highly trained staff can obtain almost any document, usually in just a couple of days or less. In addition, the librarians at the University Libraries offer all researchers specialized liaison services, from one-on-one consultations at the start of a research project, to assistance with data management plans, open access compliance assistance, copyright help and archiving.

UMKC CLINICAL PARTNERS

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Children’s Mercy Kansas City. The Children’s Mercy Kansas City have been providing exclusive medical service to children for more than 100 years. Children’s Mercy Kansas City today provides the highest level of medical care, technology, services, equipment and facilities all tailored to meet the intricate needs of its pediatric patients. Children’s Mercy is the only Level I Pediatric Trauma Center in the region. Physicians representing more than 40 pediatric specialties care for children who come from a 150-county region in
western Missouri and eastern Kansas. The hospital is nationally recognized in: Cardiac Surgery, Transplantation, Nephrology, Neonatology and more.

**Center for Behavioral Medicine.** The Center for Behavioral Medicine is an agency for the Department of Mental Health located on Hospital Hill and provides comprehensive psychiatric care to patients from Kansas City and the seven surrounding counties. CBM serves as the University of Missouri-Kansas City’s Department of Psychiatry, fulfilling academic and research needs. CBM offers services in alcoholism, drug, family, group and individual counseling, crisis intervention, group psychiatric therapy, and suicide prevention as well as hospital inpatient care, mental health aftercare and psychiatric care. The hospital also offers treatment to mentally ill patients with substance abuse problems.

**The Kansas City Veterans Administration Medical Center.** The Kansas City VAMC is one of eight medical centers in VISN 15. The mission of the KC VAMC is to provide high quality, comprehensive primary and tertiary healthcare to veterans in our service area, and to provide selected specialty care services to referred veterans. KC VAMC also provides education and training to healthcare professionals and performs research that benefits veterans. The KC VAMC offers residency training in all major medical and surgical specialties and subspecialties. Associated Health Training is offered in nursing, psychology, audiology, social work, dietetics, pharmacy, chaplaincy, health care administration and optometry.

**Research Medical Center.** Research Medical Center was founded more than 120 years ago and today is one of the crown jewels of the HCA Midwest Health System, with a new lobby and admitting areas, a renovated and expanded Cancer Center and Women’s Care Unit, new private patient rooms, and an expanded emergency room. The 22,000-square foot Cancer Center is a comfortable outpatient facility and a dedicated inpatient oncology unit. The Liver and Pancreas Institute is the first unit in the Midwest to provide specialized care to patients who suffer liver, pancreas and biliary cancers. The Transplant Institute has received national recognition for best outcomes in kidney-pancreas transplants. www.researchmedicalcenter.com

**FRONTIERS AFFILIATE INSTITUTIONS**

**KANSAS CITY UNIVERSITY OF MEDICINE AND BIOSCIENCES**

The Kansas City University of Medicine and Biosciences (KCU) campus houses a private, post-baccalaureate, not-for-profit institution of higher education (Figure FR-TL1.13). Founded in 1916, KCU is one of the oldest of 145 medical schools in the United States, and is the oldest in Kansas City, Missouri. The location of the university campus in the heart of the downtown district of Kansas City, Missouri provides access to a rich, multi-cultural community that can be
recruited for studies focusing on health outcomes.

RESEARCH ADMINISTRATION

Office of Research and Sponsored Programs. The growth of research infrastructure and culture at KCU has been remarkable over the last three years. A focus of the university strategic plan has been on fostering an environment supportive of research. Dr. Jeffrey Joyce was hired as Vice-President for the Office of Research and Sponsored Programs approximately three years ago. Dr. Joyce has enhanced the intellectual environment with opportunities for faculty to discuss and share ideas creatively to support the research endeavor at KCU. Science Fridays and the University Lecture Series occur throughout the year, and provide a rich scientific environment that is strongly supportive of research, and therefore, the success of this partnership with KUMC.

Some of the existing research support capacity has been enhanced, and a significant increase in funding from federal research grant awards has occurred. The Office of Research and Sponsored Programs (ORSP) also provides pre and post award support for research grants as well as compliance oversight by the KCU Manager of Research Compliance who is charged with promoting and supporting ethical research at KCU. Mechanisms devoted to increase the practice and quality of ethical research include education and training via on-line modules, small- group presentations, and one-on-one contacts. Some of this training is mandatory, and must be completed prior to beginning the research, and must be updated annually. In particular, all investigators and personnel participating in human subjects or animal research are required to complete the appropriate basic education program developed by the Collaborative Institutional Training Initiative (CITI). The ORSP provides a fully functioning Institutional Review Board (IRB) and an Institutional Animal Care and Use Committee (IACUC). Members of these committees must complete mandatory CITI training. In addition, committee members must also participate in on-going training during committee meetings. KCU has a fully operational animal laboratory facility located on campus, and has submitted an application for OLAW approval. The ORSP is also responsible for the Conflict of Interest program which assures and monitors investigator compliance with institutional policy on financial conflict of interest.

Biological Safety. KCU operates a Biological Safety Program and has an Institutional Biosafety Committee (IBC) to review all research activities involving recombinant DNA or the deliberate infection of experimental animals, as required by the NIH Guidelines for Research Involving Recombinant DNA Molecules, and by university policy. A mandatory, web-based Biosafety Training Program for both investigators and their laboratory personnel is required. Approved programs are subject to annual continuing review, and all laboratories of IBC-approved programs are inspected by our biological safety officer (BSO). IBC committee members must also participate in mandatory training modules.

PHYSICAL INFRASTRUCTURE

Office Space. Office space provided for research faculty members is fully equipped with desks, chairs, file cabinets, bookshelves, and computer stations with laptop computers, desk jet and laser printers, and scanners. Those designated spaces have multiple high speed T1 access to the internet through the site: www.KCUMB.edu. The Ethernet connection allows for continuous access to the Internet and connection to the University Library. Faculty can perform literature and database searches directly from their offices. KCU is fully interconnected via a Novell Local Area Network. The university also provides file sharing, networked printing, and e-mail access. Research faculty have easy access to many regularly updated word processing, graphics, statistical, and data analyses programs as needed. (ex. IBM SPSS Statistics 22). Faculty can access a variety of medical applications loaded at the workstation and file server level. Other services provided by the IT department include computer application training, helpdesk services, distance education, and 24-hour on-call IT staff availability for emergencies. The PI’s lab is equipped with a desktop computer, with redundancy back up storage for large data-sets, and another laser printer.
Library. The Library reference service offers assistance with research, teaching, and other information needs by performing literature searches in MEDLINE (PubMed), MD Consult, OVID, EBM Reviews (OVID), ScienceDirect, OSTMed.DR, Natural Standard, ERIC, Google Scholar, EBSCO, and Gale databases. Other databases are also available for information requests and include: Access Medicine, Access Pediatrics, Access Surgery, CDC, USA.gov, Clinical Pharmacology, John Hopkins ABX Guide, Journal Citation Reports, Medical Letter, First Consult, Up-to-date, MedlinePlus, New Bank, Springer Images, and Ulrich’s Periodical Index. Reference questions or search requests are provided for KCU faculty and clinical community faculty without charge. Interlibrary Loan service augments the holdings of the D’Angelo Library by providing access to other national and international library collections.

KCU is invested in the success of our research faculty, and will provide resources in the form of logistical support such as administrative management, oversight, and best practices training and financial support such as protected faculty time for research associated with this partnership. The facilities and other resources available to research faculty and their research teams will include everything needed to successfully undertake, support, and complete this research partnership.

COMMUNITY PROGRAM

Score 1 for Health. The University has access to unique and diverse patient populations as a result of our affiliations with several area hospitals and clinics that provide our student rotations for third and fourth year medical student training. Score 1 for Health is another program located on the campus of KCU. This program has been providing free in-school health screening to children (K-5th) for more than fifteen years. Targeting elementary schools that enroll 50% or more of their students in the free lunch program, Score 1 screens approximately 14,000 students annually, and to date has screened over 100,000 students. KCU clinical faculty and medical students conduct these screenings, along with the Score 1 for Health registered nurses, allied health professionals and nursing students from schools in the Kansas City metro area. These screenings include height and weight assessments including calculation of BMI, hearing tests, blood pressure tests, dental checks and a head-to-toe physical assessment. An annual assessment of the student screening data is conducted and a corresponding report is produced.

TRUMAN MEDICAL CENTERS

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SAINT LUKE’S HOSPITAL

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SWOPE HEALTH SERVICES

Swope is a patient-centered medical home that provides primary health care and behavioral health services in Kansas City. Swope Health Services mission is to improve the health and wellness of the community by delivering accessible, quality, comprehensive patient care. Today, Swope Health Services provides care for more than 40,000 patients in western Missouri and eastern Kansas.

The PCI program in Frontiers Hub Research Capacity component uses the Swope Health Center to increase enrollment in clinical trials to include their largely minority, underserved population. The PCI program has dedicated research space at Swope that includes 2215 sq ft of space that includes 10 offices and 3 workstations. The space enhances access to the patient population served at Swope and provides the space to accommodate over 2400 research assessments annually. Currently, there are three smoking cessation projects including two R01 funded projects led by Drs. Nollen (DA031815 ) and Cox (DA035796) and a PCORI-funded project (AD-1310-08709) led by Dr. Nollen. Additionally, the satellite presence created opportunities for the KU AD Center to participate in an NIA funded multi-site trial of aspirin in reducing clinical events in older adults.

CENTER FOR PRACTICAL BIOETHICS

The Center for Practical Bioethics is a nonprofit, free-standing and independent organization nationally recognized for its work in practical bioethics. For more than 30 years, the Center has helped patients and their families, healthcare professionals, policymakers and corporate leaders grapple with difficult issues in healthcare and research involving patients. The Center does not wait to be called upon. Their vision and mission requires them to be proactive — to call attention to ethical issues and to develop programs, policies and publications that address them. Through this unique approach, the Center puts “practical bioethics” into action. A dedicated Board of Directors and staff representing multiple disciplines and fields of expertise, as well as individuals and organizations throughout the nation committed to advancing ethical practices and policies in health and healthcare, support the Center.

PAIN KC: For the past three years, Frontiers staff has facilitated a community group of people living with chronic pain called PAINS KC. This group is a grassroots response to the IOM Report calling for action to address the widespread public health problem of chronic pain. The group meets in the Clinical Research Center facility monthly and includes patients, family members and caregivers. This venue is particularly appreciated by the community for its easy access for wheelchairs and those with mobility limitations as well as ample, nearby parking and public transportation.