HEALTH CARE INNOVATION THRIVES IN KANSAS CITY

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HHS Chief Medical Officer to Speak at 2019 KCMS Annual Meeting

MARK YOUR CALENDARS FOR THURSDAY, SEPT. 26

The Medical Society is pleased to announce that our 2019 annual meeting speaker will be Vanilla M. Singh, MD, MACM, chief medical officer for the Office of the Assistant Secretary for Health at the U.S. Department of Health and Human Services. The meeting will be held at the Marriott Kansas City Overland Park, same location as the 2018 annual meeting.

Dr. Singh’s appearance follows on the heels of last year’s highly successful annual meeting featuring U.S. Surgeon General Jerome Adams, MD, MPH, which drew some 350 attendees.

As chief medical officer Dr. Singh serves as the primary medical advisor to the assistant secretary for health on the development and implementation of HHS-wide public health policy recommendations. The Office of the Assistant Secretary for Health includes 11 core public health offices, including the Office of the Surgeon General, 12 advisory committees and 10 regional offices. Dr. Singh’s portfolio includes issues related to pain medicine, including opioid use and misuse, medical ethics and public health.

Dr. Singh has been a clinical associate professor of anesthesiology, perioperative and pain medicine at Stanford University School of Medicine for the past 13 years.

Dr. Singh has been active in national medical organizations, serving as the vice chair of the National Physicians Council on Health Policy, and editorial board member of the Pain Physician journal for the American Society of Interventional Pain Physicians.

Watch for further announcements on the meeting including registration information.

Kansas City Medical Society Foundation 2018 Highlights

Thousands of residents of the Kansas City metropolitan area go without or postpone needed health care because they cannot afford the cost and do not have health insurance. The Kansas City Medical Society Foundation is working to provide a vehicle for physicians to impact the problem individually by each donating care to a select number of cases. During 2018, the Foundation strengthened its ability to address this need following the merger of the Wy Jo Care (Kansas) and Metro Care (Missouri) programs under the Foundation.

HIGHLIGHTS FROM 2018:

• 1,827 patients were referred to Metro Care and Wy Jo Care by area safety net clinics.
• 1,656 passed initial eligibility screening and scheduled appointments with specialists who accepted their cases.

• 110 new providers added to the roster of those available to donate services for the uninsured, including 38 for Wy Jo Care and 72 for Metro Care. Providers include physicians as well as hospitals, laboratories, physical therapists and other services.
• A total of 925 specialty physician volunteers are now registered, including 650 with Wy Jo Care and 275 with Metro Care.
• The value of services donated annually through Metro Care and Wy Jo Care continues to exceed an estimated $8,000,000 annually.

Staffing for the foundation has been strengthened during 2018

• Karole Bradford was appointed chief program officer in late 2018. She brings 19 years of nonprofit leadership experience.
• Stephanie Lopata, who has been with Wy Jo Care since 2008, serves as referral manager for both programs. She manages patient referrals and provides care coordination. She is supported by Maria Valencia, referral coordinator.
• Natalie Lynch joined the Foundation in 2018 as provider relations director, working to build relationships with physicians and other providers who volunteer services. She is supported by Laura Yount, outreach specialist.

To learn more about donating specialty care through Wy Jo Care and Metro Care, contact Natalie Lynch at (913) 526-8231, nlynch@kcmedicine.org.
innovate (v.)
1540s, “introduce as new” (trans.), from Latin innovatus, past participle of innovare “to renew, restore,” also “to change,” from in- “into” (from PIE root *en “in”) + novus “new” (see new). Intransitive meaning “bring in new things, alter established practices” is from 1590s. Related: Innovated; innovating.1

In this issue of Kansas City Medicine, the journal explores medical innovation that is occurring in the Kansas City region. As usual, there is much to take pride in. Kansas Citians often understate their accomplishment, and thus many readers may be surprised by the depth and breadth of activities in our region.

I must admit, I had until recently conflated innovation and invention. Invention refers to something entirely unique and not previously seen, like the introduction of germ theory of disease or quantum physics. Innovation is a process of renewal, a rebuilding or building on what is already known or present.

What are the renewals occurring amongst our innovators? Much work centers on becoming more accessible to patients. This work comes from medicine’s historical values famously stated by Francis W. Peabody, MD, in 1927: “One of the essential qualities of the clinician is interest in humanity, for the secret of the care of the patient is in caring for the patient.”2

Another area where renewals are occurring is in surgical process, where innovators are refining care techniques.

Recently the business community has been abuzz about “disruptive innovation,” a term that is a tautology given the impact of innovation. While many view the profession of medicine as progressing rapidly, it is also true that as many as two out of three change attempts in medical organizations fail. Many years elapse for recognized evidence-based findings to be taken up by the practicing community, a gap often measured as bench to bedside.3

There is a real appetite in our nation for medical care to change. Many physicians view physician assistants, nurse practitioners, optometrists, pharmacists and others as interlopers with scope of practice creep. It should be understood that their gains in our legislature are because those that govern us see these other professionals as adding value to medical care beyond what physicians currently offer. As put by Tom Feltenstein et. al in their book Change is Good ... You Go First, “If you don’t like change, you’re going to like irrelevance a lot less.”

Many of our featured innovators are controversial among their peers. Niccolo Machiavelli stated that “The innovator makes enemies of all those who prospered under the old order, and only lukewarm support is forthcoming from those who would prosper under the new.” It remains true that standing still in this vibrant community is not an option for survival.

Despite any discomfort from their changing the order, we have much to thank our innovators for. 

Michael O’Dell, MD, MSHA, FAAFP, is chair of the Department of Community and Family Medicine at the University of Missouri-Kansas City School of Medicine, and associate chief medical officer for the Truman Medical Centers Lakewood campus. He can be reached at michael.odell@tmcmed.org.

REFERENCES
Medical Society Supports Wyandotte, Johnson County EMS Physician Advisory Committees

The Kansas City Medical Society plays a direct role in the development and approval of EMS protocols for pre-hospital care in Wyandotte and Johnson counties. Kansas law stipulates this role for the local medical society where one exists. In Wyandotte County, KCMS staffs and supports the EMS Physician Advisory Committee. The primary function of the committee is to provide overall medical supervision of pre-hospital care, including EMS protocols as well as equipment and supplies used to deliver care.

Members of the Wyandotte County committee include, pictured from left at their March meeting: Dennis Allin, MD, and Eric Vaughan, MD, both of The University of Kansas Medical Center; Tony Burr, deputy chief and EMS director, City of Edwardsville; Theodore Barnett, MD, Children’s Mercy Hospital; John Cota and Anne Seeberger Kansas City, Kan. Fire Department.
Unintended Consequences
WHERE WILL THE LEGALIZATION OF MARIJUANA LEAD US?

By Charles W. Van Way, III, MD, Editor Emeritus, Kansas City Medicine

“We went to war to save democracy and got back home only to find we couldn’t get anything to drink?”
~ Soldier’s complaint, ca 1919

The 100th anniversary of Prohibition is upon us. Yes, the Great Experiment of alcohol prohibition in the United States. It began with the passage of the 18th Amendment to the Constitution in late 1918, with full implementation in 1920. Initially, it was a product of the very popular Progressive movement. When it was adopted, 33 of 48 states were already “dry.”

But Prohibition rapidly became unpopular and was ended in 1933. Even after that, a number of states remained dry or partly so. The experiment was effective in that it destroyed the liquor industry, hugely reduced the number of breweries and changed the behavior of a generation.

The period of Prohibition—the Roaring Twenties—was a time of changed behavior indeed. Unfortunately, many of the changes were not intended by the authors of the 18th Amendment.1,2

From an historical perspective, this sort of thing is known as a sumptuary law.3 Throughout history, these have been used to separate elites from the common people. The Great Experiment was not very different. The virtuous people who wanted Prohibition were highly concerned about crime among the “lower classes.” Prohibition was largely intended to reduce crime and other social ills resulting from drinking. But in fact, it stimulated an entire underground economy of bootlegging, saloons and gang warfare. Stopping crime was used by its opponents to support its eventual repeal. Among the ironies of Prohibition was that both its adoption and its repeal were promoted to reduce crime.

Alcohol prohibition created great opportunities for criminals. Consider smuggling. Ships would anchor outside the three-mile limit, offload crates of booze, and speedboats would rush them past the Coast Guard to beaches all along our coasts. They would land in isolated coves, friendly villages or open beaches, and offload the contraband beverages. The thing is, liquor is relatively cheap to produce. Half of the cost of a bottle of booze is government tax. So … the markup, which would normally go to the government, went to the smugglers. Perhaps that explains why the government was willing to repeal Prohibition.

The argument goes that decisions made without considering possible adverse consequences are often very bad decisions.

Now, we have embarked on a different national experiment. Call it Great Experiment II. But it comes with a twist. For the past 100 years, prohibiting drugs and intoxicants have been the norm. During the Progressive era, we rushed to prohibit all sorts of other drugs besides marijuana including morphine, cocaine and opium. Marijuana, for example, was first prohibited in 1916, in California. (Yes, California!) As we all know, drug prohibition has lasted much longer than alcohol prohibition. But marijuana has now become an exception.

Today, a majority of people want to legalize marijuana, either for medical use or general use. And state governments, of course, want the taxes. History repeats itself in odd ways.

As we look at the map of the United States, the number of states which have legalized marijuana—color them green—is increasing steadily. Led by California and Colorado, these now encompass 10 states including Alaska, Washington, Oregon, Nevada and much of New England. A majority of states now have legalized “medical” marijuana, including Missouri. Use of marijuana or tetrahydrocannabinol (THC) for medical purposes is now legal in 33 states, four of five territories and the District of Columbia.4

BORDER CONTROL AND SMUGGLING

There will be a number of consequences. But because border control is a hot issue today, let us consider smuggling. At present, marijuana is smuggled into the U.S. from locations that are somewhat friendlier about growing it. It’s not an ideal product for the purpose, because it’s bulky
ments for legalizing marijuana, it’s easy to see people making a case for legal use of opioids. Not at the moment, of course. Right now, we’re in the middle of an epidemic of opioid-related deaths. We’ve been tightening the enforcement of existing laws regulating opioids and even passing a few more. But most of the regulations have targeted physicians.

Opioid use has long since escaped the control of physicians or of the health system in general. Nobody controls the underground economy. It’s like liquor in that regard. Because it takes up a lot of room, marijuana needs a bulk carrier like trucks, cars, boats or even airplanes. For that reason, people tend to bring it across the border rather than through ports of entry.

While it’s mostly smuggled across the Mexican border, some also comes in from Canada. As an example, look at Pure, a new TV show about a Mexican-Canadian-Mennonite connection. Based on fact. You really can’t make this stuff up. Real life can be bizarre.

What will happen now that marijuana can be legally grown and sold in the U.S.? For one thing, we are likely to finally eliminate marijuana smuggling. Or more accurately, we may eliminate cross-border smuggling. With Canada preparing to adopt full legalization, even that may be difficult to achieve. But we will certainly drop the volume.

According to a report from the Cato Institute, we already have done so. Following legalization in several states, there has already been a significant drop in smuggling of marijuana across the border. Now that some of the biggest consumers of marijuana have legalized it, smuggling has decreased dramatically.

On the face of it, this is a Good Thing. Smuggling feeds criminal gangs, organized crime or simply criminal behavior in general. As a matter of public safety, it’s good to curtail smuggling. Of course, underground drug smuggling will still carry on, just with other drugs. Fentanyl, cocaine, opioid pills and other drugs continue to come through the border, usually at ports of entry. They are easier to hide, being less bulky. And they have a higher profit margin.

COULD IT LEAD TO OPIOID Deregulation?

Will we go further? Looking at arguments for legalizing marijuana, it’s easy to see people making a case for legal use of opioids. Not at the moment, of course. Right now, we’re in the middle of an epidemic of opioid-related deaths. We’ve been tightening the enforcement of existing laws regulating opioids and even passing a few more. But most of the regulations have targeted physicians.

There are very few drugs for which we can tell patients, “take as much as you want, as often as you like,” and then give out a certification saying precisely that.

Opioid use has long since escaped the control of physicians or of the health system in general. Nobody controls the underground economy. It’s not hard to look forward a decade or two, and see a movement to deregulate opioid use. Twenty years ago, few of us envisioned legal marijuana. Yet, here we are.

RESPONSIBILITY WITHOUT CONTROL

Most medical societies have opposed both medical marijuana and full legalization. On balance, we’ve been right to do so. There is much potential for harm and only a few areas of unequivocal benefit. Medical marijuana in particular is just a way of shifting responsibility to doctors. We cannot prescribe a controlled dose of marijuana. All we can do is give a patient a license to buy something which would otherwise be illegal. That’s responsibility without any control. But we’ve lost that battle. Whether we like it or not, medical use is here, and recreational use is on the way.

Its advocates say marijuana is actually safer than alcohol. Perhaps so. It’s harder to overdose, for one thing. Long-term use probably has some serious adverse consequences, but that’s true for both intoxicants. Alcohol use may lead to violent behavior in some people. Everyone knows what a “bar fight” is.

Marijuana users have the reputation of being more laid-back, although some writers disagree. They may also be more paranoid, apparently depending on the individual. Either intoxicant may predispose to mental illness. Both are harmful to children and adolescents. Potency of marijuana is far higher than in the 1960s and 1970s, which means we may see more side effects. We know very little about synergistic effects, which simply haven’t been studied. We do know, from talking to our patients, that both are often taken together.

But the socially accepted use of one intoxicant is hardly justification for introducing another into general use. We already have a large amount of disease caused by alcohol. There are well-known consequences of alcohol intoxication, such as auto accidents and violent behavior. Will there be consequences of widespread marijuana use? Pedestrian deaths, accord
Charles W. Van Way, III, MD, is editor emeritus of Kansas City Medicine and is emeritus professor of surgery at the University of Missouri-Kansas City. He can be reached at cvanway@kcrr.com.

REFERENCES
Medical Society Endorses Medicaid Expansion in Kansas and Missouri

The Kansas City Medical Society has identified access to health care as its number one policy priority of 2019 and will advocate for Medicaid expansion legislation in Kansas and Missouri leading up to and during the 2020 sessions.

A letter to the editor from the Medical Society appeared in the May 12 Kansas City Star. In addition, letters have been sent to Missouri Gov. Mike Parson and Kansas Gov. Laura Kelly, as well as legislators in both states. Letters also have been sent to the Kansas Medical Society and the Missouri State Medical Association asking that Medicaid expansion be a priority in their legislative advocacy.

Each of the letters emphasizes the argument in favor of expansion as follows.

WHY IS MEDICAID EXPANSION IMPORTANT?
• Patients can be treated sooner if insured, and the end cost is lower.
• Our community’s economy is directly linked to its health.
• It’s important that low-income people get the health care they need to keep working and taking care of their families.

As U.S. Surgeon General Jerome Adams, MD, MPH, shared at the November 2018 KCMS annual meeting, a community’s health and economic prosperity are linked.

Physician members agree that a major barrier to delivering care is health insurance or ability to afford health insurance. Uninsured patients end up getting sicker and needing more costly treatments than if they had been insured and received care sooner.

The Kansas and Missouri Medicaid programs currently offer no coverage to childless adults and very low-income eligibility limits for parents (19% of the federal poverty level in Missouri and 33% in Kansas). To put this into context, 19% FPL for a family of four is roughly $4,500 annually.

Absent Medicaid expansion, the coverage system in both Missouri and Kansas has a large coverage gap that leaves hundreds of thousands of residents behind, because they make too much money to qualify for the current Medicaid program and too little for a subsidized marketplace plan.

If both Missouri and Kansas expand Medicaid, 400,000 people would gain access to health insurance. This would bring approximately $325 million per year into our six-county area surrounding Kansas City for the health care of our neediest residents.

In addition, some community hospitals in rural areas in both Kansas and Missouri are closing or in danger of closing. Medicaid expansion would assist some of these hospitals. These hospitals are key to access to care but also to creating jobs in their communities.

For more information, please contact KCMS President Mark Brady, MD, at drbrady@kcmedicine.org.

Medical Society Endorses Medicaid Expansion in Kansas and Missouri

Passionate About Mission Work

TED HIGGINS, MD, BUILT SURGERY CENTER TO SERVE RESIDENTS OF SOUTHEASTERN HAITI

By Jim Braibish, Kansas City Medicine

Overland Park vascular surgeon and Medical Society member Ted Higgins, MD, has been committed to mission work since his first trip to Haiti as a fourth-year surgical resident in 1982. That commitment culminated with the 2016 opening of the Higgins Brothers Surgicenter for Hope, which today provides much-needed surgical services to the rural community of Fonds-Parisien in southeastern Haiti.

The Surgicenter in 2018 performed over 600 procedures and 500 deliveries, including quadruplets born in August. Four times a year, Dr. Higgins brings a group of surgeons, physicians, nurses and other support personnel from Kansas City to serve a weeklong mission. In 2018, those from Kansas City serving included six surgeons, six anesthesia providers, 25 nurses, several nursing students and 12 non-medical members.

“We’re in medicine to help people,” Dr. Higgins explained. “There are so many people around the world who need our help. We are fortunate to have the skill set to help a lot of people.”

The Higgins Brothers Surgicenter provides elective general and vascular surgeries along with gynecological and obstetric procedures. There also is 24-hour emergency treatment available. The center is a teaching and training hub for future Haitian surgeons, educating surgical residents from nearby Port-au-Prince General Hospital.

Patients are referred to the Surgicenter from all over Haiti. Few can afford to pay anything; fees operate on a “pay-what-you-can” basis, and no one who needs surgery is turned away.

Working alongside the mission team—and staffing the center the year-round—are Haitian physicians and nurses trained by Dr. Higgins and his team. Currently there are 25 Haitian staff, including two surgeons, an ob-gyn surgeon, two anesthesiologists, two emergency room physicians, and a medical director, along with a nursing staff of 12.

Most of the Haitian staff speak English to communicate with the Americans, with interpreters available to assist in communicating with patients.

Among other Kansas City physicians who frequently serve on the missions are Dr. Higgins’ KC Vascular & General Surgery partners Jeffrey Cameron, MD; Joe
“We’re in medicine to help people. ... There are so many people around the world who need our help.”

Cates, MD; and Austin Lehr, DO. Ob-gyn physician Bradley Sullivan, MD, along with podiatrist William Cruce, DPM, have also participated in the trips. Anesthesiologist Burney Miller, MD, has been on all the mission trips, along with his wife Nancy who supervises the recovery room.

This spring, Dr. Higgins unfortunately had to cancel the mission trip because of civil unrest and violent protests in Haiti. The U.S. State Department issued a statement advising U.S. citizens not to travel to Haiti. Dr. Higgins nevertheless made a week-long trip on his own and did not encounter any difficulties.

NEED FOR THE SURGICENTER
The center is part of the Haitian Christian Mission, which also provides primary care and ob-gyn care in the same building complex. In 2010, Dr. Higgins began serving at the Mission in the aftermath of the major earthquake that struck the country. He and his team would operate on about 60 patients during annual week-long trips over the next few years. This was an extension of mission work Dr. Higgins had been performing in the neighboring Dominican Republic since the 1990s.

By 2015, Dr. Higgins recognized that a great unmet need for surgery remained at the Haitian Christian Mission. “So we talked with the Mission about building our own surgery center on their property,” he recalled.

Dr. Higgins funded most of the construction cost with the help of some private donations. Hospital Corporation of America (HCA) provided equipment and materials, while Heart to Heart International has provided containers for equipment transport. There also are ongoing operating costs to pay the Haitian physicians, nurses and staff, funded by Kansas City philanthropy, Dr. Higgins and other individual contributions.

The facility has two operating rooms plus a delivery room. Opened on Dec. 10, 2016, it is earthquake and hurricane proof. “During Hurricane Matthew in October 2016, shortly before the building opened, it was used as an emergency shelter,” Dr. Higgins said. “Our architect told me that this building has more rebar than the rest of the city.”

The Surgicenter was warmly received by the community. “Opening the center (continued)
really meant a lot to the people of Fonds-Parisien,” Dr. Higgins noted. It was covered live on national television by both Haitian TV stations.

“The Haitian people are amazing. It is the poorest country in the Western Hemisphere, but they keep a cheerful demeanor. They are so grateful for everything we do,” he added.

FAMILY OF PHYSICIANS

The center is named “Higgins Brothers” in honor of Dr. Higgins’ father and uncle, who were both surgeons in the upstate New York community of Cortland. In turn, the two were inspired by Dr. Higgins’ grandfather and great-grandfather who also were physicians.

“In their shared 38-year practice, my father and uncle were role models to medical students, physicians and the wider community for their exemplary patient care and civic involvement,” Dr. Higgins said. “In addition, both served in World War II as physicians, my father in Europe and my uncle in the Pacific.”

Dr. Higgins earned his undergraduate degree from St. Lawrence University in Canton, N.Y., and his medical degree from the State University of New York at Syracuse. He completed his residency at Yale New Haven Hospital and his fellowship at Baylor College of Medicine in Houston.

It was during residency when Dr. Higgins was introduced to mission work in Haiti.

“I was amazed at how much we could help the Haitian people by performing general surgery at the mission. It convinced me to change my residency from cardiac to vascular surgery, so I would still be able to do general surgery on the missions,” Dr. Higgins recalled.

Several years later, after becoming established in Kansas City, Dr. Higgins resumed mission work. The church to which he and his wife belong, Village Presbyterian in Prairie Village, had set up medical missions to the Dominican Republic. Initially Dr. Higgins worked in clinics operating on Haitian sugar cane cutters and their families living in the Dominican Republic. By 2000, a hospital was built and Dr. Higgins could perform surgeries. In 2010, the opportunity to serve at the Haitian Christian Mission and care for Haitians presented itself.

Besides mission work, Dr. Higgins has volunteered locally at KC Care Health Center and supports the MS 150 bike ride with a fund in memory of his colleague who died of the disease.

“I enjoy the work I do, and I want to keep doing it,” Dr. Higgins summarized. “If I can help someone, I will do it.”

HOW TO SUPPORT

THE HIGGINS BROTHERS SURGICENTER FOR HOPE

TO LEARN MORE:
https://higginsbrotherssurgicenter.org

TO VOLUNTEER:
- Dr. Ted Higgins at tedhig@gmail.com
- becky@higginsbrothers.org

TO DONATE:
- Online:
  https://higginsbrotherssurgicenter.org/donate/
- Mail a contribution:
  Higgins Brothers Surgicenter for Hope,
c/o Greater Kansas City Community Foundation, 1055 Broadway, Suite 130,
Kansas City, MO  64105

These quadruplets were born at the Surgicenter in August 2018. Mother and children continue to do well.
The spirit of innovation is alive and well across Kansas City—especially in health care. It is evident through the variety of regional organizations promoting entrepreneurship as well recent events such as the Mayors Conference on Entrepreneurship. This section of the spring Kansas City Medicine is devoted to the many outstanding individuals and institutions that have built a rich foundation for health care innovation in Kansas City.

At the core of innovation are Kansas City's many fine medical research institutions where ideas are born. These include the University of Kansas Medical Center, Children's Mercy Hospital, the University of Missouri-Kansas City School of Medicine, Stowers Institute for Medical Research and Kansas City University of Medicine and Biosciences. Each of these institutions provides information about their work in the following pages. (Note: Stowers’ profile will appear in the summer issue of this journal.)

Ideas from inside the universities and out have spawned the development of startup businesses, many of which are led by physicians or in which physicians are involved. Two physician-led startups are profiled here. Redivus Health has developed a mobile app to guide physicians and the rest of the care team through current treatment protocols for three high-stress situations—cardiac arrest, stroke and sepsis.

ModRN Health seeks to help individuals navigate the complex health care system through a mobile app and the support of nurse advisers.

The region is home to more than a dozen incubators for startup businesses in health and biosciences, according to the latest Kansas City Regional Life Sciences Industry Census, produced by BioNexus KC. Life sciences employment in the Kansas City region—counting the Columbia, Mo., and Manhattan, Kan., areas—has increased 22% since 2015 and now numbers 292 life science companies that employ 34,611 people.

BioNexus KC describes the entrepreneurial climate in Kansas City and the various supports available to entrepreneurs in the first article in our innovation section.

The third dimension of health care innovation in Kansas City is at the patient level. Blue Cross and Blue Shield of Kansas City has pioneered many innovations in coverage and care, most recently the launch of Spira Care, which simplifies the patient experience with no deductibles and copays for primary care. Partners in Primary Care is utilizing capitated Medicare payments to enable physicians to see fewer patients per day while offering a full range of team-based care focusing on the whole patient. These innovations are profiled.

In previous issues of Kansas City Medicine, we have highlighted recipients of the Medical Society’s Innovation Award, including Richard Hellman, MD, and his advances in diabetes care; Sukumar Ethirijan, MD, and his development of concierge care for cancer patients; and Daniel Durrie, MD, and his national leadership in laser refractive surgery.

Of course, Kansas City also is home to nationally leading companies in health care innovation such as Cerner today and Marion Laboratories in the past. There are many more outstanding innovators in Kansas City health care than we can feature in the pages of this journal. ☺
Kansas City came together as a community nearly eight years ago under the leadership of the Greater Kansas City Chamber of Commerce to evaluate the “Big 5” opportunities for the region. One of those identified goals was to make Kansas City “America’s most entrepreneurial city.”

While seemingly a tall task, the legacy of health care innovation in Kansas City is significant, promulgated historically by the various iterations of Ewing Kauffman’s Marion Laboratories and more recently by Cerner’s explosive growth in leading expansion of electronic medical records. Considering this strong history of health care entrepreneurship, what has the region accomplished since this concerted effort began in 2011, and what is the current climate for health care startups in Kansas City?

Kansas City has excelled in developing significant resources for entrepreneurs and startup companies operating in the region. These efforts are coordinated primarily by KCSourceLink, a program of the University of Missouri-Kansas City Innovation Center that works by connecting entrepreneurs and early stage companies to a network of business-building resources and mentors across the region. The network is comprised of nonprofit, academic and government resources that support entrepreneurship. They are viewed as regional leaders in providing education, events and resources available to entrepreneurs.

Augmenting KCSourceLink’s broad efforts around educating and engaging entrepreneurs are additional organizations, including the Ewing Marion Kauffman Foundation, Enterprise Center for Johnson County and the Kansas City Startup Foundation, to name a few. While many of these organizations provide vital services to entrepreneurs and the community, none are exclusively focused on life science or health care entrepreneurship.

**BIONEXUS KC PROGRAMS**

As the organization spearheading the regional life sciences strategy, BioNexus KC is a catalyst for innovation in both animal and human health by:

- fostering constructive relationships between the academic and private sectors;
- facilitating collaborative scientific research;
- advocating for the life sciences at local, state and national levels; and
- supporting economic development, technology transfer and commercialization.

Our key stakeholders include academic research universities (Kansas City University, Kansas State University, University of Kansas, University of Kansas Medical Center, University of Missouri, University of Missouri-Kansas City), hospitals (Children’s Mercy, Saint Luke’s Hospital, Truman Medical Centers) and institutes (MRIGlobal) in the Kansas City region, covering the area between Columbia, Mo. and Manhattan, Kan. We also serve the nearly 300 life sciences companies in the same region.

The regional life sciences industry has experienced sustained growth since tracking efforts began in 2006. Conducted every three years by BioNexus KC, the 2018 Life Sciences Industry Census identified 292
life science companies in 23 counties in the Kansas City Metropolitan Statistical Area, along with the regions surrounding St. Joseph, Mo., Kansas State University in Manhattan, the University of Kansas in Lawrence and the University of Missouri in Columbia. Conservative employment estimates for these companies indicate about 35,000 employees. A net increase of 43 companies in the region represents an impressive 17% growth in companies, with 22% employment growth since the 2015 census.

Four years ago, we delivered a regional strategic assessment entitled “Pathway to 2025.” The evaluation phase of the assessment identified four scientific areas of strength (animal health, cancer research and care, health IT and outcomes research and neuroscience). Within these areas are four cluster enhancement strategies (capital formation, collaboration, messaging/marketing and workforce development). While internationally recognized as the home to the largest concentration of animal health assets in the world, human health assets outnumber them by 3:1. By leveraging strengths at the nexus of human and animal medicine, the region could position itself to be a worldwide leader in several fields, including animal health, health care technology and outcomes research.

**ADDITIONAL ASSETS SUPPORTING LOCAL ENTREPRENEURS**

Listed below is a brief summary of other local assets focused on supporting entrepreneurs in the life sciences and health care technology sectors:

**Institute for Advancing Medical Innovations (IAMi).** IAMi is a nationally recognized proof-of-concept center and product development arm of KU Medical Center and the KU Cancer Center. IAMi’s mission is to “improve human health by accelerating new drug therapies and medical devices to patients.” To achieve this mission, the Institute translates laboratory and bedside discoveries into new drugs, diagnostic tests and medical devices. IAMi works with its partner organizations and a national network to develop medical innovations that change the standard of health care.

**Whiteboard2Boardroom (W2B).** W2B is a partnership between more than 20 regional research institutions created to explore and develop technology commercialization processes that maximize new company formation. KCTechMatch is a group of individuals associated with the program who provide technology assessment, mentoring and business startup support to emerging technologies. In addition to serving as a clearinghouse for matching local technologies with executives and management teams, the program provides educational support for those interested in technology transfer including licensing and commercialization support.

**Digital Sandbox-KC.** Kansas City has long lacked the early-stage proof-of-concept support that allows entrepreneurs/early-stage startups the opportunity to prove the viability of a product or process. This would also better position technologies for further investment and advance products to commercialization. Entrepreneurs traditionally relied on friends and family to support early-stage development with little knowledge of, or access to, vital resources. Stuck in the “valley of death,” these concepts will often languish. Digital Sandbox-KC fills this gap and develops new ways to connect large industry to the entrepreneurial network. Established in 2012, they provide proof-of-concept support to quality ideas, giving early-stage entrepreneurs critical access to proof-
of-concept resources. Most importantly, they leverage proof-of-concept support by surrounding the company or entrepreneur with a wealth of resources moving the idea forward and finding the critical connections needed to help the company progress toward sustainability.

Medical Device Network of Kansas City (MDNKC). Led by BioNexus KC, the MDNKC is a group of innovators, entrepreneurs and service providers that convenes quarterly to discuss a variety of industry-specific topics, all with the overarching goal of advancing medical device innovation within the regional life sciences community. Recent efforts have focused on being more inclusive of medical technology in general and including device, diagnostics and digital technologies. While Kansas City is not known for any individual large medical device company, it does have significant health care technology assets, including Cerner, Netsmart and even Garmin (think wearables!). We have a robust tech and entrepreneurial community that, when all combined, positions Kansas City to be a future leader in the medical technology space.

Incubators and Accelerators. Business incubation catalyzes the process of starting and growing companies, providing entrepreneurs with the expertise, networks and tools they need to make their ventures successful. Incubation programs diversify economies, commercialize technologies, create jobs and build wealth. Critical to the general definition of an incubator is on-site management, which develops and orchestrates business and provides marketing and management resources tailored to a company’s needs. Incubators usually also provide clients access to appropriate rental space and flexible leases, shared basic office services and equipment, technology support services and assistance in obtaining the financing necessary for company growth. The term “incubator” has expanded over time to include facilities that include formal company development programs, both with and without permanent physical space for companies to locate. The region is home to nearly 15 life sciences incubators/accelerators.

FUTURE “OUTCOMES CAPITAL OF THE WORLD”

Outcomes Research and Health Information Technology (hIT) are important segments in the regional life sciences cluster. Cerner and Netsmart represent companies making significant investments in population health utilizing hIT technologies. Saint Luke’s Hospital and the University of Kansas Health System boast world-class outcomes research scientists, most notably in cardiology. To support and encourage existing and new businesses in this sector, BioNexus KC is establishing a database of de-identified human clinical data from regional hospitals, Cerner and regional health information exchanges to allow companies to validate their technologies and solutions. This “data accelerator” is a truly unique asset of the life sciences cluster.

In the last year, BioNexus KC has also helped catalyze the Quality and Value Innovation Consortium (QVIC), which is a group of health care leaders focused on identifying value-based health care opportunities and implementing them across the region to improve patient outcomes and decrease health care costs. Our Collaborate2Cure (C2C) event series highlighted several topics and priorities of Kansas City area health care systems, including opioid management, pre- and post-natal care, social determinants of health, patient
engagement and satisfaction and health care-associated infections and conditions.

From these presentations, two projects were selected as pilot programs to be rolled out to multiple health systems in the region: opioid management and transitions in care around heart failure. This unique collaboration among competitor health systems will undoubtedly have a positive impact on costs and patient outcomes, establishing Kansas City as the “health care outcomes capital of the world.”

ACCESS TO CAPITAL

Despite numerous resources available to entrepreneurs in Kansas City, access to capital remains the most pressing issue and prevents the region from achieving its full entrepreneurial potential. According to the 2018 Midwest Health Care Growth Capital Report, Kansas and Missouri ranked at or near the bottom in terms of investment in biomedical companies across three sectors: medical device, biotechnology and pharmaceuticals.

Despite this dismal record, the region has been hard at work in developing more funds to address this gap. But even with significant progress in improving capital sources for companies raising between $100K and $10M, glaring deficiencies in the investment continuum remain. There are only limited options, for example, available to early stage entrepreneurs seeking the proof-of-concept funding (<$150K) necessary to develop technology to an investable stage. It will be important for the region to develop new sources of proof-of-concept funding that facilitate technology commercialization from regional universities and hospitals.

Funds specifically focused on life science and health care commercialization are especially important as they could play a two-fold role: provide the funding necessary to move technologies out of institutions and towards commercialization, and provide a source of expertise for later sources of capital. While there are local options available to provide capital at levels greater than $10M, those funds are typically not available to life science and health care entrepreneurs in the region. Regional investor hesitancy to invest in these types of opportunities may be fueled by a lack of understanding of the technology, a lack of understanding of the market opportunity, an unfamiliarity of the life cycle of life sciences investments or a combination of all the above.

BRINGING TECHNOLOGIES FROM UNIVERSITY TO MARKET

The region also needs to find better, more efficient ways to roll technologies out of regional universities and hospitals. Nearly all of these organizations have researchers or clinicians working to develop the latest innovations and treatments but lack the skills necessary to bring those technologies to the marketplace where they can have an impact on patient care. In addition to the innovators, most of these institutions employ technology transfer professionals focused on identifying and protecting the organization’s most promising technologies, and then helping move those technologies more efficiently toward the market.

There exists, however, significant variation between individual organizations regarding the level of priority for commercialization activities, the degree of funding to support those activities, and the use of best practices for technology transfer. A larger-scale effort within individual universities is required to foster a climate supportive of technology transfer and commercialization.

Many institutions known for their ability to successfully commercialize technologies include incentives for faculty to engage in entrepreneurial activities. To complicate matters, however, not all researchers are interested in leaving their academic careers to pursue entrepreneurial endeavors.

In these cases, the institutions need to make it easy and affordable (or free) for interested entrepreneurs to license and commercialize the technology, with the payoff happening if the technology successfully exits or makes it to market. The probability of success at this early stage is quite small, so it’s simply a numbers game. The more technologies that can be vetted and moved towards commercialization, the more likely it is that an institution will find one that can have a valuable exit.

CONCLUSION

Many organizations in the Kansas City region, including BioNexus KC, have worked diligently to establish a technology transfer/commercialization ecosystem supporting entrepreneurs in commercializing novel technologies, increasing access to capital, connecting to scale-up/prototyping expertise, and applauding both successful and unsuccessful ventures. Health care technologies and medical devices are particularly well-positioned to rapidly utilize components of the existing ecosystem to accelerate time to market.

While entrepreneurship includes many sectors beyond life sciences, the strides highlighted in this important sector serve as indicators that Kansas City is making significant progress toward becoming “America’s most entrepreneurial city.”

Dennis Ridenour is president and chief executive officer of BioNexus KC. He can be reached at dridenour@bionexuskc.org. Keith A. Gary, PhD, is vice president, BioNexus KC. He can be reached at kgary@bionexuskc.org.
Innovation means many different things for the six Partners in Primary Care Centers which opened here in Kansas City in late 2017. Partners offers senior-focused primary care in a value-based reimbursement model. This payment system allows us to provide a different holistic care delivery model—with a true integrated team-based approach to both individual patient care and population health management, supported by data analysis. We refer to these new or different approaches to health care as “test and learn” opportunities.

In an effort to reduce health care costs while promoting high-quality and effective care, HHS and CMS have designed several different payment systems that reward clinicians for value over volume. One of these systems, through Medicare Advantage plans, offers a per-member, per-month capitation to practices based on the type of chronic conditions and illness severity of the patients being served. This capitated payment allows practices to provide this integrated and coordinated team-based care model which is focused on prevention and long-term wellness. Partners in Primary Care is a wholly owned subsidiary of Humana, but is payer-agnostic. We provide care to Medicare Advantage patients from most health plans, as well as original Medicare and dual-eligible Medicaid patients.

This capitated Medicare Advantage payment allows Partners clinicians to see an average of only 12-15 patients per day, spending more time with each patient than in a typical fee-for-service practice.

INTERDISCIPLINARY TEAM-BASED CARE

The true interdisciplinary team-based care model at Partners is also innovative. The Partners team in each center includes not only physicians, advanced practice professionals and medical assistants, but also a care coach nurse, clinical pharmacist, referral coordinator, documentation specialist, center administrator and front desk staff (including health information management), plus one behavioral health specialist who works between all the centers.

All members of the team start the day with the morning huddle where all of the day’s scheduled patients are discussed. Data analytics provides patient-level knowledge regarding clinical care gap opportunities. These include needed preventive care such as immunizations, mammograms, colon cancer screening, as well as diagnosis-specific care such as HgbA1C or nephropathy screening for diabetic patients, spirometry for patients with COPD, PHQ9 to screen for depression, and PVD screening. We also cover medication adherence, controlled substance prescription issues, outstanding specialty/procedure referrals and patient social issues.

This same center team also meets at least once a month for patient care grand rounds, where the center’s highest-risk patients are discussed for clinical, pharmacy, behavioral health or social opportunities to improve their health.

Several members of this team are espe-
Care coach nurses manage all patients through post-hospital or post-skilled nursing facility care transition—with the goal of a clinician seeing those patients in the office within one week of discharge to try to prevent 30-day readmits.
Innovation

Health care involves asking patients questions about social determinants of health such as loneliness, food insecurity or transportation concerns. This is part of Humana’s Bold Goal Project to improve the health of selected communities by 20 percent by 2020 based on the Centers for Disease Control’s Healthy Days Survey. Kansas City is one of those designated Bold Goal Communities. Partners in Primary Care will be working with the Kansas City Bold Goal Team to “test and learn” an online resource system developed by Humana that identifies resources in close geographic proximity to where patients live. Another innovation is having community centers in the Partners centers; these are used by senior patients and non-patients for daily activities ranging from Silver Sneakers and health education programs to bingo—which can help to overcome isolation issues.

Finally, Humana and Walgreens partnered a “test and learn” national pilot here in Kansas City, where two full-service Partners in Primary Care centers have been co-located inside Walgreens stores since October 2018. These two centers feature external signage as well as a separate entrance from the Walgreens entrance. The goal is to help seniors improve their health and save costs by bringing together primary care, pharmacy support and other health resources all under one roof.

These are just some of the ways Partners in Primary Care is innovating and applying a “test and learn” approach to improve the health of seniors in Kansas City!

Stephen Salanski, MD, is Kansas City regional medical director for Partners in Primary Care and Transcend Population Health Management. He is a past president of the Kansas City Medical Society and current member of the Medical Society board of directors. He can be reached at ssalanski@transcendphm.com.
More Than a Protein Factory: A Role for Ribosomes in Regulating Human Gene Expression

Researchers from the Stowers Institute for Medical Research have discovered a new function of ribosomes in human cells that may show the protein-making particle’s role in destroying healthy mRNAs, the messages that decode DNA into protein.

“For a long time, many people have viewed ribosomes as a passive player in the cell—a molecular machine that’s just producing proteins,” says Stowers Assistant Investigator Ariel Bazzini, PhD. “Now there’s growing evidence that ribosomes regulate gene expression, including in human cells.”

These findings, which were recently published online in *eLife*, could lead to further understanding mRNAs role and the causes of gene misregulation in human diseases.

In the process of translation, ribosomes make proteins by serving as the site for the biological synthesis of them. Specifically, a ribosome reads codons—sets of three consecutive nucleotides—in an mRNA message to determine which amino acids to add to the growing protein chain. As part of this process, ribosomes also act as quality control, triggering the destruction of improperly made mRNA.

A growing body of evidence has shown ribosomes also play a role in affecting the stability (life) of properly processed mRNAs, thereby acting as a key factor in modulating mRNA stability, level of mRNA, and protein production. This had been shown in organisms such as yeast, E. coli, and zebrafish. In this study, researchers showed that ribosomes affect mRNA stability in human cell lines as well.

“Continuous investment in AI-enabled workflows, machine learning solutions and natural language processing are key ways we’re committed to ensuring the EHR remains a tool that helps physicians do their jobs and deliver the best care.”

A full profile of Stowers’ innovative research work will appear in the summer issue of Kansas City Medicine.

Cerner Utilizing Artificial Intelligence to Overcome EHR Challenges

Cerner—the Kansas City-based national leader in health IT innovation—announced it has introduced Chart Assist, a new artificial intelligence-enabled workflow, to join a suite of solutions designed to reduce physician burnout, enhance the clinician’s experience and increase productivity.

Cerner’s suite of AI-enabled solutions goes beyond traditional processing and focuses on user efficiency to identify gaps and inconsistencies within the patient record. These advancements will help providers address patient care and validate diagnoses, ultimately helping to reduce the physician workload, while supporting the financial strength of the health system.

Artificial intelligence is the use of computers to process large amounts of data to “learn” by detecting patterns or features of the data. Google search, the Amazon Alexa virtual assistant and self-driving cars are examples of AI being used to perform specific tasks.

“Our new AI-driven advancement will complement our existing workflows to enhance the physician experience. Our goal is to bring real change to the industry-wide challenge of physician burnout,” said Jeffrey Wall, MD, director and physician strategy executive, Cerner.

Recently, Cerner participated in a study with MedStar Health and the American Medical Association that is designed to help push for changes to address risks to patient safety and clinician burnout. The use of analytics, research and feedback are key to continuously optimize solutions to deliver a more personalized and intuitive care delivery experience, according to Cerner.

Dr. Wall added, “Continuous investment in AI-enabled workflows, machine learning solutions and natural language processing are key ways we’re committed to ensuring the EHR remains a tool that helps physicians do their jobs and deliver the best care.”
Professionals across the health care industry agree that the system needs to change in order to improve the delivery and quality of care. Innovative health care products and processes are bringing solutions to help tackle some of the toughest health care challenges, but we still have opportunities to do more.

At Blue Cross and Blue Shield of Kansas City (Blue KC), we understand that innovation is key to our success in this rapidly evolving health care landscape. As the chief innovation officer at Blue KC, I work tirelessly with our innovation team to design new care strategies that will improve the overall experience and health of our members.

**BLUE KC APPROACH TO INNOVATION**

Our team believes that innovation opportunities should emerge from and be connected to our mission, to provide affordable access to health care and to improve the health of our members. Our human-centered innovation approach, called “Launchpad,” is critical for solutions to have positive and significant impacts. We leverage a four-phase process to innovate, as outlined in the accompanying chart (Fig. 1).

The first phase, “investigate,” involves truly understanding the problem or opportunity. We often refer to this part of the process as “falling in love with the problem.” It involves research and dialogue with the end users who are affected by the problem and stand to benefit from potential solutions. This step frequently yields significant insights that point us in a direction we wouldn’t have pursued otherwise.

Phase two is “design,” which is fairly self-explanatory. During design, we leverage a number of tools and methodologies to build out ideas and concepts. Key to this phase is collecting input from the entire cross-functional team with a goal of inclusivity leading to an increased number of potential solutions.

Phase three is “experiment,” which is where we begin to define the most viable opportunities from the list of all potential solutions. Similar to the “investigate” phase, we leverage the end users to assist us in testing solutions. Just as they can help us articulate and understand the problem, they are in the best position to provide feedback as to which of our proposed solutions will best solve the issue.

Finally, the process concludes with “act,” during which we bring the solution to market. Often, this starts with a small pilot, to allow us to test and learn before committing significant time or resources to a full-scale solution. We often find that our first effort identifies opportunities for improvement; starting small allows us to make adjustments with increased speed and lower costs.

**EXAMPLES OF INNOVATION BY BLUE KC**

Using this process, Blue KC has launched and identified several viable solutions that will improve access to affordable health care and improve the health of our members.

- **Blue KC Healthcare Innovation Prize:**
  We partnered with the Regnier Institute...
for Entrepreneurship and Innovation at the University of Missouri-Kansas City Bloch School of Management to encourage the next generation of innovators and entrepreneurs in Kansas City to help drive the health care industry forward. The 2018 Healthcare Innovation Prize was awarded to a team that developed a better and more reliable medical ID bracelet called “BodyGuard ID.” The team recognized that efficient patient identification is necessary for patient safety and will support a decrease in deaths caused by medical errors. Blue KC is proud to have financially supported this team in securing their patent and enabling them to fund additional product development.

- **Transforming KC Health Grant:** We have also partnered with BioNexus KC to offer a research grant aimed at improving the health and wellness of those living in the Kansas City region. This year, the grant program aims to better understand the links between the socioeconomic, behavioral and environmental factors that shape our community’s health outcomes. For more information, visit www.BlueKC.com/HealthGrant.

- **Spira Care:** Spira Care combines primary care and insurance to give eligible Blue KC members simple, seamless access to health care. This consumer-centric experience was designed with an easy-to-understand, easy-to-use approach in mind. At Spira Care, there are no deductibles, no copays and no additional cost for any onsite procedures. The Spira Care experience takes place at care centers, where personal care guides help members navigate their health care. For more information, visit www.spiracare.com.

**CONTINUED INNOVATIONS LEAD TO CONTINUED GROWTH**

To learn more about innovation at Blue KC, visit The Blueprint, our corporate blog (http://blog.bluekc.com), where you’ll find more information on the Healthcare Innovation Prize, the Transforming KC Health Grant, Spira Care and other innovative initiatives at Blue KC.

Jason Spacek is vice president and chief innovation officer for Blue Cross and Blue Shield of Kansas City. He can be reached at jason.spacek@bluekc.com.
During a cardiac arrest or other high-risk situation, physicians and the care team face a stressful, chaotic scene while they also work to follow proper treatment protocols. An app from the Olathe startup Redivus Health aims to provide a roadmap through the chaos.

“Our mission is to save lives and prevent medical errors through next-generation clinical decision support,” said Redivus CEO and co-founder Jeffrey Dunn, DO, a KCMS member. Prior to going full time with Redivus, he was a hospitalist with Saint Luke’s Health System for eight years.

Redivus (pronounced RED-ih-vus) utilizes a mobile application that provides step-by-step guided workflow to assist physicians, nurses and other providers. Modules are available for cardiac arrest, stroke and sepsis. Dr. Dunn compares it to Google Maps for health care providers, with turn-by-turn navigation.

The Redivus app also documents each step taken, ensuring that records are complete and accurate. A designated staff member on the care team activates the app and inputs patient information.

“Our solution is designed to function on any device, in any environment or health care setting. It is EMR agnostic and has the capability to be launched outside the EMR or without a cellular connection,” Dr. Dunn described.

In cardiac arrest cases, for example, the app will direct staff to begin chest compressions, then count down two minutes for switching providers so no one becomes fatigued. It also directs medical staff when to use electric shock and follows national standards for what medications to administer and when.

Dr. Dunn added, “When providers use our solution, they can’t believe the difference it makes. The app empowers clinicians and gives them a strong feeling of confidence in high-stress situations. We’ve had physicians and nurses say they never want to run another code blue without our app.”

REDIVUS IN USE

Redivus developed a partnership in 2017 to pilot the use of the app with five northwest Kansas hospitals that are part of the University of Kansas Health System Heart and Stroke Collaborative. The app was also tested with the Kansas City Fire Department and Truman Medical Center residents.

“Already the Redivus app has helped our team spot and treat five times as many sepsis cases as we did two years ago,” said Hannah Schoendaler, Sheridan County Hospital chief nursing officer. “The app is giving us the confidence to make the diagnosis of sepsis and to treat our patients quickly, at our hospital, so they can recover and go home.”

Tom Collins, deputy chief of the Kansas City Fire Department, was part of the pilot of Redivus for cardiac arrest emergencies. He said, “Anything we can do to keep us on a timeline will help us with the outcome of the patient. This includes making sure the medications are being given every three minutes, making sure we’re changing out that responder, and more.”

Currently in the works are partnerships with Saint Luke’s Health System and Mercy Health System in St. Louis, Dr. Dunn said.

At Saint Luke’s, Redivus Health implemented a sepsis management screening program in 2017 that operates outside the electronic health records system. The goals of the pilot program were to identify sepsis patients at the transferring facilities, start treatment sooner and improve patient outcomes. The clinical decision support platform enabled transfer nurses to identify over 200 more sepsis cases, and it allowed for patients to receive time-critical treatment before being transported to a higher level of care. Mortality decreased by 30%, according to Saint Luke’s. ☉
HOW DID THE IDEA FOR REDIVUS HEALTH ORIGINATE?

In 2012, I was working as a hospitalist in a Kansas City-area hospital and responded to a code blue call on a 62-year-old patient whose heart had stopped. The initial people in the room were frozen with ‘adrenaline brain’ and not taking lifesaving action. We ran through the protocol the best we could, but we lost that patient.

Sadly, I learned first-hand that day how the choices we make as doctors, particularly in time-critical events, can be the difference between life and death. I immediately started thinking of ways this situation could be prevented and was inspired by apps like Waze and Google Maps, that took us from paper reference to a mobile application with turn-by-turn navigation, and I wanted to apply that to a medical crisis.

Soon after, I joined with our group of founders—all physicians—and began the process of developing Redivus.

WHAT WAS THE PROCESS OF DEVELOPING AND TESTING THE SOFTWARE?

Our team started with clinical process flow diagrams for cardiac arrest, stroke and sepsis that health care professionals typically use as reference. The Redivus team of medical clinicians worked with a user experience designer to turn those decision trees into a user-friendly interactive app.

We consulted with renowned medical experts to refine the diagnosis and treatment steps. Once we had a prototype, we extensively tested the effectiveness of the app in a simulation lab with paramedics, nurses and physicians. The simulation lab brings to life these high-anxiety, life-threatening scenarios with high-tech dummies acting as patients. We gained valuable feedback from our end users and continue to test our iterative changes in the simulation lab.

WHAT TYPE OF SUPPORT HAVE YOU RECEIVED FROM LOCAL STARTUP INCUBATORS?

We were fortunate to be part of the Kansas City Innovation Partnership Program in 2016. We’ve also participated in the LaunchKC competition in 2017, and in 2018 our company was accepted into Matter Health (Chicago), a health care startup incubator. This incubator has been an invaluable resource connecting us to the larger Midwest health care community to meet other innovators, potential customers and sources of capital. We’ve benefited from partnership with Kansas State University and our office is located on the K-State Olathe campus in the Johnson County Education Research Triangle. I’m currently a member of the 2019 Class of Fellows in the Pipeline Entrepreneurs program, and it’s a fantastic opportunity to learn from other successful entrepreneurs in the Midwest.

HOW HAVE YOU OBTAINED STARTUP CAPITAL?

We have raised a total of $4.5 million from friends, family and angels, mostly from the Kansas City area. We have not yet raised any venture funding.

PLANS FOR GROWTH?

To grow our business, we are targeting large health systems, specifically those that have a reputation for being innovative and committed to quality and patient safety. We are focused now on selling our product into those hospitals and health systems, as well as offering a seamless EMR-integrated solution for the most common EMR systems.

Our product offers real-time support to solve the key problems providers face when delivering emergency care. No other solution can provide this today.

HOW IS KANSAS CITY A GOOD PLACE TO LAUNCH A MEDICAL/HEALTH CARE STARTUP?

Kansas City has a vibrant and supportive startup community. It has a thriving tech community that makes it possible to find the right talent for our software development needs. With premier health care systems and biotech companies in the area, we have the resources to innovate and build a business that will make a difference in saving patient lives.

LEARN MORE: www.redivus.com
Navigating the health care system can be complex and overwhelming, from choosing a provider to accessing wellness resources. Overland Park-based ModRN Health has developed a system to help individuals navigate the clutter.

KCMS member Scott Roethle, MD, FASA, president and co-founder of ModRN Health, said, “Our innovative platform combines personalized clinical care by live providers and useful technology to connect patients to valuable health care resources. We use nurses and technology to fill the many gaps in health care and guide patients to true health outcomes.”

ModRN Health customers are employers, senior living centers and health providers who want to offer their employees, residents and patients a better health care experience. They use the ModRN Health service and platform as an enhancement to their current plans and programs.

ModRN Health has two primary components:
- Access to nurses and care advocates who help interpret the individual’s health needs and coordinate care. Each person on the ModRN Health platform is paired with a personal nurse-led care team that is dedicated to promoting patients’ rights and assuring access to all available resources, support and education as a person navigates the health care system.
- A mobile application through which individuals engage and follow personalized care plans and track their personal health record, which includes note-taking, information sharing and decision making. The nurse-led care teams utilize the app to engage and communicate to the individual patient’s needs and care plan.

In addition, ModRN Health’s technology supports long-term aggregation of patient data across multiple health information sources; enables the analysis of that data into a single, actionable patient record; and delivers insights to help customers improve both clinical and financial outcomes.

“Our primary goal is to increase patient activation in regards to health, and to simplify and unify the many resources and tools to solve their health care needs. Our interactive software platform was built to encourage patient engagement, and allows our nursing care teams to appropriately interact with each patient in a personalized manner,” Dr. Roethle said.

The mobile application utilizes the Patient Activation Module (PAM), developed by University of Oregon and licensed by Insignia Health, which measures each individual’s personal level of engagement in their health care.

“This measure allows us to personalize our interaction and the messages we deliver,” Dr. Roethle explained. “This level of activation and engagement is separate from the patient’s health status or disease state, and has more to do with their involvement, pro-activity, health literacy and social determinants of health. By using this well-researched and validated PAM measure, we then incorporate our Coaching for Action (CFA) tools to personalize, educate and promote individual patient engagement in health and health care.”

He continued, “Although there is no shortage of tools or resources available for patients, most people don’t know what to use or how to use those tools to make it relevant to their health outcomes. Our platform functions as a central hub of the most useful health care resources.”

Also available are bundled service for telemedicine physician visits, a prescription savings and discount tool, tele-dentistry for acute dental needs, partnerships with direct primary care providers, and other items in development. Nutrition and recipe guidance is being developed, and eventually the app will integrate with wearables and connected health care devices to help patients share data.

ModRN Health was beta tested last year with several small business employers, and its first full version was launched this year. The company now has several local small business clients on board and more in the pipeline.

Dr. Roethle is involved with several other innovative ventures focused on healthy living and sustainable life improvements, including Dr. Scott LLC and In2Great KC Integrative Health. Formerly with Anesthesia Associates of Kansas City, Dr. Roethle continues to practice anesthesia at Bothwell Regional Health Center in Sedalia.
HOW WAS THE NEED IDENTIFIED AND WHEN DID THE IDEA ORIGINATE?

The original concept of ModRN Health as scaled care coordination was developed by CaRessa Hutchinson, RN, after years of seeing her patients and their families struggle through the health care system and experience great difficulty in achieving positive health outcomes. It has long been apparent to both of us that the health care system is complicated, fragmented and extremely expensive. We often fail to achieve true health despite this complexity and great expense. CaRessa originally founded the company under a different name in 2015, and she laid some of the conceptual groundwork to make nursing and care coordination scalable and readily available outside of the confines of our typical health care system and clinic visit structure. The concept and company have evolved and grown greatly over the past several years.

As a physician anesthesiologist, I see many of these same issues daily in the peri-operative setting, and I have always been interested in improving health care delivery and outcomes beyond what our “sick-care” model typically delivers. Too much of what we do is reactionary and only addresses symptoms of complex diseases, not the underlying problems and disease processes, nor the lack of true health.

We also realized that simply having health benefits or health coverage (insurance) does not necessarily mean that people actually have or get good health care. We work with small businesses and their employees, who often are underinsured and/or can’t utilize the health care system due to increasing out-of-pocket expenses. Our model is to help these companies and their people get appropriate care at reasonable costs, by shifting to value-based care and ongoing health management to decrease health care expenditure.

WHAT WAS THE PROCESS OF DEVELOPING AND TESTING THE SOFTWARE?

We developed a basic product last year on a shoestring budget and tested it with several small businesses. We have since launched our updated first version ModRN Health platform and app, allowing us to work with local small businesses and their employees, along with individual members, providers and clinics, to support their health care needs. We continue to test, learn, and develop our platform, and recently started developing version 2.0 to roll out late this year, as we aim to scale our membership into the tens of thousands widely across the country.

WHAT TYPE OF SUPPORT HAVE YOU RECEIVED FROM LOCAL STARTUP INCUBATORS?

We have not been through any official incubators or accelerators, but we have worked with some amazing people and groups in the Kansas City startup community. We are blessed to have a great network of prominent supporters and some amazing mentors and advisers that have helped us greatly over the past couple years. We are also working with some great local companies with expertise in technology development, marketing and business growth.

HAVE YOU OBTAINED STARTUP CAPITAL?

Now that we launched our platform and actively market our services, we have the ability to officially pitch for investors to help us grow. In February, we were invited and presented at Startup Grind Global in Silicon Valley, where we had great reception and connected with a number of investors and businesses across the country. We are very hopeful to obtain investor support from the Kansas City startup and health care communities this summer.

PLANS FOR GROWTH?

We have amazing plans for growth! Our twelve-month goal is to sign 10,000 members, mostly in the Kansas and Missouri markets. Additional capital will help us expand nationwide more quickly. We fully believe that a realistic five-year trajectory could produce $100 million in revenue and opportunities to help many thousands of people improve their health and reduce costs in care.

HOW IS KANSAS CITY AS A GOOD PLACE TO LAUNCH A MEDICAL/HEALTH CARE STARTUP?

CaRessa and I both have great connections to Kansas City and the health care community here. The startup and entrepreneurial community is quite close-knit and supportive, despite the limited amount and conservative nature of startup capital available. We are excited to help many businesses and people here in Kansas City and well beyond.

LEARN MORE: www.modrnhealth.com
Medical research and innovation are transforming not only the future of clinical care and treatment, but also how academic health centers are educating and training the next generation of physicians, nurses and health professionals. For the University of Kansas Medical Center, innovation and research are among the central tenants of our mission—to improve lives and communities in Kansas and beyond through innovation in education, research and health care.

As one of 62 invited members of the prestigious Association of American Universities (AAU), research has always been an important component of scholarly activity at the University of Kansas. In fact, KU is one of only 26 U.S. universities that have a National Cancer Institute-designated cancer center, a National Institute on Aging-designated Alzheimer’s disease center and a National Institutes of Health Clinical and Translational Science Award (Fig. 1).

These three prestigious federal awards, initially awarded in 2011 and 2012 and renewed in the last few years, have helped secure our position as a serious academic research center. Peer institutions around the country now are aware of the scientific research talent we have at KU Medical Center and in the region. We are proud to be a relevant part of the national conversation regarding the direction of research and how the United States can remain the world’s leader in scientific advances, particularly in medicine and health.

**RESEARCH**

Research and Innovation at the University of Kansas Medical Center

GROWING RESEARCH THROUGH EDUCATION AND COLLABORATION

By Richard Barohn, MD, and Jamie Caldwell, MBA

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**NATIONAL INSTITUTES OF HEALTH DESIGNATION AWARDS**

<table>
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<tr>
<th></th>
<th>KU CENTERS</th>
<th>FEDERAL FUNDING SOURCE</th>
<th>CURRENT FEDERAL FUNDING PERIOD</th>
<th>OTHER UNIVERSITIES CURRENTLY FUNDED</th>
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<td>National Center for Advancing Translational Sciences</td>
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**NIH RANKINGS**

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**TRANSLATIONAL RESEARCH - RELEVANT TO HEALTH**

Much of the research taking place in these centers and institutes and throughout KU Medical Center is translational research. Translational research is a relatively new term that resulted from a National Institutes of Health (NIH) initiative to promote research relevant to patients and their health issues, as opposed to basic science laboratory research with no direct relation to health or disease.

Translational research ranges from laboratory work in test tubes and animal models to human drug or device treatment trials. It includes drug and device trials to determine if a new therapy is indeed effective, as well as outcomes research and research in community settings that help us determine whether we are really chang-
In fact, KU is one of only 26 U.S. universities that have a National Cancer Institute-designated cancer center, a National Institute on Aging-designated Alzheimer’s disease center and a National Institutes of Health Clinical and Translational Science Award.
Center has dramatically increased the number of clinical trials we can offer patients in the region, thanks in large part to the strong national reputation of our investigators who are sought out for national, industry-sponsored clinical trials. In fiscal year 2014, we had 609 trials with a KU Medical Center site; and in fiscal year 2019, we anticipate exceeding 1,000 clinical trials (Fig. 3).

To support the university’s aggressive research goals, leadership is evaluating infrastructure and faculty needs, including space, technology and training. Another key part of the equation is identifying faculty not currently engaged in research, but who show promise as future researchers, as well as recruiting accomplished research scientists to KU Medical Center.

While the university is laying the groundwork for continued research growth, it is the passion and the creative initiative of our individual faculty members who are investigating and developing the therapies and cures of tomorrow that are helping KU make its mark in the world of research.

CURRENT KU RESEARCH WORK
Innovative research is taking place throughout KU Medical Center. Here are a few examples that highlight the significant studies bringing new therapies to Kansas and beyond.

Fighting Obesity in Rural Areas
Christie Befort, PhD, associate professor of preventive medicine and public health at the KU School of Medicine, is leading a research team at the University of Kansas Medical Center to study the comparative effectiveness of obesity treatment options in rural communities.

A Focus on Prevention
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 are (above left) Jeffrey Burns, MD, and (above right) Russell Swerdlow, MD, both professors of neurology at KU Medical Center; they focus on exercise and brain metabolism as ways to potentially stave off the disease.

Dr. Burns said previous research on the role of exercise and brain health has proved inconclusive, largely because of inconsistency among how the studies were conducted. That is why researchers at the KU Alzheimer’s Disease Center are teaming up with scientists from the University of Pittsburgh and Northeastern University to conduct the study known as IGNITE: Investigating Gains in Neurocognition in an Intervention Trial of Exercise—the largest, most comprehensive study ever on the role exercise plays in brain health and cognitive decline in older people.

The five-year, $21.8-million study, funded by a grant from the National Institute on Aging, focuses on how specifically prescribed exercise affects cognitive performance. It also looks at biomarkers linked to Alzheimer’s and structural and protein changes in the brain.

Investigational Bladder Cancer Drug First Developed by KU Cancer Center
The University of Kansas Institute for Advancing Medical Innovation (IAMI) transforms biomedical discoveries into drug, diagnostic and medical device innovations. IAMI is partnering with CicloMed, LLC, on the development of the Ciclopirox Prodrug, a novel targeted agent for the treatment of bladder cancer. This drug is in the pipeline now to become...
the first KU-invented cancer drug to span the entire translational process, from discovery to development, and ultimately to patients.

Bladder cancer is a devastating disease and ranks as the fourth-most common cancer in the United States for men, and the sixth-most common cancer for men and women combined. Because of the high risk of recurrence, disease progression and required life-long surveillance, bladder cancer is the most expensive cancer to treat on a per-patient lifetime basis. Ciclopirox Prodrug is the first drug in nearly 40 years developed specifically to fight this disease.

Since this partnership with CicloMed began in 2016, the investigational treatment has been tested in Phase I and II clinical trial at several clinical sites, including the University of Kansas Cancer Center.

Half-Century of Research Lays Groundwork for First PKD Treatment

A drug with a decades-long history of research and testing at the University of Kansas Medical Center has been approved by the Food and Drug Administration as the first treatment for autosomal dominant polycystic kidney disease, the most common form of polycystic kidney disease (PKD). The two forms of PKD—autosomal dominant (ADPKD) and autosomal recessive (ARPKD)—affect 600,000 people in the United States and millions worldwide.

In April 2018, the FDA approved the use of tolvaptan, a targeted treatment that has shown it can slow both the growth of cysts on the kidney and the progression of the disease. While tolvaptan is not being touted as a cure, it is a significant breakthrough in the treatment of PKD.

KU Medical Center researchers were involved in the development of tolvaptan, including the late Jared Grantham, MD, who co-authored a paper in the New England Journal of Medicine based on a three-year international study showing tolvaptan to be an effective treatment for kidney disease. @

Richard Barohn, MD, is vice chancellor for research at the University of Kansas Medical Center and is president of the University of Kansas Medical Center Research Institute. He also is director of Frontiers: University of Kansas Clinical and Translational Science Institute. He can be reached at rbarohn@kumc.edu.

Jamie Caldwell, MBA, is associate vice chancellor for research administration and executive director of University of Kansas Medical Center Research Institute. He can be reached at jcaldwell4@kumc.edu.

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The University of Missouri-Kansas City School of Medicine has an outstanding portfolio of research activities, including studies to reduce surgical errors, development of a visual test to identify Alzheimer’s disease, engineering new treatments for glaucoma, and more. The School of Medicine is also deeply dedicated to improving health in our community by working with our community partners to develop culturally tailored health promotion interventions for underserved African American populations.

It is a priority of the School of Medicine to perform cutting-edge research that improves the health and well-being of individuals and populations through stimulating innovative educational programs in medicine and biomedical science, cutting-edge biomedical research and leadership in academic medicine. It is a priority of the School of Medicine to aggressively recruit new NIH-fundable investigators who can lead interdisciplinary teams that integrate basic and clinical research to promote bench to bedside translation.

Following is a summary of some of the exciting research under way.

**HARNESSING MEDICINE, ENGINEERING, COMPUTER SCIENCE AND THEATRE TO REDUCE SURGICAL ERRORS**

More than 200 million surgeries are performed annually worldwide, and preventable errors during those surgeries have the potential for devastating injury. Preventable complications occur in up to 22% of cases, with permanent disability/mortality rates between 0.4-0.8%. Errors of judgment, omission, wrong order and technique can plague even the most experienced surgeons, leading to poor outcomes, decreased satisfaction, reoperation, even death and subsequent litigation.

Surgeons certainly are concerned about avoiding surgical errors. Gary Sutkin, MD, MBA, professor, associate dean of women’s health and Victor and Caroline Schutte Chair in Women’s Health, leads a multidisciplinary team of researchers at the schools of Computing and Engineering, Nursing and Health Sciences and the Conservatory of Music and Dance to study two areas of error prevention: communication between operating room inter-professional team members and prevention of individual surgeon error.

Miscommunication remains a leading cause of surgical error, and the operating room (OR) is a sound polluted environment, including a cacophony of beeps, squeals and drones, encompassing all sounds, from machinery to conversations, necessary and accidental. Precise communication between surgical team members is vital to completion of a safe surgery. Yet operating room sound during surgery frequently exceeds OSHA work-place standards. Source: Centers for Disease Control and Prevention.

**Fig. 1. Occupational Noise Levels.** Noise levels commonly experienced in an OR frequently exceed OSHA workplace standards. Source: Centers for Disease Control and Prevention.
Dr. Sutkin anticipates that their research will result in future ORs being designed like concert halls, such that auditory distractions are minimized.

Workday. OSHA further recommends that individuals should not be exposed to sound levels over 100dBA for more than 15 minutes per day. Yet despite these recommendations, these levels are sustained well beyond 15 minutes per day within an operating room. Sound decibels within operating rooms often exceed that of interstate traffic (90dBA) or a jet engine 200 feet away (130dBA)! Sound levels increase with the number of individuals present within the OR. In some especially noisy orthopedic surgeries, sound levels can exceed 100 dBA for more than 40% of the procedure. Even routine staff conversation can produce noise levels of 78 dBA.

As health care work environments become increasingly infiltrated with machines, conversations and ambient noise, it raises a critical question: How are surgical team members supposed to overcome the considerable ambient noise and achieve accurate communication? How do they hear what needs to be heard? This question has significant implications for patient safety in an operating room.

Dr. Sutkin and his collaborators are creating a modifiable simulated OR soundscape, based on recorded sounds from live ORs. They plan to use spectral analysis to compare specific combinations of sound sources of equipment and case-relevant conversation. Multi-channel recording will allow them to compare, for example, the spectrum of background conversation with the instructions of the surgical team, to determine the level of interference caused.

Going forward, the data collected in this project can be used for making recommendations for reducing sound levels in the operating room that may result in an acoustically superior operating room. If the auditory surgical environment can be better analyzed, a realistic virtual reality simulation experience that recapitulates the actual OR auditory environment can be created. Dr. Sutkin anticipates that their research will result in future ORs being designed like concert halls, such that auditory distractions are minimized through best performance practices, and the surgical team is given the opportunity to care for the patient in a safe soundscape environment.

A second area of research focuses on injury from erroneous surgeon movement. Dr. Sutkin holds that the lead surgeon bears responsibility for such errors and that approaches aimed at preventing individual errors are necessary to effectively lower surgery-specific error rates. While large-scale prevention should focus on improving the training of surgeons, we must first understand individual surgical error. This relies on a granular understanding of the finite technical aspects of individual surgeries.

In Dr. Sutkin’s Surgical Innovation Laboratory, they study the biomechanics of individual surgeon error by quantifying the individual movements of a surgeon responsible for a surgical error. His team uses virtual and physical anatomic models, simulation of surgical injury and kinematics to define and measure these surgical errors. The Surgical Innovation Laboratory is creating a high-fidelity simulator to identify surgical errors and correlate those errors to surgeon motions.

The project presents four foundational shifts in the prevention of surgical error:

• Addressing surgical safety through prevention of individual errors
• Transforming simulation training from learning the steps of a surgery to learning how to prevent common errors
• Linking the biomechanics of the surgeon to individual errors
• Creating a high-fidelity pelvic simulation system, with anatomic detail unlike any available model

This methodology can be applied to other surgeries and will revolutionize the prevention of individual errors. When a surgeon performs a surgery for the first time on a live patient, he or she is anxious to avoid injury. If a step is forgotten, the supervising surgeon will issue a reminder. If a blood vessel is lacerated or a nerve is cut, damage may be permanent. This methodology can revolutionize how both resident and community surgeons learn to prevent surgical errors through simulation.

The ultimate goal will be to assess whether these methodologies will translate into decreasing surgical errors. Dr. Sutkin’s team expects that their results will translate into subsequent intra-operative technology, namely: development of real-time, intraoperative feedback for the surgeon on the position of the instrument and arm kinematics in regard to the like-

(continued)
lihood of a surgical error; image-guided interventions, including tracking surgical tools inside the body, tested first on cadavers; intraoperative tissue deformation technologies; and translation to other surgical procedures.

The research teams are interdisciplinary, allowing for a multi-dimensional approach to question assumptions in a non-reductive manner and to critically and creatively find solutions. Their team includes a surgeon (MD), two mechanical engineers, a biologist, a cognitive psychologist, an artist/humanities scholar, a medical student, a sociologist/medical educator and a composer/sound artist. Multiple members of this team have already collaborated through the Surgical Innovation Laboratory on projects dedicated to patient safety in the operating room.

Dr. Sutkin and his team have an imperative to make surgery safer. Current efforts largely focus on a systems approach to surgical safety, commonly used for preventing human errors in other high-stakes environments, such as aeronautics and aviation.20 The adoption of a “culture of safety” in the OR21 has resulted in error reduction that is modest at best.22 Through research in surgeon biomechanics and team communication, we hope to lower the error rate and make surgery safer.

A RAPID VISUAL TEST FOR NON-SYMPTOMATIC ALZHEIMER’S DISEASE

Peter Koulen, PhD, FARVO, professor and Felix and Carmen Sabates, Missouri Endowed Chair in Vision Research, along with director of basic research at UMKC’s Vision Research Center, uses basic science to develop new therapeutic approaches to common diseases of the eye and brain. Dr. Koulen recently received a patent for a non-invasive, rapid screening test to diagnose mild cognitive impairment and pre-symptomatic Alzheimer’s disease (Fig. 2).

Using microperimetry, a technology that is already widely used by ophthalmologists, Dr. Koulen’s team had spent several years developing a database baseline of healthy retina function that can be applied to identify major eye diseases affecting the retina such as glaucoma, macular degeneration and diabetic retinopathy. Through these studies, Dr. Koulen identified baseline deviations from normal aging values that are linked to early-stage Alzheimer’s and mild cognitive impairment. This technology has the potential to allow physicians to identify patients before onset of neurological symptoms. UMKC is working with a Kansas City based startup company to obtain FDA approval for the novel diagnostic tool and to make it available to health care providers and patients.

A NOVEL THERAPY TO PREVENT VISION LOSS IN GLAUCOMA

Addressing a different urgent clinical problem, glaucoma, which is the second leading cause of vision loss, Dr. Koulen’s research team harnesses the strength of basic science to develop new drugs that have the potential to protect the eye from vision loss. Once acquired, glaucoma is a lifelong disease, with therapies that often fail over time despite diligence by the patients and their physicians.

Recognizing the great clinical need for a more efficient treatment, Dr. Koulen’s research focuses on pharmacological approaches that prevent degeneration of the most sensitive visual cells in glaucoma, retinal neurons. Dr. Koulen’s team has identified a novel therapy that has the potential to be both preventative and therapeutic, and can work in combination with pressure lowering drugs. Preclinical testing of this new therapy is currently ongoing and will identify its therapeutic potential with the hope of moving this treatment to clinical trials as an effective glaucoma therapy.

Dr. Koulen continues to expand UMKC’s Vision Research Center and its research expertise by recruiting investigators that use innovative approaches to diseases of the visual system. The newest member of the Vision Research Center is Karl Kador,
PhD, assistant professor of biomedical sciences and ophthalmology. A bioengineer, he is using 3D bio-printing to create whole retinal constructs including natural vascular network with appropriate optic nerve innervation that can be used for in vitro screening of pharmaceutical therapies for the treatment of diabetic retinopathy. Dr. Kador is also developing this technology for use as whole tissue replacements for patients requiring eye enucleation as a result of trauma or tumor formation.

Since joining the Vision Research team, Dr. Kador was awarded almost $2 million from the National Institutes of Health and a $75,000 Research to Prevent Blindness International Research Collaborators Award to support his research exploring tissue engineering techniques to transplant new retinal ganglion cells into the retinas of patients with end-stage glaucoma.

**SYNTHETIC GLUCOCORTICOIDs: PRE-SERVING PULMONARY BENEFITS WHILE PROTECTING THE BRAIN**

Pre-term birth occurs in approximately 12% of pregnancies and is more common in women from economically disadvantaged communities, particularly those of black and Hispanic origin. Fortunately, the life-threatening, emotional and economic burdens of premature birth have been greatly alleviated by antenatal treatment with synthetic glucocorticoids such as betamethasone and dexamethasone. While antenatal sGCs reduce respiratory distress syndrome, intraventricular hemorrhage and necrotizing enterocolitis in premature infants, they can affect developmental processes in the brain and trigger adverse behavioral and metabolic outcomes later in life.

An interdisciplinary team is examining the long-term impact of in-utero synthetic glucocorticoid on solid organ, brain and behavioral outcome. Paula Monaghan-Nichols, PhD, associate dean for research and chair of biomedical sciences at the School of Medicine, collaborates with an interdisciplinary team including:

- Dev Maulik, MD, PhD, professor and chair of the Department Obstetrics and Gynecology at Truman Medical Center;
- Donald DeFranco, PhD, professor of pharmacology at the University of Pittsburgh School of Medicine;
- Anthony Rudine, MD, neonatologist, director of research for neonatal services, St. David's Medical Center, Austin, Texas; and

- Tim Cole, PhD, associate professor of biochemistry and molecular biology, Monash University, Australia.

Their goal is to identify the molecular and cellular targets of synthetic glucocorticoid action in the lung and brain in human and animal models. Their National Health Institute-funded studies have shown that prenatal exposure to synthetic glucocorticoids triggers sex-specific long-lasting neurodevelopmental changes in brain architecture that are associated with changes in anxiety and depressive behaviors in adult mice. Comparative studies in the lung and brain will identify pathways that are unique to each organ enabling targeted therapeutic approaches that maintain the positive benefits for lung maturation while limiting the detrimental effects on the brain. Extending their studies to infants exposed to prenatal synthetic glucocorticoids, they hope to identify novel biomarkers that predict outcome in children exposed to this widely applied antenatal pharmacotherapy.

**MOBILIZING COMMUNITY LEADERS TO USE FAITH-BASED INITIATIVES TO IMPROVE COMMUNITY HEALTH**

Jannette Berkley-Patton, MA, PhD, associate professor in the Department of Biomedical and Health Informatics, director of the UMKC’s Community Health Research Group and director of UMKC’s Health Equity Institute, is a nationally recognized expert researcher in Minority Health and Health Disparity with emphasis on African American communities. She recently received the University of Missouri System President’s Award for Cross Cultural Engagement, recognizing her long-standing efforts engaging with faith-based and community partners to develop culturally tailored health promotion interventions in underserved African American communities.

Dr. Berkley-Patton’s research is a unique combination of passion, community service, scientific excellence and dedication that has received over $7 million in grant awards from the National Institutes of Health, the Robert Wood Johnson Foundation and other private agencies. It is notable that the majority of her research funding directly supports her faith-based and health community partners with staff, stipends, participant reimbursements and, most notably, equipment and training that (continued)
can be sustained—and improve community capacity to address health beyond the life of the research. Another crucial feature is the involvement of community advisory boards to identify health priorities, address cultural appropriateness, and develop feasible intervention strategies that are delivered by church and community members.

One initiative, "Taking it to the Pews" (TIPS), is a religiously tailored project that provides education on HIV and other sexually transmitted diseases, along with prevention and testing in African American churches. Furthermore, Project "Faith Influencing Transformation" (FIT) is a comprehensive collaboration between the KC FAITH Initiative Community Action Board, specially trained church liaisons and UMKC School of Medicine student facilitators. Working in African American churches, they address priority diseases in their community such as diabetes, heart disease and stroke. They provide religiously tailored information in church settings such as health brochures and risk checklists. They also conduct health screenings and weekly guided weight loss programs for patients with diabetes, directly linked to care facilities at partner institutes such as Children’s Mercy Hospital and KC CARE Health Center. These programs have already shown promise for weight loss, increased social support and improved interactions with health care professionals.

Dr. Berkley-Patton’s rare ability to develop the balanced combination of scientifically rigorous methods with culturally appropriate and community-based interventions has resulted in confidence and trust from both the scientific and lay communities, creating opportunity to expand to other cultures, community settings and chronic health conditions including diabetes, heart disease and stroke. She has recently extended her community research to engaging faith leaders in Jamaica, West Indies. This year, she conducted a health needs assessment with five churches and nearly 250 church members which identified diabetes as the priority health issue they want to address.

Dr. Berkley-Patton has been formally honored seven times with local and national awards or recognition related to her sustained cross-cultural engagement accomplishments. In addition to the distinguished UMKC Chancellor’s Award for Excellence in Community Engagement and UMKC Trustees Faculty Fellowship Award, she has received recognition from the community including the Health Department of Kansas City, Mo., and a local magazine. She is frequently invited to make national and regional presentations, including presentations at NIMH, about conducting community-engaged research. Her most notable honor directly relates to her national community-based HIV research reputation; this occurred when she was invited to the White House to participate in the discussion of the national response to HIV stigma through research.

Paula Monaghan-Nichols, PhD, is professor and associate dean for research administration, and chair of the Department of Biomedical Sciences at the University of Missouri-Kansas City School of Medicine. Her areas of interest are community and family medicine, neurology and pediatric oncology. Her research focuses on prenatal basis of neurological and behavioral abnormalities. She can be reached at nicholasap@umkc.edu.

REFERENCES


The new building reflects a culture that embodies a new way of working together—not in the silos of closed labs or in divisions based on specialties, but in cross-functional teams aligned to benefit children.

For more than 120 years, Children's Mercy has been involved in clinical care, academics and research to improve health outcomes for children. Today, the hospital is breaking down the traditional barriers between medical care and research, with a focus on team science and collaboration. Through the Children's Research Institute (CRI), faculty and staff are committed to translational research that will improve care at the bedside today and in the future.

A new research building, home to the CRI, is currently under construction and has been carefully designed so research and clinical care come together. The new building reflects a culture that embodies a new way of working together—not in the silos of closed labs or in divisions based on specialties, but in cross-functional teams aligned to benefit children.

This work is already going on today in research studies across all specialties, complemented by the hospital's foundation of nationally recognized expertise in clinical pharmacology, genomics and health outcomes. The following examples highlight a few areas where Children's Mercy is leading and partnering with other institutions to transform pediatric care for children here and around the world.

**PREDICTIVE MODELS IMPROVE OUTCOMES IN PEDIATRIC T1D PATIENTS**

Studies of type 1 diabetes in patients under 20 show that poor disease control at any age significantly raises lifetime risk of serious complications. **Mark Clements, MD, PhD,** endocrinologist and medical director for the Pediatric Clinical Research Unit at Children's Mercy, is leading a project to determine whether doctors can predict which patients are at risk of poor outcomes.

Project partners Children's Mercy and the Joslin Diabetes Center in Boston teamed up with the machine learning-powered performance improvement company Cyft, Inc. Together they developed models that can be used to detect and alert caregivers of opportunities to intervene with patients at risk for near-term deterioration in their health.

Based on early predictions from the new model, the team has been able to offer immediate alternate pathways of care for those at high risk of poor outcomes. The

(continued)
first intervention is currently being piloted at Children’s Mercy.

IDENTIFYING THE IMPACT OF GENETIC VARIANTS ON SYSTEMIC STEROID RESPONSE IN PRETERM INFANTS AT RISK FOR BPD

With increasing survival of the most premature infants, rates of bronchopulmonary dysplasia (BPD) are rising. A common preventive/therapeutic medication for BPD is systemic corticosteroids, but the clinical response to the medication in preterm babies is highly variable and unpredictable.

Tamorah Lewis, MD, PhD, neonatologist and pharmacologist at Children’s Mercy, led the first-ever pharmacogenetic study in preterm infants. The goal of this retrospective study was to uncover potential genetic variants within babies’ DNA that can predict which infants will respond favorably to treatment. Dr. Lewis and her team identified an SNP called CRHR1, a genetic variant that was associated with systemic steroid response in preterm infants.

To advance the understanding of this genetic variant and to advance their steroid pharmacogenetic program, Dr. Lewis and the team at Children’s Mercy have launched a prospective cohort to continue this line of study.

NIH-FUNDED CKiD STUDY BEGINS NEW PHASE

The national, multicenter Chronic Kidney Disease in Children (CKiD) study and Children’s Mercy were recently approved to receive an additional $4.8 million of funding by the National Institutes of Health over the next five years, making 20 consecutive years of funding. Led by Bradley Warady, MD, director of the Division of Pediatric Nephrology and director of dialysis and transplantation at Children’s Mercy, CKiD is currently enrolling its third patient cohort.

The new phase of the study will focus on the full spectrum of the disease, enrolling children with early chronic kidney disease (CKD) during infancy, as well as continuing the study of those children who progress to kidney failure, requiring dialysis and transplantation.

To date, the study has resulted in:
- Creating a better glomerular filtration rate (GFR) estimating equation for children with CKD.
- Better defining risk factors for progression of CKD.
- Recognizing the prevalence and severity of cardiovascular disease in children with CKD.

NIH-FUNDED STUDY IDENTIFIES GENETIC LINKS TO NEC IN PRETERM BABIES

Although significant advancements have been made in the care of premature infants, outcomes for babies that develop necrotizing enterocolitis (NEC) have remained unchanged. In fact, they may even be getting worse, as many who develop NEC do not survive.

Venkatesh Sampath, MBBS, medical director of the Donald Thibeault Lung and Immunology Laboratories at Children’s Mercy, is leading an ongoing study of the immunogenetic basis of NEC in preterm babies. His work, funded by the NIH, is offering important new insights into the pathogenesis of NEC and creating the potential for more targeted care of infants with inherent susceptibility. To date, Dr. Sampath and his colleagues have been able to identify two genetic links to NEC: ATG16L1 and SIGIRR.

Dr. Sampath and his team have received a new NIH award of $2.6 million over five years to study the role of the SIGIRR gene in NEC.

OPTIMIZING MEDICATIONS FOR PATIENTS WITH CEREBRAL PALSY AND OTHER DISABILITIES

Matthew McLaughlin, MD, pediatric rehabilitation medicine specialist and clinical pharmacologist, recently received a K12 grant from the NIH National Center for Medical Rehabilitation Research to investigate the variability of oral baclofen concentration between the blood and cerebrospinal fluid in pediatric patients with cerebral palsy (CP). Oral baclofen crosses the blood-brain barrier to act on the GABA-B receptors in the brain and in spinal cord to treat spasticity/muscle tightness in patients with CP, spinal cord injury and traumatic brain injury.

Ultimately, this helps researchers understand how medications move from a peripheral compartment to the central compartment, where many prescribed medications actually act, but where little is known. This model could help further the understanding of all medications that act centrally, such as opioid pain medications, benzodiazepines or anti-epileptic medications. Investigating these centrally acting medications closer to the site of action remains challenging, but possible. Opportunistically collecting samples from cerebrospinal fluid allows these researchers a glimpse into the way these medications move throughout the body.

This grant will also investigate the rate of oral baclofen clearance based on a patient’s known genotype. Dr. McLaughlin
This model could help further the understanding of all medications that act centrally, such as opioid pain medications, benzodiazepines or anti-epileptic medications.

has identified a single-nucleotide polymorphism in ABCC9, which resulted in double the rate of oral baclofen clearance. With this increased clearance, patients may not receive the same plasma concentration as someone receiving the same dose. Patients entering this single-dose pharmacokinetic study to measure baclofen clearance will be genotype-stratified, which means they will be selectively enrolled for their known genotype. This research design allows for individually identifying certain genotypes prior to entering the study, which makes it more scientifically sound and financially feasible to conduct studies like this.

“CHAMP” IMPROVES OUTCOMES FOR INTERSTAGE SINGLE-VENTRICLE PATIENTS

In 2014, Girish Shirali, MBBS, FACC, FASE, division director of cardiology, and the team at the Ward Family Heart Center at Children’s Mercy, created the Cardiac High Acuity Monitoring Program (CHAMP). Since the development of the program, including a proprietary home monitoring app, the mortality rate for babies with single-ventricle heart defects being followed by CHAMP has been reduced to 2.4%, compared to a national average of 10-20%. The team has worked with nine additional sites across the country to help them implement CHAMP, so today babies in 17 states are using the home monitoring technology.

The CHAMP app is currently used on a tablet loaned to the family, but to create a more consumer-friendly approach, work is underway to create a platform-agnostic model of the app.

ADVERSE DRUG REACTION RESEARCH

Jennifer Goldman, MD, director of the Antimicrobial Stewardship and Drug Safety Service at Children’s Mercy, is leading studies related to adverse drug reactions in children. In addition to her recently funded R01 study investigating the mechanisms of Bactrim (trimethoprim and sulfamethoxazole)-related hypersensitivity reactions, the prospective, active adverse drug reaction surveillance program at Children's Mercy is unique among children's hospitals in the United States.

The program, which is led by Dr. Goldman, ensures that accurate data is collected for causality assessment for patient care, while ensuring the format of the data collected can be retrieved for research purposes. The clinical program is accompanied by an IRB-approved protocol to enroll patients with adverse drug reactions for collection of biological samples for future research.

A MORE EFFECTIVE APPROACH TO TREATING EoE

Although eosinophilic esophagitis (EoE) is rare, Children’s Mercy and other hospitals across the country have seen an increase in prevalence in the past 20 years. The medication typically used to treat it, budesonide, is a liquid that must be mixed with something to thicken it to a viscous slurry before the child is asked to swallow it. Unfortunately, the medication can be quickly washed away from the tissue where it is needed. Rachel Chevalier, MD, pediatric gastroenterologist at Children's Mercy, is leading an effort to develop a more effective method of delivering medication to the esophagus.

Dr. Chevalier began her work by identifying an appropriately sticky substance—sodium alginate, a polymer that is FDA-approved for use in a variety of medications and food items. She then developed a method to embed the EoE medication into the polymer. Next, Dr. Chevalier fabricated coin-shaped discs that would not be easily dislodged from the walls of the esophagus. These discs are designed to slowly release the medication as they dissolve. Now, Dr. Chevalier is testing the new delivery method using a pig esophagus model, which is similar to the human esophagus. Although this study is still in the early laboratory phase, Dr. Chevalier hopes to be able to prove the new design is beneficial to the uptake of the medication.

To learn more about research at Children’s Mercy, visit childrensmercy.org/research.
Osteopathic Medical Students Find a Role Managing the STI Crisis

TEACHING DOCTOR–PATIENT COMMUNICATION AND SEXUAL HEALTH EDUCATION FOR TODAY’S ENVIRONMENT

Submitted by Kansas City University of Medicine and Biosciences

Kansas City University College of Osteopathic Medicine students Mianna Armstrong and Megan McMurray were alarmed by statistics from the Centers for Disease Control and Prevention (CDC) that showed a substantial rise in the number of sexually transmitted infections (STIs). They wanted to do something to help.

The students conducted their own research into sexual health care and sought possible solutions to this disturbing trend. Their work, titled “Addressing the Increased Incidence of Common Sexually Transmitted Infections,” was published by the Journal of the American Osteopathic Association in August 2018.1 Just a few months later, a new statistical record for STIs unfortunately was broken.

What is now described as a health crisis has the two women more dedicated than ever to bringing awareness to a public health issue that is now at a critical level.

“I hope providers, particularly medical students, will understand that this trend will only continue to worsen unless we take on the challenge of educating our patients and advocate for the resources to do so,” Armstrong said.

The CDC reports that STIs increased nationally to a record of more than 2.3 million in 2017, the most recent year for which numbers are available. Cases of syphilis nearly doubled between 2012 and 2017. And according to the Missouri Department of Health & Senior Services, Jackson County experienced a total of 2,595 cases of STIs (chlamydia, gonorrhea, syphilis) through March 2019 alone.

KCU TO ADDRESS STI ISSUES IN CURRICULUM

The KCU College of Osteopathic Medicine is preparing future physicians for the challenge. “We are in the initial stages of addressing this from the curriculum standpoint,” said John Paulson, DO, PhD, FAAFP, the KCU faculty chair who advised McMurray and Armstrong on their research. “There are complexities that exist today that we did not take into consideration in the past.”

Dr. Paulson lectures on the male genital health care in the KCU curriculum. He stresses the physician-patient conversation on sexual history has changed: “We strive to provide our students with skills needed to obtain a thorough sexual history with non-judgmental communication skills that address gender orientation and provide sexual health education.”

He continued, “In this current climate our students are trained to ask about the specifics of sexual relationships when a sexually transmitted infection is suspected or identified, as those specifics determine which antibiotic is appropriate for treatment. Most importantly, we are teaching our students non-judgmental communication skills which we hope will provide an opportunity for patients to open up and have important conversations.”

Taking a detailed sexual history does not always come easily. “For clinicians that have been practicing for 20-plus years, it’s a culture change,” Dr. Paulson said.

“The ability to take an accurate sexual history now goes beyond the question of ‘Are you sexually active?’ Now it’s ‘Do you...’”
have sex with men, women or both?” “Oral, vaginal or anal?” All those sexual questions have to be part of the conversation now and it can be uncomfortable for novice medical students as well as seasoned practicing physicians,” he added.

The good news is that medical students such as McMurray and Armstrong are engaged and searching for solutions. The article Armstrong and McMurray authored explored Expedited Partner Therapy (EPT): treating the sex partner of a patient diagnosed with a sexually transmitted infection with a prescription, even if the partner is unwilling or unable to seek treatment themselves. EPT is illegal in Kentucky and South Carolina; it is limited in Kansas among several other states. Inspired by the students’ work, the American Osteopathic Association (AOA) approved a resolution to advocate for the legalization of EPT as outlined by the CDC.

**SEXUAL HEALTH EDUCATION A CAREER GOAL**

Armstrong, who has recently graduated from KCU, hopes to include sexual health education as part of her ob-gyn residency. “I would be interested in developing a curriculum for third-year medical students or pre-clinical year medical students that would help them build a comfort level in talking to young patients, especially in rural areas. We would teach them to encourage patients that the doctor-patient relationship is a safe place where the patient can feel confident their information will not be shared in any way.”

Armstrong notes that patients age 15-24 are the most vulnerable population in terms of contracting STIs, and are aware that their privacy is limited. “They don’t want their online search history to show they looked at sexual health,” she noted. “They are fearful of their data being tracked, and they don’t want their parents to find out. We want them to feel comfortable accessing that information and getting proper treatment. That is definitely something in which I will be interested moving forward.”

The KCU-Joplin campus is specifically involved with safety net clinics where there is opportunity for the students to educate the public. Student perspective and intuition is helpful. For example, after KCU held a heart-screening health fair at Pittsburg State University on Valentine’s Day, the medical students vocalized their belief that a health fair on Valentine’s Day should not be held without education on sexually transmitted infections. Dr. Paulson, who is a family practice physician, points out the ultimate answer to managing the explosion of STIs is that everyone should have a family physician and access to care. The financial, social and logistical barriers restricting access need to be addressed.

In the meantime, he believes medical education has a role to play in handling the crisis. “Our students researching and writing about this have already moved the needle nationally with the AOA,” Dr. Paulson said. “For our students, the education piece in the community may be the starting point of identifying the cause; helping people become more comfortable talking about it; and hopefully reducing morbidity down the road. That’s a step in the right direction.”

**REFERENCE**


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**UMKC RESEARCH**

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“It is a privilege to work with the generous physicians of Kansas City so that members of our community without the means to pay for their care receive the health care they need with dignity.”

~ Sheila McGreevy, MD
Internist, University of Kansas Health System Chair, KCMS Foundation Board of Directors and founding member of Wy Jo Care

Dr. Sheila McGreevy throughout her career has advocated for patients who are uninsured and of limited means. She has provided much care to those in need, and as a physician leader she has recruited many other physicians to join in this mission of caring for those less fortunate. She is a founding member of Wy Jo Care, which over its history has arranged for millions of dollars in donated specialty care for thousands of uninsured individuals. Through her humanity, compassion and leadership, she has been a role model and inspiration to many.