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MESSAGE FROM the
EXECUTIVE VICE CHANCELLOR

The human brain, made up of 100 billion neurons, each of which connects to thousands of other neurons, is the most complex biological structure on Earth. Despite all the recent advances in the cognitive and neurosciences, the inner workings of the brain to a large extent remain a mystery. But scientists and clinicians at KU Medical Center are among those who are working to unravel the enigma of the brain.

As you will read in this issue of Kansas Medicine + Science, a group of neuroscientists and engineers, led by KU Medical Center’s Dr. Randolph Nudo have developed an implant that could one day lead to a device to restore brain function in people who have suffered strokes and head or spinal cord injuries. Another story in this issue details how neurosurgeons learn the complicated art of repairing a brain that has gone wrong.

It is exciting to envision that we may be at the beginning of a new era where we are starting to better understand how the human brain functions…and that researchers and physicians at KU Medical Center are playing a big part in that revolution.

Also in this issue, we profile Joshua Burbank, a student in our Department of Speech Pathology, who plans to return to his American Indian roots after graduation to help improve health care on the reservation; we explore the exciting field of bioinformatics, being led at KU Medical Center by Dr. Russ Waitman; and we look at the outstanding job the KU School of Nursing is doing when it comes to educating the nurse leaders of the future.

We hope you enjoy this issue of Kansas Medicine + Science. We always appreciate your feedback, so feel free to drop us an email at kmands@kumc.edu and let us know what you think. We look forward to hearing from you.
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A $25 million lead gift from the Hall Family Foundation will help KU Medical Center move forward with plans for a $75 million health education building on its Kansas City, Kan., campus. The building will allow the University of Kansas to train future doctors, nurses and health care professionals in state-of-the-art facilities appropriate for the modern health care education curriculum.

Construction costs will be covered through a combination of state bonds, university funds and private philanthropy. The Kansas Legislature in April approved $25 million in bonds for construction. KU will provide $15 million, and the remaining $10 million will be raised by KU Endowment.

With the new building, KU Medical Center will be able to educate more physicians and other health care professionals to meet the state’s needs. Currently, 89 of the state’s 105 counties are medically underserved, and it is estimated that 30 percent of the current physician workforce will retire or leave their medical practices within the next decade.

KU trains 211 medical students annually at its Kansas City, Wichita and Salina campuses. With the new health education building in Kansas City, the School of Medicine proposes increasing its class size across all campuses by 50 students.

Scientists at KU Medical Center have determined that high doses of vitamin C, administered intravenously along with traditional chemotherapy, helped kill cancer cells while reducing the toxic effects of chemotherapy for some cancer patients. The study found that a combination of infused vitamin C and the conventional chemotherapy drugs carboplatin and paclitaxel stopped ovarian cancer in the laboratory and reduced chemotherapy-associated toxicity in patients with ovarian cancer. The results of their study were published in the journal Science Translational Medicine.

The study’s senior author is Qi Chen, Ph.D., an assistant professor of pharmacology, toxicology and therapeutics, and integrative medicine. Collaborating on the study were postdoctoral fellow Yan Ma and graduate student Kishore Polireddy; Jeanne Drisko, M.D., director of the Integrative Medicine program; and Julia Chapman, M.D., associate professor in the Department of Obstetrics and Gynecology.

The researchers’ clinical trial involved 27 patients with newly diagnosed Stage 3 or Stage 4 ovarian cancer. All of the participants received conventional therapy with paclitaxel or carboplatin, while some were also treated with high-dose intravenous vitamin C. Those who received vitamin C tended to experience fewer toxic effects from the chemotherapy drugs.
Two faculty members in the KU School of Medicine–Wichita’s Department of Preventive Medicine and Public Health were awarded research grants. Robert Hines, an assistant professor of preventive medicine and public health, received a grant from the American Cancer Society to look for gaps in medical care for cancer patients in rural Kansas. Previous studies have shown that patients who live in rural areas or have a lower socioeconomic status had higher rates of mortality. Lisette Jacobson, a post-doctorate fellow, received a grant to explore how breast feeding affects women’s risk of stroke. Jacobson’s grant was from the Frontiers Pilot and Collaborative Studies Funding Program and the Wichita Center for Graduate Medical Education-Kansas Bioscience Authority.

Nearly 200 polycystic kidney disease (PKD) scientists and physicians from around the world came to Kansas City in May for the Jared J. Grantham Symposium on Future Directions of PKD Research. Grantham is a University Distinguished Professor and Director Emeritus of the Kidney Institute at KU Medical Center. The event honored Grantham’s ground breaking 45-year career in PKD research and service to the PKD community. The symposium featured presentations and interactive panel discussions by 12 recipients of the Lillian Jean Kaplan International Prize for Advancement in the Understanding of Polycystic Kidney Disease. Topics focused on discovery research and therapy development.

Researchers at KU Medical Center have shown that a compound frequently found in plastics, Bisphenol A (BPA), can worsen migraine headache-related symptoms. The findings suggest that migraine sufferers might be able to reduce the frequency and severity of their headaches by changing their diets. Nancy Berman, Ph.D., a professor of anatomy and cell biology, one of the country’s leading experts on migraine, led the study. According to some estimates, at least 90 percent of people living in the United States have BPA in their bodies. The effect of BPA exposure on cancer has been widely studied, but little is known about the role of BPA in worsening migraine and other pain syndromes.

Joe Lutkenhaus, Ph.D., a University Distinguished Professor in the Department of Microbiology, Molecular Genetics and Immunology, was elected to the U.S. National Academy of Sciences. Lutkenhaus was one of 84 new members and 21 foreign associates from 15 countries who were elected to the academy in 2014 in recognition of their distinguished and continuing achievements in original research. Lutkenhaus is considered one of the country’s foremost bacterial cell researchers. He gained worldwide attention for his discovery that FtsZ, a protein in all bacterial cells, forms a ring in the middle of a cell when it is preparing to divide. In 2012, he was named one of three winners of the 2012 Louisa Gross Horwitz Prize by Columbia University.

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The KU School of Medicine ranks No. 2 in a study of medical schools’ production of graduates who go into family medicine.

The American Academy of Family Physicians conducts an annual census of the medical school graduates who enter family medicine residency programs accredited by the Accreditation Council of Graduate Medical Education. The authors of the study, now in its 32nd year, create a three-year rolling average to determine which medical schools consistently graduate a higher percentage of students into family medicine.

The University of Kansas ranked No. 2 on the list, with 20.8 percent of its graduates in family medicine residencies. East Carolina University is No. 1, with 20.9 percent of its graduates in family medicine residencies. In the United States, only 7.8 percent of graduates of M.D. programs enter family medicine.

KU is also leader in the raw number of students entering family medicine. In 2012, KU led all M.D.-granting medical schools with 39 of its graduates entering family medicine.

The Council on Graduate Medical Education, which assesses physician workforce trends for the U.S. Congress, has said the current physician workforce is in jeopardy because medical school graduates are not going into primary care in numbers sufficient to replace retiring physicians. Most young doctors are drawn to subspecialties, which offer better compensation and often more manageable work hours.

In 2011, KU opened a new campus in Salina and expanded the M.D. program at the Wichita campus to a full four years. The expansions increased the number of first-year KU medical students from 175 to 211.

In addition to larger class sizes, the KU School of Medicine works to identify and encourage students who are interested in primary care.

During the admissions process, Kansas residents and applicants with strong Kansas ties are given priority consideration. Pipeline programs, such as the Primary Care Workshop and the Scholars in Rural Health program, introduce students to the rewards and challenges of primary care before they begin their medical education. The state-funded Kansas Student Medical Loan program helps pay the debt of medical school graduates who agree to provide primary care in underserved areas of Kansas.

The study of medical school graduates entering family medicine residencies appeared in the October issue of the journal *Family Medicine*. The lead author is Wendy Biggs, M.D., associate professor of family medicine at KU.

KU Medical Center was awarded a five-year, $19 million grant from the National Institute of General Medical Sciences of the National Institutes of Health, which will continue a Kansas cell and developmental biology research program that has brought $64 million into the state since it was first funded in 2001.

The award is for the Kansas Institutional Development Award Network of Biomedical Research Excellence (K-INBRE). K-INBRE is a multi-disciplinary program to enhance Kansas’ research capacity through faculty development, retention and infrastructure, as well as inspire undergraduate researchers to pursue careers in biomedical research. Ten university campuses in Kansas and Oklahoma are a part of the initiative.

The grant will fund numerous research initiatives, including research projects and startup funds for new faculty, post-doctoral fellowships and undergraduate student research projects. The grant also supports translational research partnerships between clinicians and basic scientists and provides bridging funds for grant applications that are close to acquiring national funding.

K-INBRE was originally funded in 2001 as part of the National Institute of General Medical Sciences’ Institutional Development Award (IDeA) program.

With the help and guidance of KU Medical Center faculty and other community members, a group of Nepali Bhutanese refugee women in Kansas City are discovering that yoga may be an effective tool in addressing the trauma of culture shock and the physical pain that many of them have experienced since coming to the United States.

Joseph LeMaster, M.D., M.P.H., an associate professor in the Department of Family Medicine, says stress can have devastating effects on mental and physical health of refugees. He came up with the idea of leading an exercise class to help Bhutanese refugees deal with their stress. In what became known as the Chautari Intervention Program, members of the Bhutanese community with complaints of chronic pain that had yet to respond to medical treatment began taking part in an exercise class, which eventually morphed into a weekly yoga class.

The feedback from the participants has been positive. The relaxation techniques and the physical relief provided by stretching exercises have resulted in an improvement in chronic pain for many of the women.
SPEECH PATHOLOGY STUDENT JOSHUA BURBANK DREAMS OF RETURNING TO THE RESERVATION AFTER HIS EDUCATION TO IMPROVE THE HEALTH OF HIS PEOPLE

Joshua Allison-Burbank and his son, Kaleb
WHEN JOSHUAA BURBANK PACKED HIS YOUNG FAMILY and all their belongings into a U-Haul in New Mexico last August he was a man on a mission as he headed east to the University of Kansas.

The KU School of Health Professions graduate student in speech pathology said goodbye to life on a Navajo reservation and moved to small apartment in Lawrence, Kan., along with his fiancée, Kristina Lewis, and their 3½-year-old son, Kaleb. They left behind a life filled with familiar routines, secure jobs, loving families and a network of support.

Burbank has seen first-hand the lack of skilled health care, particularly speech pathology, while working on the reservation and in rural areas. He is driven by a strong desire to return home after his education to make a difference in the community that has supported him his entire life.

“I come from a small, but strong tight-knit community on the reservation,” he says. “My family and community have invested in my academic journey through prayers, ceremony, and even financial means.”

GROWING UP

Burbank grew up in Tohatchi, N.M., a town of about 1,000 on a Navajo reservation with two small gas stations, a post office and an outpatient clinic with limited services.

He attended St. Michael’s Indian School, a private Catholic school about 40 miles away in St. Michael’s, Ariz. All four of the Burbank children would ride a shuttle bus provided by the community Catholic mission – one hour to school in the morning and another hour back home in the afternoon.

During the summer after his sophomore year of high school, Burbank went to the National Youth Leadership Forum on Medicine sponsored by Georgetown University, and that is where he learned about a global charity called Operation Smile, which helps treat people with cleft lips and palates. There is a high incidence of clefts and other disorders among Native Americans.

During his final two years of undergraduate study at the University of New Mexico, Burbank worked as a research assistant for the New Mexico Cleft Palate Center of Albuquerque. Among his duties was coordinating cleft palate clinics for several tribal communities.

“I worked with families with newborns who would travel hundreds of miles on state-sponsored shuttles without money to get to a surgery that would allow their children a shot at a typical childhood,” he says. “Families from my community came to my team and me for help, so I made a commitment to these families and their children – I would leave to attend a school that would mold me into a quality professional clinician and then return to them.”

A BRIDGE BETWEEN CULTURES

With his unique background, Burbank sees himself as a cultural broker who is bridging the gap between different cultures.

“Western forms of medicine are not fully responsive to the unique needs of culturally and linguistically diverse populations,” he says. “So there is the potential for service delivery disconnects when it comes to medical and education services.”

Spirituality also plays a part, especially with Native American populations, he says, cautioning that health care providers should also be aware of the social components that may impede a patient’s participation in their community.

“A holistic approach to treatment will be more effective than direct intervention methods,” Burbank says. “Holistic treatment in Native American communities has shown a decrease in post-surgical complications with the cleft clinics that I used to coordinate.”

COMING TO KU

Burbank’s choice to attend graduate school was guided as much by a desire to give back to his home community as it was the need to get special schooling for his son, Kaleb, who was diagnosed at 18 months with developmental delays. Kaleb now attends the Language Acquisition Preschool on the Lawrence campus.

“I have to admit that having Kaleb in a preschool within the same department is a highlight of being at KU,” he says. “We often go to class together. His teachers are my mentors and instructors.”

The Language Acquisition Preschool is a licensed program that works with children both with and without learning disabilities. It is also a place where students can go to learn intervention techniques in a classroom setting. Kaleb receives speech and language therapy twice a week.

“Being a student in the field, I was becoming increasingly aware of the importance of early intervention and the benefit of facilitating language skills in preschoolers,” he says. “My son had developmental delays in motor, speech and language. We wanted a preschool that was highly structured and following a language-based curriculum. We also wanted a program that incorporated literacy skills while also recognizing diversity.”

The experience of going to school at the same place where his son is educated has proved to be a good combination for Joshuaa and Kaleb. Matt Gillispie, Burbank’s mentor at KU, says his pupil’s experience as a parent and work on the reservation have made a difference in the kind of student and practitioner he is.

“Joshuua came to KU with some skills and experiences that most new graduate students don’t have,” says Gillispie, a clinical assistant professor in KU’s IPCD. “One, he has the family...
experience of being a father and having a young child. Two, he had work experiences that taught him some about speech-language pathology and working with children.

Gillispie adds that Burbank demonstrates patience and care while acknowledging the children’s need for the services he’s providing.

“He is extremely hard-working, which results in academic success but also clinical success and a genuine eagerness to learn and grow as a clinician,” Gillispie says. “He regularly seeks resources and experiences that are above and beyond the minimum requirements. In his clinical experiences at a preschool on the Haskell Indian Nations University campus, he’s bringing Native American stories, themes, and materials into his services.”

But getting into KU wasn’t always a sure thing. Burbank admits he wasn’t sure he would be competitive enough academically to attend a top-ranked school. But that feeling changed when he became involved with the Native American Caucus of the American Speech and Hearing Association.

Through the caucus he met other speech language pathologists who were Native American, including Gillispie. The two participated in a panel discussion that highlighted the disparities in serving tribal communities, and they stayed in touch, and Gillispie encouraged him to apply.

“I didn’t think I would be competitive enough,” he says. “I had a family and limited resources to relocate to another state to attend school. Plus, I also had a child with a developmental disability.”

While working and studying as a non-degree graduate student, he prepped for the graduate record exam and got his KU application ready. Burbank attended an online information session before applying and most of the participants were from good schools with impressive undergraduate experiences.

The good news that Burbank was selected came after several months, but it was still a difficult decision to uproot his family leaving a world where he was surrounded by Native Americans, but he adds that those worries have quickly subsided.

“I think he was excited by the quality of our program but also learning about the tradition of supporting Native American students in our disciplines,” Gillispie says. “When you combine those elements with the Native American population of Lawrence, Haskell Indian Nations University in Lawrence, Prairie Band Potawatomi Nation and Kickapoo reservations, I think he felt like he and his family would feel welcome, which would help him be successful.”

**BALANCING SCHOOL AND FAMILY**

Burbank admits sharing time between being a full-time graduate student, a family member and having a job can be challenging, especially with his training split across both the Lawrence and Kansas City campuses. Practicums and field studies sites are also conducted throughout metropolitan Kansas City, Lawrence and surrounding communities such as Oskaloosa and Topeka.

“I leave early and return home late, especially when classes are at KU Medical Center. Then, in the evenings I spend time studying or preparing materials for the following day. So even when I’m home, my attention is directed at grad school.”

Burbank has a research assistant’s job at Juniper Gardens Children’s Project in Kansas City, Kan., and he is excited about a new Culturally Responsive Literacy Intervention grant headed...
by Gillispie which is designed to recruit, train and fund Native American speech-language pathologists while giving students a chance to work with local Native American families.

Even though they are a long way from home, Burbank and his family do what they can to be involved in the local Native American community, while embracing the opportunity to explore life outside of the reservation. Kristina comes from the tribes of Acoma, Laguna and Taos Pueblo, so Kaleb is a member of four different tribes.

“We live in Lawrence and do what we can to stay connected to native people,” Burbank says. “We attend local pow-wows and go to basketball games at Haskell Indian Nations University. Our plan is to return to our tribal community, but our time in Lawrence is giving us the time to grow as a young family while navigating the non-reservation world.”

JOBS AND DREAMS

For Burbank, a voice is always calling him home to serve the community where he was raised. He says with there being so few Native American speech-language pathologists he has little doubt that he will be able to find work on the reservation or in a rural area.

“I would love to get a job with the Indian Health Services, which would allow me to work in a medical setting directly on a reservation,” he says. “There’s a lot that I want to do including advocating for university programs in New Mexico to be more responsive to needs of rural communities in New Mexico, particularly Native American communities.”

But Burbank’s dreams don’t stop there. He plans to continue advocating for the health care needs of Native Americans.

“I would also like to advocate at a national level to bring more attention to the needs of Native American communities,” he says. “I want to be a clinician and an advocate. I just have to find the right position to do both.”

“I think each and every day he’s discovering ways he’s going to be able to give back and contribute to his family and his community,” Gillispie says. “The passion is there, and the evidence is his relentless pursuit for learning.”

Burbank is on track to earn his master’s degree in 2015, and then it will be Kristina’s turn to be a full-time student again while he pursues his doctorate. She plans to major in education. The two are excited about the idea of creating an education center when they return to the reservation.

“My community has invested in me,” Burbank says. “Now I have an obligation to return and serve my people.”

Contact Greg Peters at gpeters3@kuan.edu
Kelli Crabtree, M.D., was on her rotation at Children’s Mercy Hospital. Under the microscope was a girl just 11 years old. A large, angry tumor was knit into the girl’s spinal cord, extending from the base of her skull through her cervical spine, the entire length of her neck. In a surgery that would end up lasting nearly 12 hours, the girl’s spinal cord needed to be opened, a rare procedure. Crabtree’s job was to close the pia mater, the extremely thin innermost layer of the dura mater, the area covering brain and spinal cord.

Watching through the scope instead of looking at her hands, Crabtree picked up layer after layer of the thin tissue she could barely see and sutured it back together. “I’m thinking to myself ‘this is an 11-year-old girl, don’t mess it up.’” She reminded herself that she’d practiced doing this with even finer sutures in the microvascular lab.

This is how you learn to be a neurosurgeon...training on real patients, in real operating rooms.

Standing beside Crabtree that day was Christian Kaufman, M.D., a pediatric neurosurgeon at Children’s Mercy. Crabtree completed one suture. It went well, so she tried another one. Kaufman corrected her, and the next one went even better. “You have to be able to take what they’re telling you, think it through and change your movements accordingly,” Crabtree says. “Get in the zone, focus on the task at hand, and know what areas to stay out of.”

It was a tough, long day, but the patient did well. Later, Kaufman sent Crabtree a text: “You did a good job.”

Starting her fourth year of residency, Crabtree has spent the last few years at the KU School of Medicine learning how to
do this most delicate of surgeries the same way generations of neurosurgeons have learned it. You put on gloves and stand beside a more experienced surgeon and watch, until one day the surgeon hands you instruments, stands back and guides your hands with his voice.

“None of it is intuitive,” Crabtree says of neurosurgery.

“As a teacher, you have to be confident enough in your abilities that you can rectify or stop mistakes before they happen,” says Paul Camarata, (M.D.’86), chair of KU’s Department of Neurosurgery. “You have to be able to recognize if the resident is really ready. On the other side of the coin, the resident has to recognize if they’re not quite ready. Sometimes they’ll want to say, ‘Oh yeah, I’m fine.’ But one wrong move can cause a major stroke.”

When he was a resident, Camarata would often spend more than 120 hours a week in the hospital in what was essentially an apprenticeship of their attending neurosurgeons. But the rules of residency have changed. In 2003, in response to mounting pressure from policymakers in response to public concerns about the safety of overtired residents treating hospital patients, the Accreditation Council for Graduate Medical Education restricted resident duty hours to 80 averaged over four weeks. Neurosurgeons fear these restrictions have hurt their brand of surgery the hardest.

“When I was a resident, I’d spend up to 150 hours a week in the hospital during a seven-year residency,” Camarata says. “Now, when they reach their limit of hours, residents leave in the middle of a case. You wouldn’t do that if you were actually treating someone.”

The Immersive Touch neurosurgery simulator is a booth where residents can load various cases – pre-programmed ones or actual patient scans – and practice their moves before going into the operating room. In a large booth reminiscent of 1980s-era arcade video games, residents sit in front a glass pane wearing 3D glasses. On a screen in front of them is an image of the patient’s head, freshly shaved and ready for its first incision. The joystick-like controller mimics different types of surgical equipment, and the machinery provides haptic feedback, recreating the physical sensation of pressing on bone or tissue. “You push or move your fingers, and the computer moves back,” Camarata says. “You can feel it in your fingers as you’re looking through the glass.”

Camarata has also been collaborating with colleagues at Northwestern University to create simulation exercises to help neurosurgeons learn microvascular anastomosis, or how to connect ultra-small vessels and neural structures using a microscope.

“We use a video camera and a grading scale, to see how efficiently the student is moving,” Camarata explains. “This is used across the continuum from student, to resident, to fellow, and continuing.” He hopes this educational model could be rolled out nationally. And he hopes to begin gathering data on how well simulation helps neurosurgeons learn.

“For residents, simulations could really help – it could be a better way to learn, instead of having to go into a surgery after being up all night taking care of someone with a hemorrhage. It’s also a great tool for testing a 70-year-old surgeon with a tremor who is no longer on top of his game enough to perform safely.”
By the end of his second year of residency, Kushal Shah had done 20 or 25 surgeries and was comfortable opening the skull, taking off the bone flap and starting to remove tumors.

“You watch someone first to learn the basics,” he says. “Then you start with the beginning and ending of the procedure, then as you gain experience move more toward the meat of the surgery.”

“Tumors closer to the surface are easier. They’re in a place where there’s the least risk,” he says.

“Once you open the dura, which is the covering of brain – it’s a leathery type of material, very tough but not very thick – you can see the tumor right underneath. The tumor is more firm, and it has a grayish look, a different consistency. You can see how the brain around it looks normal. When you touch the brain it has a very different feel from the tumor,” Shah says.

“The first time someone says, ‘You can do this,’ you’re a little nervous but excited. It’s very satisfying the first time you take over a tumor.”

Kelli Crabtree says that after surgery, she debriefs with her attending surgeon and thinks about what she could have done better. Learning in this sort of group environment can be painful, she says, “but the struggle feels good. We’re the luckiest people in the world to help people during the toughest times of their life.”

Besides, she says, “this is the last frontier of medicine.” Shah agrees. Neurosurgery, he says, is the most exciting specialty because of the growth in the field and technology.

“We learn so much every year. We know so much now that we didn’t know 20 years ago – I see that on the staff here. It just makes you excited to think about how much we will know 20 years from now.”

Meanwhile, the old-school rewards of the discipline won’t change.

“In neurosurgery, you really get to treat a lot of people who would otherwise suffer a horrible, life-changing event,” says Camarata. “They have brain cancer or a hemorrhage in brain. People who were once paralyzed or near paralyzed can walk again. I remember a patient who had a huge arteriovenous malformation (a tangle of blood vessels in the brain diverting blood from the arteries to the veins). We were in surgery for about 28 hours, with a near catastrophe at the end. The patient almost died on the table. But we got it fixed, and he was able to walk again. He had four young children who have now graduated from college.”

The patient still occasionally stops by Camarata’s office to say hello…and thanks.

Contact kmnds@kumc.edu
ROBERT D. SIMARI, M.D., assumed his duties as the new executive dean of the University of Kansas School of Medicine in March 2014. Simari, who received his medical degree from the KU School of Medicine, was the vice chair of the Division of Cardiovascular Diseases at the Mayo Clinic and the dean for clinical and translational research at the Mayo Clinic. After a few months as the executive dean, Simari chatted about his hopes and future plans for the school.

Q: So, welcome back to the KU School of Medicine and to Kansas...how does it feel?
A: It is great to be back at KU and Kansas after being away for 28 years. We’re excited to be home again. It is said that change is as good as rest and I have enjoyed the change.

Q: What do you see as your biggest challenge as the new dean?
A: This is a complex organization and getting up to speed quickly, getting to know the people and what they do and what their goals are is a huge task. The best way to do that is to get out and talk to people on all three of our campuses, which I’ve been fortunate to do in my first months here. The campuses are full of highly committed faculty and staff and it is a pleasure to meet them and hear their stories.

Q: When you accepted the job, you said that KU Medical Center and the School of Medicine have undergone one of the most impressive trajectories in academic medicine in recent years. Can you elaborate on that?
A: Achieving National Cancer Institute designation, receiving the Clinical and Translational Science Award from the NIH and being designated a national Alzheimer’s Disease Center are all huge achievements. Any one of those things would be impressive on its own – but to have all of them come in the past several years is amazing. And you can add to that the growth of the KU Hospital, the launch of the Salina School of Medicine campus and the expansion of the Wichita campus.

Q: Why do you think KU Medical Center is on such a roll?
A: I don’t think all of this growth and achievement is just a coincidence. We have faculty and staff who worked hard to make all this happen. And they have worked under visionary leaders such as Doug Girod and Bob Page. We have also been fortunate to have great partners on each campus and in each community.

Q: What do you like to do for fun in your spare time?
A: I am becoming less familiar with the term. Seriously, my wife, Kelly, and I like to spend time with our four children. We are huge KU basketball fans and are excited to be back in Kansas in time for the upcoming season.

Contact Donna Peck at dpeck@kumc.edu
RESEARCHERS AT KU MEDICAL CENTER HAVE TESTED A TINY IMPLANT THAT COULD RESTORE FUNCTION IN DAMAGED BRAINS

BY DAVID MARTIN
Randolph Nudo, Ph.D., a professor of molecular and integrative physiology and director of the Landon Center on Aging at the University of Kansas Medical Center, knows both personally and professionally how a traumatic brain injury can completely change the lives of victims and their loved ones. Brain trauma can cause a host of physical, cognitive, social, emotional, and behavioral effects, and the outcomes can range from complete recovery to permanent disability or death.

But research being conducted by Nudo and his KU Medical Center colleagues is giving new hope to the millions of individuals suffering from the damage left by stroke or head injuries. Working with Case Western Reserve University in Cleveland, the team has developed a lightweight, battery-powered device that appears capable of repairing damaged pathways in the brain. Nudo is the senior author of a study on the device, which appeared in The Proceedings of the National Academy of Sciences.

“Randolph Nudo and graduate student assistant Max Murphy”

Mohseni says he met Nudo at a Keck Foundation conference in the fall of 2006, and he visited Nudo’s lab at KU Medical Center in January 2007 to discuss the approach they should take with the device and the study.

“It was a great opportunity for me to showcase how integrated circuit design could be used to shed light on how the brain operates and functions,” Mohseni says.

The idea behind the prosthesis, or microdevice, is similar to defibrillators implanted into heart patients. But instead of monitoring the heart, the microdevice monitors neurons firing in the brain. The aim is to restore communication patterns that have become disrupted by injury or disease.

The research is supported in part by the United States Department of Defense. Traumatic brain injury is one of the signature injuries of troops wounded in Afghanistan and Iraq.

“We’re basically trying to reproduce the process that the brain uses during development, and that it tries to accomplish after injury, but with electronic components that will artificially bridge these areas,” Nudo says.

Mohseni says the challenge in designing the device was that Nudo needed it to do three separate functions.
“For this study, this tiny device needed to be able to process neural signals, record them and then stimulate another part of the brain, which I don’t think has ever been attempted before.”

In order to test the idea, the device components were scaled to fit a rat-sized brain. Powered by a simple watch battery, the microdevice was implanted into rats with damaged frontal cortices. The microdevice was designed to record signals in one part of the brain and then translate them into electrical impulses that stimulate another part of the brain. Nudo and his colleagues wanted to see if the artificial communication could help the brain-injured rats recover their motor skills.

To determine if recovery had taken place, the rats were tested on their ability to reach for a food pellet. The task required some skill as the rats had to reach through an opening in a Plexiglas chamber.

The results were striking. Without help from the device, rats with brain injuries struggled to reach for and grasp the pellets. When the device was switched on, they were suddenly able to perform the task with ease. In fact, after two weeks of microdevice-delivered brain stimulation, the rats were performing approximately at pre-injury levels.

David Guggenmos, Ph.D., a student in Nudo’s lab at the time of the experiment and first author of the study, captured the before-and-after tests on video. Nudo says he almost could not believe his eyes when Guggenmos hit the play button. “I almost hit the ceiling,” he says. “It was one of the most exciting things I’ve seen since I’ve been in science.”

While the early results of the brain microdevice are getting a lot of buzz around the world, Nudo says the work is really just beginning.

“We are looking for additional funding that will allow us to delve deeper into what specific brain injuries the device might help,” Nudo says. “There is a significant difference in what happens to a brain that is affected by a stroke, as opposed to a traumatic brain injury. We need to determine exactly how the device interacts with different kinds of brain trauma.”

Nudo and Mohseni are currently developing a similar model for testing on primates, which will bring the device one step closer to human trials. And they are developing a spinal cord stimulation device to be tested on rats, which if successful, will move on to primate testing.

“Because of the number of soldiers who are affected by spinal cord injuries, the Department of Defense is also very supportive of this research,” Nudo says.

In the meantime, a full patent on the device was filed in June 2012, and the idea of a start-up company is being discussed.

Nudo says the publicity over the successful early testing of the device has generated a lot of interest and emails from people around the world who have family or friends affected by brain and spinal cord injuries.

“It is hard to tell people that this is still in the early stages of development and that we are years away from human trials,” Nudo says. “But it is gratifying that we are giving people hope. We really believe this is going to be a game changer.”

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Patients who are diagnosed with amyotrophic lateral sclerosis (ALS), or Lou Gehrig’s disease, know that the road ahead doesn’t look good. So far, medical research in the field hasn’t yielded much.

“We don’t have a cure and we don’t have a cause,” says Sally Dwyer, program director for the Keith Worthington Chapter of the ALS Association, an organization that serves 575 patients in Kansas, Nebraska and the western two-thirds of Missouri.

Dwyer goes on to say that researchers believe the disease likely has multiple causes and it will take multiple treatments to be able to cure everyone. Patients and researchers alike are always trying to find ways to advance knowledge more quickly in the fight against the disease that attacks the nerve cells of the brain and spinal cord.

At the University of Kansas Medical Center, a team of researchers is working with those patients and a national network to harness the power of “big data” to answer new questions more quickly and efficiently than before.

“That’s the criticism we’ve had for all these years,” Dwyer said. “All this research is done in silos.”

L. Russell Waitman, Ph.D., director of medical informatics and assistant vice chancellor for Enterprise Analytics at KU Medical Center, is leading a team of 10 different medical centers to harness the capability of each system’s electronic medical records to allow that kind of sharing of knowledge to occur. The project is called the Greater Plains Collaborative, and focuses on helping patients with breast cancer, obesity and ALS.

The team includes researchers at Children’s Mercy Hospitals and Clinics in the Kansas City metropolitan area, the Medical College of Wisconsin, the University of Nebraska Medical Center, the University of Iowa, the University of Wisconsin, the University of Texas-San Antonio, the University of Texas-Southwestern, the University of Minnesota and the Marshfield Clinic Research Foundation.

Funded by $7 million from the Patient-Centered Outcomes Research Institute, the team will spend 18 months developing a network to connect electronic medical record systems and building tools that can use patient data to answer specific research questions.

“We’ll be able to see in real time if what’s working for breast cancer patients in Minnesota is leading to better results than what’s working for breast cancer patients in Texas,” said Waitman, who is the principal investigator on the project.

Waitman says the collaborative is a huge step forward. “We want to help lead the national conversation about ways to advance scientific knowledge faster by creating better studies, analyzing data more quickly and helping to answer questions that come from patients themselves.”

Though the effort of the collaborative is notable by itself, its real power will be connecting to an even larger network that can potentially reach millions of people.
The Patient-Centered Outcomes Research Institute, or PCORI, is an independent funding organization authorized by the U.S. Congress in 2010 as part of the Patient Protection and Affordable Care Act.

It has invested $93.5 million to build a large connected network of data that spans across the country. The collaborative is part of the larger network called PCORnet. PCORI aims to involve patients and other stakeholders in the research process as much as possible, and patients and the individual health care providers who create the data will be actively involved in the data’s governance and use.

The overall goal of the new network and the data it will create will be to significantly reduce the time and effort needed to start new research studies and build the infrastructure to conduct them.

“We can now look at questions by using data that’s already there,” Waitman said.

For example, he says, if the network were fully operational, it would be possible to see how a variable like race or ethnicity might affect different health outcomes for smokers. And, unlike today – when a controlled study would likely be necessary to get meaningful data – the answers would be just a few clicks of a mouse away.

PCORI officials noted that vast amounts of valuable health information are created every day during routine patient visits, but the opportunities to use this information are often missed because the networks that house this information cannot easily communicate with each other.

All of the data used in the network will be “de-identified” in order to protect patient privacy rights. While researchers will have access to the data in an electronic medical record, those data will not be tied to a specific person’s name. Creating safeguards to ensure the security of the records and to protect patient privacy is a top priority of the new clinical research network.

The collaborative will serve as one of 11 networks of health care systems that will be linked together to provide data from everyday clinical encounters in the new PCORnet national network.

Those 11 networks will work closely with 18 other networks run by patient and advocacy organizations interested in sharing health information. Waitman said those patient-driven networks would help ensure that researchers were working on the questions that mattered most to patients, and would also help contribute their own data to help solve those problems.

When it becomes fully operational, PCORI hopes that the network will be used as a national resource, supporting projects from within its own network as well as projects coming from other research institutions and funding agencies.

“‘This project is an outstanding example of how translational research can benefit patients and health care providers by coming up with innovative ways to address some of our society’s most important health issues,’” said Richard J. Barohn, director of Frontiers: The Heartland Institute for Clinical and Translational Research, headquartered at KU Medical Center.

Barohn, a neurologist who specializes in the treatment of ALS, is leading the ALS research component of the Greater Plains Collaborative.

“This really is the wave of the future,” Barohn said. “This project will open the door to the way research is going to be done moving forward.”

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Researchers will be able to instantly answer questions that previously required large and costly studies to find. If what’s working for breast cancer patients in Minnesota is leading to better results for patients than what’s working for breast cancer patients in Texas, researchers will be able to see that in real time and make better decisions.
On any given day, University of Kansas Hospital chief operating officer Tammy Peterman juggles a schedule that takes her from executive-only conversations in conference rooms to auditorium-sized meetings with leaders from every area of the hospital.

And whenever she can, Peterman stops on a patient floor to visit with staff and patients.

“That is truly the best part of my day,” she says. “I think it reminds us why we come to work every day.”

Peterman, who has a master’s in nursing from the University of Kansas School of Nursing, is also the hospital’s chief nursing officer, a role that gives her the opportunity to lead and support the estimated 2,400 nurses who work at KU Hospital. She has an unwavering commitment to further the profession of nursing, nurse education and the development of more nurse leaders.

“Nurse leaders have the discipline of nursing coupled with a broad perspective of providing health care in a multidisciplinary nature,” Peterman says. “More nurse leaders are sitting at that table, and I think that’s a good thing for everyone, most importantly for patients.”

THE NEW WORKFORCE

At 3 million strong, nurses make up the largest segment of the U.S. health care workforce and remain in high demand, particularly those with advanced degrees.

A 2010 report by the Institute of Medicine and the Robert Wood Johnson Foundation outlined the urgent need to ready the nursing workforce for a rapidly changing health care system. The Future of Nursing: Leading Change, Advancing Health sparked initiatives in most every state to promote the need for more nurses to take on leadership roles in an effort to improve health outcomes for patients and to help design a better patient-centered system under the Affordable Health Care Act.

In response to the report, the KU School of Nursing developed and strengthened programs to meet the recommendation that 80 percent of all nurses have a minimum bachelor of science in nursing (BSN) degree by 2020.

Already, nearly 300 BSN-prepared nurses are graduating each year from the KU School of Nursing’s undergraduate programs, which include an online RN-to-BSN program.

“We realize the far-reaching influence nurse leaders can and should have in today’s health care,” says Karen Miller, RN, Ph.D., who is dean of the KU School of Nursing and senior vice chancellor for academic and student affairs at KU Medical Center. “Our graduates are taking on decision-making roles in clinical, research and education settings, not just in the region but around the world.”

INFLUENCE OF NURSE LEADERS

Another boon to advanced nursing education in Kansas has been the KU-Community Colleges Nursing Partnership, formed in 2012 by the KU School of Nursing and 17 community colleges to increase nursing educational opportunities in the region. The partnership streamlined the application process to KU’s online RN-to-BSN program for qualifying students who have an associate degree in nursing from a participating community college.

The agreement has also added a shared curriculum option offered by several of the community college partners, where
students take community college and KU classes at the same time and graduate with a bachelor’s of nursing degree from KU at the end of the program.

Shirley Wendel, who has a Ph.D. from the KU School of Nursing, is dean of Allied Health and Nursing at Kansas City Kansas Community College, which is part of the partnership.

“I think the higher education nursing community, especially in Kansas, has been forward-thinking by presenting more opportunities for more students to get an advanced degree.”

**EMPLOYER DEMAND FOR BSNS**

In January 2013, The University of Kansas Hospital joined a growing group of hospitals in the country committed to hiring only nurses with a baccalaureate degree or higher.

“It was a policy decision based on mounting evidence that shows organizations with BSN-prepared nurses have a lower mortality rate overall, higher certification rates and patient satisfaction,” says Chris Ruder, RN, MS, vice president of patient care services at the hospital.

“That’s not to say anything about the abilities of our nurses who are not baccalaureate prepared. We have a number of them and they’re fantastic nurses,” he adds.

Ruder has both his BSN and MSN from KU. He was a nurse manager at the hospital when he began the Master of Nursing program at the School of Nursing.

“Learning other skills and other pieces of not just leadership but organizational understanding helped me in that management role and has continued to do so throughout my career,” Ruder says.

**MAGNET STATUS**

Peterman says she that KU Hospital’s Magnet® designation underscores not only nursing excellence at the hospital but acknowledges the important role nurses play in the hospital’s success.

The Magnet status is given only to facilities that statistically prove the highest degree of nursing standards, including in the areas of quality care, patient outcomes, low mortality rate, patient satisfaction, and nurse retention.

And while Peterman’s roles may sometimes pull her in different directions, what they have in common is a leader with a laser-like focus on a priority that doesn’t change.

“At the end of the day, it’s all about patient care,” she says.

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Jack Stapleton, M.D., is a self-described “virus nerd.”

Stapleton, who graduated from the University of Kansas School of Medicine in 1980, has developed a national and international reputation as a superb virologist whose work has had major implications for the treatment of hepatitis viruses and the human immunodeficiency virus (HIV).

“I’ve always had a vision that I wanted to do research around how diseases occur and how we can stop them,” says Stapleton, who is now a professor in the Department of Internal Medicine at the University of Iowa and director of the Helen C. Levitt Center for Viral Pathogenesis and Disease. “Right out of medical school, I treated a woman who had pneumocystis pneumonia brought on by HIV. That was the beginning of my interest in studying HIV and treating HIV and AIDS patients.”

Stapleton has also been a leader in identifying the nature and behavior of hepatitis C infections, and his research has led to an increased surveillance for hepatitis C in all blood products across the United States.

Stapleton is probably best known for his research on the hepatitis G or hepatitis GB virus, which been reported in adults and children throughout the world and is found in about 1.5 percent of blood donors in the United States.

“My lab has done extensive work on how the GB virus interacts with the HIV virus in AIDS patients,” Stapleton says. “Patients with both viruses tend to live longer than patients with just HIV, so understanding the relationship between the two could lead to improved vaccines and therapies for autoimmune diseases.”

When he’s not studying viruses, Stapleton enjoys playing guitar in a rock band with some of his fellow doctors and researchers. The band, called Lazy Boy and the Recliners, recently opened for Jefferson Starship when they performed in Iowa.

“Although I can’t verify it,” Stapleton jokes, “I like to claim that our band has more National Institutes of Health funding than any other rock group in the country.”

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**ELIZABETH POWELL, RN, BSN**
Topeka, Kansas

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