

# Outlook



Washington  
University in St. Louis

SCHOOL OF MEDICINE

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SPRING 2017

## Transforming trauma care

Artificial blood, other innovations  
could save lives



Rupa Patel, MD, MPH, speaks with Keith Cotton, owner of Boardwalk Waffles & Ice Cream in St. Louis, about PrEP, a single daily pill that helps prevent HIV. As part of her community outreach efforts, Patel distributes informational posters on PrEP to local businesses. See page 10.



TIM PARKER

**COVER** ErythroMer, a red blood cell substitute formulated from freeze-dried hemoglobin (shown above), which has shown success in small animal trials, may become available for human use within 10 years. On the battlefield and in desolate locations, such a preparation could be mixed with water at the point of care to treat traumatic bleeding. See page 16.

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Graduating students learn where they will spend their residency.



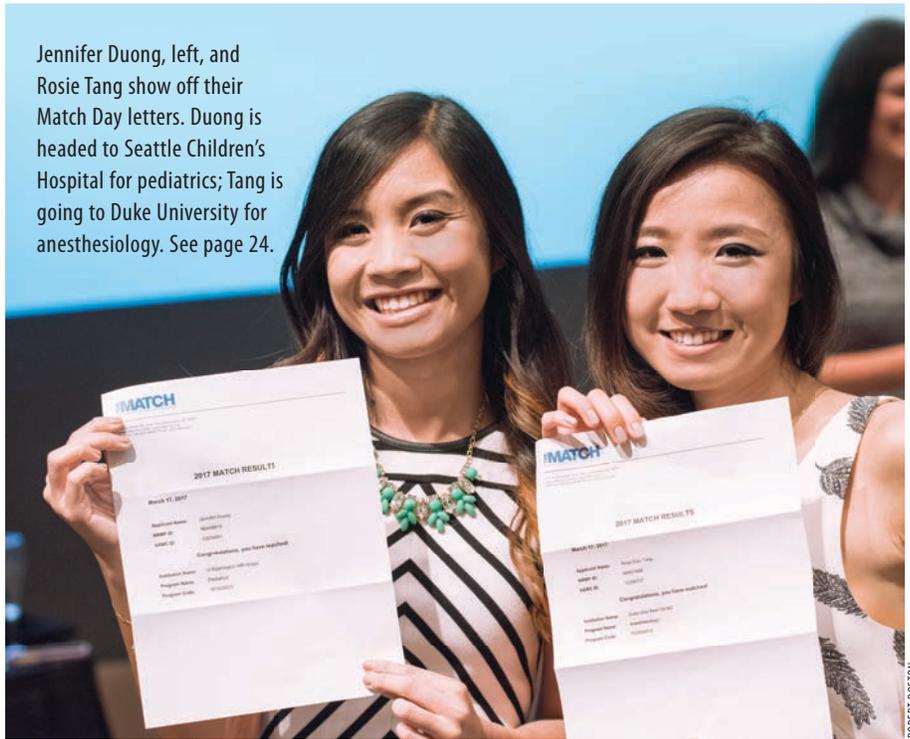
ROBERT BOSTON

# Outlook

Washington University School of Medicine

OUTLOOK.WUSTL.EDU SPRING 2017

Jennifer Duong, left, and Rosie Tang show off their Match Day letters. Duong is headed to Seattle Children's Hospital for pediatrics; Tang is going to Duke University for anesthesiology. See page 24.



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## DEPARTMENTS

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As her premature baby struggled for survival in the neonatal intensive care unit, Robin Torrence-Webber, right, became anxious and depressed. She credits therapist Anna Constantino-Pettit, MSW '14, left, with lifting her spirits and teaching her to cope. See page 26.

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Study findings suggest that current allowable limits for manganese exposure are not adequately protecting welders.



# Danger in the workplace

## Manganese-containing welding fumes linked to neurological problems

**W**elders exposed to airborne manganese at estimated levels below federal occupational safety standards exhibit neurological problems similar to Parkinson's disease, according to new research.

The findings, published Dec. 28 in *Neurology*, suggest that current safety standards may not adequately protect welders.

"We found that chronic exposure to manganese-containing welding fumes is associated with progressive neurological symptoms," said Brad A. Racette, MD, a professor of neurology and the study's senior author. "The more exposure you have to welding fumes, the more quickly those symptoms progress over time."

At high levels, manganese — a key component of important industrial processes such as welding and steelmaking — can cause manganism, a severe neurologic disorder with symptoms similar to Parkinson's disease, including slowness, clumsiness, tremors, mood changes and difficulty walking and speaking.

Decades ago, this risk drove the Occupational Safety and Health Administration (OSHA) to set standards limiting the amount of manganese in the air at workplaces. These safety standards are widely believed to have eliminated manganism as an occupational hazard. Researchers, however, have long suspected that there may still be some health effects at levels much lower than what is allowable per OSHA standards.

This is the first study showing clinically relevant health effects occurring at estimated exposures lower than the OSHA limit.

Racette and colleagues studied 886 welders at three worksites in the Midwest — two shipyards and one heavy-machinery fabrication shop. Each welder filled out a detailed job history questionnaire and underwent at least two standardized clinical evaluations of motor function spaced a year or more apart.

The most worrisome aspect of the study, Racette said, is that the neurological signs showed up in people with an estimated exposure of only 0.14 milligrams of manganese per cubic meter of air, far below the safety standard set by OSHA at 5 milligrams per cubic meter.

# Heart procedure changes could improve outcomes

U.S. hospitals can improve patient care and reduce costs if cardiologists perform more coronary angioplasties through wrist arteries, and if they take steps to discharge patients on the same day, according to a new study.

Coronary angioplasty, also called percutaneous coronary intervention (PCI), is performed to alleviate chest pain or shortness of breath. Interventional cardiologists increase blood flow to the heart by inserting a small tube via an artery in the groin or wrist, opening up the narrowed section with an inflatable balloon, and possibly placing a stent.

Shifting standard practice by 30 percent — from the groin to the wrist approach — along with same-day discharge,



could save the U.S. \$300 million per year, researchers estimate.

“The traditional way has been to go through the bigger femoral artery that is a straight pathway to the heart,” said first author Amit P. Amin, MD, an assistant professor of medicine. “Unfortunately, that artery is also deep. It’s

associated with more bleeding complications. When we go in through a vessel in the wrist, we see less bleeding, fewer complications, less pain and discomfort, higher patient satisfaction, shorter hospital stays and lower costs.”

Improved technology has allowed wrist access to become a viable route, even for complex cases, Amin said.

The researchers analyzed data from almost 280,000 Medicare patients who underwent PCI and were eligible for same-day discharge. Only about 5 percent of these patients actually were discharged prior to staying overnight.

“We have seen that it is very safe to send these patients home the same day,” Amin said. “We use risk-prediction models to predict their risks ahead of time, and we plan ahead to mitigate any issues so we can facilitate a same-day discharge. We want to outline health-care pathways that provide the best care for patients.”

For the groin approach with at least one night of hospitalization, the average cost is \$17,076. The average cost for the wrist approach with same-day discharge is \$13,389. Independent of the length of stay, the wrist approach costs about \$900 less than the groin approach.

Health-care costs for the 600,000 patients who receive PCI annually in the U.S. are estimated at \$10 billion.



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**MUCH-LOVED EDUCATORS** Glenn C. Conroy, PhD, and Jane Phillips-Conroy, PhD, celebrated retirement this April. The Conroys have taught anatomy to every single medical student for the past 32 years, since joining the faculty in 1983. They are revered by medical students not only as accomplished anthropologists, but for their skill and dedication in teaching the Human Anatomy and Development course, a cornerstone of the medical school experience.

## Brain hardwired to respond to itching

Yawning and scratching are socially contagious behaviors; if one person does it, others are likely to follow suit. School of Medicine researchers now have found that socially contagious itching is hardwired in the brain. The discovery, published in *Science*, may help scientists understand the neural circuits that control socially contagious behaviors.

Researchers put a mouse in an enclosure with a computer screen, and then played a video showing another mouse scratching. Within seconds, the mouse in the enclosure started scratching, too.

Next, the researchers zeroed in on a brain region called the suprachiasmatic nucleus, which regulates sleep/wake cycles.

When the mouse saw other mice scratching, this nucleus released a chemical substance called GRP (gastrin-releasing peptide).

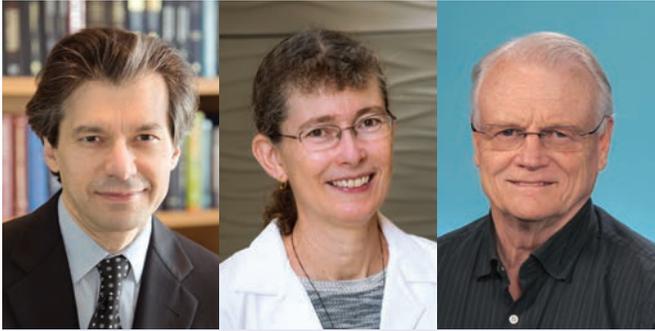
“The mouse doesn’t see another mouse scratching and then think it might need to scratch, too,” said principal investigator Zhou-Feng Chen, PhD, director of the Center for the Study of Itch. “Instead, its brain begins sending out itch signals using GRP as a messenger.”

When Chen’s team used various methods to block the chemical or receptors, the mice did not scratch when they saw others scratch.

“Many people thought it was all in the mind, but our experiments show it is a hardwired behavior and is not a form of empathy,” Chen said.



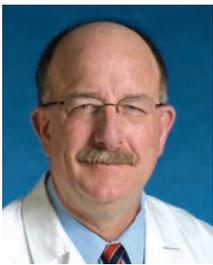
MIKE WOFFUL



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**DISTINGUISHED CONTRIBUTIONS** Three professors have been selected as fellows of the American Association for the Advancement of Science, the world's largest general scientific society. From left, the fellows are: Azad Bonni, MD, PhD, the Edison Professor of Neurobiology and head of the Department of Neuroscience; Phyllis I. Hanson, MD, PhD, the Gerty T. Cori Professor at the School of Medicine; and Gary D. Stormo, PhD, the Joseph Erlanger Professor in the Department of Genetics.

## Scheel to head faculty practice plan



Paul J. Scheel Jr., MD

Paul J. Scheel Jr., MD, a physician-leader at Johns Hopkins University School of Medicine, has been named associate vice chancellor for clinical affairs at Washington University School of Medicine and chief executive officer of Washington University Physicians, the school's faculty practice group. His appointment begins July 1.

Washington University Physicians ranks among the largest academic group practices in the U.S.

Scheel serves as vice president of the Office of Johns Hopkins Physicians in the Johns Hopkins Health System and medical director of Integrated Renal Solutions of Johns Hopkins Healthcare in Baltimore. He also is the Ronald Peterson Professor of Medicine and director of the Division of Nephrology at Johns Hopkins University School of Medicine.

Scheel succeeds James P. Crane, MD, associate vice chancellor for clinical affairs, who led Washington University Physicians for 25 years. In that time, the clinical practice has grown substantially and draws patients from across the country.

Paul Scheel's wife, Janet Scheel, MD, will join the Department of Pediatrics as associate medical director of the heart failure and transplant program in the Division of Cardiology.

The Scheels have two children: Paul recently graduated from Washington University School of Medicine and is an intern at Johns Hopkins; Amy works in public health and conducts research in Uganda.

# Insurance influences pregnancy success

Women who pursue in vitro fertilization (IVF) are more likely to give birth if they have health insurance that covers the procedure, according to new research.

The key reason is financial: The high cost prohibits most women from seeking a second treatment if the first attempt fails.

The study is published in *The Journal of the American Medical Association*.

"It's a simple and possibly obvious finding, but it highlights the importance of health insurance in the outcome of fertility treatments," said lead author Emily S. Jungheim, MD, an associate professor of obstetrics and gynecology.

"The biggest hurdle may not be the fertility treatment but the cost."

The American Pregnancy Association estimates the cost of a single IVF treatment at \$12,000 to \$17,000. The success of one IVF procedure ranges from more than 40 percent for women under age 35 to about 15 percent for women over age 40. Other factors influencing success include lifestyle, cause of infertility and reproductive history.

The study examined data from 1,572 women seeking IVF treatment from 2001 to 2010 at Washington University's Fertility and Reproductive Medicine Center. The clinic serves women in Missouri and Illinois. The location is significant to study findings as Illinois mandates IVF coverage, while Missouri does not.

Seventy percent of women with insurance returned for a second IVF treatment if the first treatment was unsuccessful.

For women with coverage, the average likelihood of giving birth after up to four attempts was 59 percent, or 515 births. This compared with 51 percent, or 350 births, for women without such coverage — a difference that is statistically significant.

Fifteen states have infertility insurance laws; however, only five have comprehensive mandates that include IVF: Illinois, Massachusetts, Rhode Island, Connecticut and New Jersey.

Researchers from Washington University's Olin Business School and the Brown School contributed to the study.



Emily S. Jungheim, MD, examines oocytes retrieved during an in vitro fertilization procedure.

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GREG BARNETT

## #ILookLikeASurgeon

A magazine cover from *The New Yorker* inspired women surgeons worldwide to post pictures of themselves on social media and, of course, Washington University had to take part. Left, female surgeons from the School of Medicine re-create the cover pose. French artist Malika Favre created the April 3 cover illustration for *The New Yorker* from the perspective of a patient, with four female surgeons peering down. The illustration soon went viral, as women surgeons took work selfies and posted them on Twitter, Facebook and Instagram. In covering the trend, CBS News highlighted the Washington University photo.



# Topical drugs effective against early skin cancer

**A** combination of two topical drugs that have been in use for years triggers a robust immune response against precancerous skin lesions, according to researchers from Washington University and Harvard medical schools.

The study, involving 132 patients with actinic keratosis, a precursor to squamous cell carcinoma, is published in *The Journal of Clinical Investigation*.

"We looked at precancerous lesions on patients with sun-damaged skin," said study co-author Lynn A. Cornelius, MD, the Winfred A. and Emma R. Showman Professor of Dermatology and director of the Division of Dermatology. "Most commonly found on the face, scalp and arms, these lesions appear abnormal by visual examination and under the microscope but are not full-blown skin cancers."

These lesions have the potential to develop into a true skin cancer and are commonly treated.

On average, the investigational therapy reduced the number of precancerous skin lesions on the face by almost 88 percent compared with a 26 percent reduction using the standard chemotherapy.

While side effects such as skin scaling and itching were similar with both treatments,

patients receiving the investigational therapy reported more redness and increased burning sensations, which are consistent with the immune response it triggers.

Interestingly, although not specifically measured, patients who had been treated previously with conventional therapies reported decreased pain and discomfort with the combination treatment, Cornelius said.

The investigational treatment combines 5-fluorouracil, a cream formulation of a chemotherapy drug prescribed to treat actinic keratosis, with a synthetic form of vitamin D called calcipotriol. The FDA has approved calcipotriol for treatment of psoriasis, an autoimmune disorder characterized by red, scaly patches of skin.

Prior studies in mice prone to allergic inflammation, especially eczema on the skin, suggest that overreactive immunity triggered by damaged skin may have a significant benefit — a hyper-vigilant system that attacks cancerous cells.



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Dermatologist Lynn A. Cornelius, MD, left, conducts a skin exam with patient Robert Manchester.

Earlier work at Washington University by senior author Shadmehr Demehri, MD, PhD, now at Harvard, showed that a protein in the skin called TSLP activates the immune system's T cells. Calcipotriol also is known to cause the skin to produce TSLP.

The therapy induces a heightened immune response in the skin, and the chemotherapy drug works to destroy the cancerous cells.



COURTESY OF THE SENATE APPROPRIATIONS COMMITTEE

**NATIONAL LEADERSHIP** Timothy J. Eberlein, MD, head of the Department of Surgery, testifies before a U.S. Senate subcommittee March 8 regarding federal funding for medical research. Such funding is critical in developing innovative therapies and vital to the careers of young scientists whose ideas and work help improve patient outcomes, he said. The subcommittee makes recommendations on National Institutes of Health (NIH) funding. Sen. Roy Blunt, R-Mo., the subcommittee chairman, invited Eberlein to testify.

## Weight-loss therapy rids body of food

Aspiration therapy offers significantly overweight people a means to rid their bodies of excess calories before digestion.

The FDA-approved, nonsurgical therapy was developed by School of Medicine researchers, who have been following study patients for three years. “It’s been very successful, with study patients losing an average of 14 percent of their total body weight, almost double the amount seen with

other nonsurgical procedures and similar to weight loss seen with some surgical procedures,” said Vladimir Kushnir, MD, an assistant professor of medicine and director of the Bariatric Endoscopy Program.



Vladimir Kushnir, MD, and research coordinator and dietitian Abigail Lowe.

Kushnir uses an endoscope to place a small, discreet device into the stomach, a tube

that is undetectable beneath a shirt or a one-piece bathing suit. That tube, similar to a port used to get drugs into the body, protrudes slightly from the skin.

For the device to work, a patient goes to a restroom 30 to 60 minutes after eating, connects the tube to an external apparatus and removes about one-third of the food eaten. Most patients perform aspiration therapy once or twice each day, after the largest meals they consume.

## Insights into autism

### Brain networks may underlie social behavior

School of Medicine researchers are key collaborators in a multicenter study that has found associations between brain connectivity and a social behavior that is a key feature of autism.

Conducted through the Infant Brain Imaging Study network, the collaboration also included scientists from the University of North Carolina, The Children’s Hospital of Philadelphia and the University of Washington.

Using functional MRI, researchers sought to identify brain networks involved in “initiation of joint attention.” This is what it’s called when a baby sees an object, such as a dog or a ball, focuses on that object and — by pointing and/or shifting gaze — gets someone else to focus on that object, too. It’s a behavior that is impaired in children with autism spectrum disorder.



GETTY IMAGES

Brain networks may play a role when a child sees an object and gets someone else to focus on the object, too.

“By the time most children are diagnosed with autism, they are 4 ½, but in studying the brains of younger children, we have found neural activity that may allow for earlier diagnosis, and that, in turn, may allow us to begin treatment sooner,” said John R. Pruett Jr., MD, PhD, co-senior author and an associate professor of child psychiatry.

The researchers scanned the brains of more than 200 sleeping toddlers. The next day, researchers watched to see how often the children initiated joint attention.

Those less likely to initiate joint attention had strong connections between their brains’ visual and dorsal attention networks. The dorsal attention network keeps focused attention on something while still allowing the brain to respond to other sensory information.

Those more likely to initiate joint attention had stronger functional connectivity between the visual and the default mode networks. The default mode network is most active during quiet rest or daydreaming but generally shuts down while one is focused on a challenging task.

First author Adam T. Eggebrecht, PhD, an instructor in radiology, said the visual and default mode regions tend to work together, while the visual and attention regions tend to decouple: “In these scans we’re seeing something like a fingerprint of how brain networks coordinate activity.”



# Building connections

A new campus plan brings communities together and improves the experience for employees, patients, students and visitors.

BY GAIA REMEROWSKI

# Serendipity as strategy

Over the past few years, Washington University Medical Center has been abuzz with construction, renovation and relocation of many departments. Behind this seemingly chaotic scene is a highly structured physical campus plan aimed at better integrating education and work spaces, student housing, pedestrian paths, and retail and social offerings. The hope behind such efforts is to forge new connections and improve the overall experience for those who frequent this bustling urban campus.

“Our goal is to bring people together in ways they haven’t connected before and to make our campus more inviting for visitors, patients, students and employees,” said Melissa Hopkins, the school’s assistant vice chancellor and assistant dean of operations and facilities management.

Working with hospital partners and the neighboring Cortex Innovation Community, planners have undertaken a comprehensive review — looking at everything from changing health-care needs and daily traffic patterns to operational efficiency and sustainability.

The key objectives: enhance education, drive talent, improve access and safety, expand clinical care and achieve better health outcomes.

- COLLABORATION
- AMENITIES
- STUDENT LIFE
- PATHWAYS
- CLINICAL CARE



## COLLABORATION

Many operational and administrative services of the medical school and BJC HealthCare now are housed together in the new **Mid Campus Center**, located in the heart of campus. The 12-story building includes a **joint emergency command center** and **enhanced meeting rooms** and consolidates the school’s administrative offices, including the Dean’s office, Human Resources, General Counsel, Finance, Medical Public Affairs and others. This **single administrative location** aims to encourage efficiency and eliminate technological redundancies, while allowing for **serendipitous collisions** and collaborations. New faculty offices free up space in clinical care buildings, allowing for expanded patient services. Integrating safety operations also provides an additional level of campus security.

## CLINICAL CARE

The medical school’s clinical practice has tripled in size over the past 15 years. Visits to the **Center for Advanced Medicine** are expected to continue to grow to 500,000 by 2020. Five floors of the **Center for Outpatient Health** administrative offices have been moved to the Mid Campus Center to make way for this **increasing patient volume**. This has allowed for multiple clinical programs to expand, including **additional oncology infusion bays**. The medical school also is working with hospital partners to improve signage, valet service, pathways and operations with the goal of **enhancing the patient and visitor experience**.





## AMENITIES

Amenities include: a **Kaldi's Cafe** in the Mid Campus Center, **Farmstead** cafe serving locally sourced food in the McDonnell Pediatric Research Building, and an improved, dedicated space for food trucks, complete with **green space** and picnic benches. A new **bookstore** in the Mid Campus Center includes a **FedEx kiosk**. A larger FedEx facility will open in the Clinical Sciences Research Building link. Expanded and improved **lactation rooms** aim to reduce barriers to breastfeeding for all new mothers on campus.



## STUDENT LIFE

To enhance the student experience and revitalize historic sites, **apartment-style housing** is being built in the original Central Institute for the Deaf and the original Shriner's Hospital. The facilities will house 197 beds, additional common space for **expanded fitness and recreation opportunities**, a **music room** and **community center**. In this increasingly digital age, Bernard Becker Library has removed three floors of stacks to create a centralized **interactive educational hub** with space for **education offices** and all their affiliated services. The library also will house the **Feuerstein Health and Wellness Information Center** that will bring together services and resources for students, faculty and staff.



## PATHWAYS

Plans to improve campus access and safety include enhancing the Central West End **MetroLink arrival experience** with an extended platform and better pedestrian circulation routes and adding a **new station east of Boyle Avenue**. Already completed: an elevated walkway **link**, which now connects four employee garages to the hospitals and west part of campus, a new 3,000-space **Duncan Central Garage**, defined **bike** and **pedestrian pathways**, additional and **clearer signage**, and new **traffic signals and turn lanes** to make intersection crossings easier.







In Africa, Assistant Professor Rupa Patel, MD, MPH, meets with team members from Jhpiego. This non-profit organization works with Kenyan governmental leaders to implement HIV prevention throughout the country.

# Gateway to care

**Fighting social stigma and barriers, doctor seeks to prevent HIV infections worldwide.**

BY KRISTINA SAUERWEIN

In 1978, during the infancy of the AIDS epidemic, reports about isolated cases of gay men suffering from a rare lung infection and an aggressive cancer began trickling in to the Centers for Disease Control and Prevention (CDC).

That same year, Rupa Patel was born in the Midwest to immigrants from rural Indian villages. While her parents worked long hours in medicine and business, Patel became family mama-bear, a persistent protector helping her non-English speaking, illiterate grandmother as well as her little brother — who never quite fit in — navigate life in white suburban Michigan.

By the time Patel earned a medical degree in 2004, her brother had acknowledged he was gay, and she had discovered a passion for treating people who were emotionally vulnerable, socioeconomically disadvantaged and at risk for contracting human immunodeficiency virus (HIV), the virus that causes AIDS.

For Patel, MD, MPH, Washington University School of Medicine — with its international reputation for developing HIV/AIDS prevention and treatment therapies — beckoned. She arrived on campus in 2013 as an instructor of medicine in the Division of Infectious Diseases.

**I** knew this would be an excellent place for me to make an impact on the community as well as in the medical field,” said Patel, who favors her division’s emphasis on hands-on research and community outreach. “Also, importantly, the HIV/AIDS scientists here are world-renowned.”

Their influential body of work ranges from research on the potent multidrug AIDS “cocktails” developed in the 1980s to ongoing analysis of the relationship between the virus and inflammation to recent studies on the role of gut microbial communities in HIV/AIDS. Such efforts have helped to commute AIDS from a death sentence that, thus far, has claimed 35 million lives globally to a chronic and manageable disease, with treatments that provide a normal life expectancy.

Patel’s mission is to prevent HIV infections altogether. From urban St. Louis to the rural Midwest to remote African and Asian villages, Patel advocates for a once-daily pill called PrEP, which stands for “pre-exposure prophylaxis.” Studies have shown that pre-emptive use of this antiviral drug, when taken consistently, decreases the risk of HIV infection more than 90 percent. In illicit drug users who share needles, PrEP is more than 70 percent effective at reducing risk.

PrEP contains Truvada, which the U.S. Food and Drug Administration approved in 2012 as “an important milestone in our fight against HIV.” The CDC and World Health Organization (WHO) also endorse PrEP.

“PrEP is a game changer for HIV prevention,” said Patel, director of the PrEP Program at the Washington University Infectious Diseases Clinic and a PrEP advisory group member for the WHO.

In her various roles, Patel has helped revise international PrEP guidelines and consulted for PrEP programs in places such as Brazil, South Africa and, most recently, India and Kenya. HIV rates in these countries are especially high among teens and young women who work in the sex industry. “PrEP’s public health implications are profound,” Patel said.

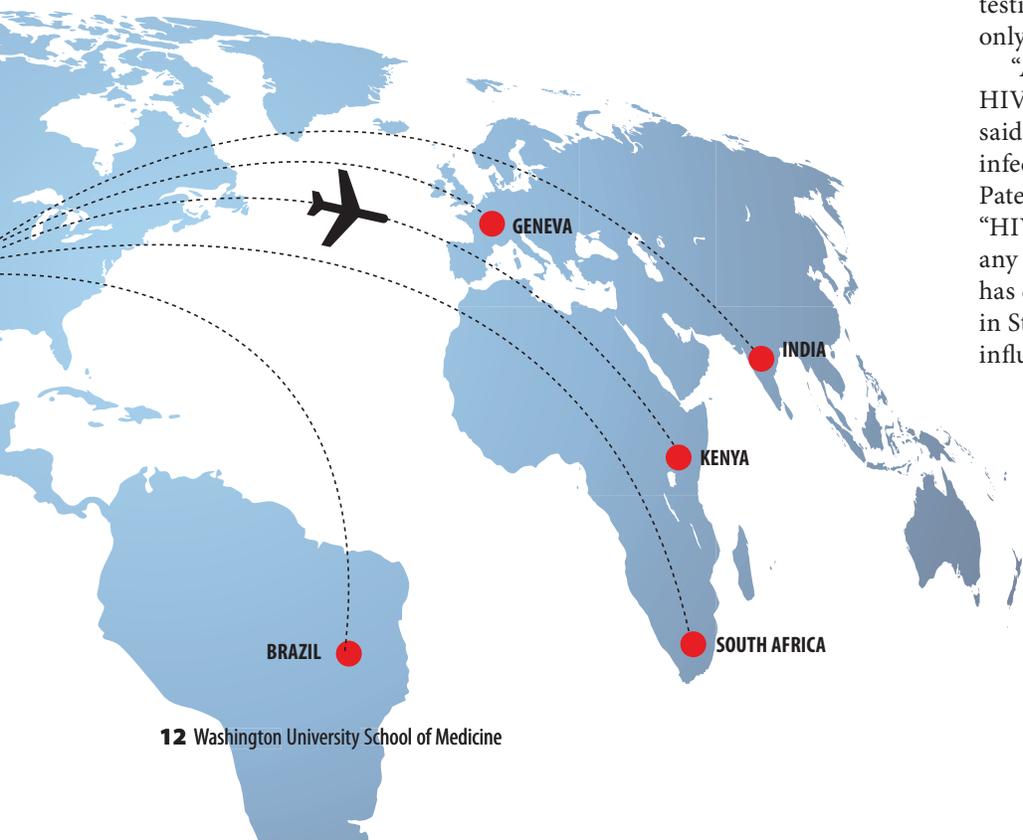
The CDC estimates that 1.2 million Americans live with HIV; of those, approximately two-thirds are not in treatment. Yearly, 40,000 people in the U.S. receive an HIV diagnosis, but those numbers have declined about 19 percent since 2005.

However, HIV rates are climbing among certain populations — in men who have sex with men and in African-Americans and other minorities. Reasons include a lack of health-care access, cultural and social stigmas and an overall distrust of the medical profession, a particular problem in the African-American community.

“It is critical to knock down these barriers,” said Patel, noting that the HIV-infected who are untreated or undiagnosed are the most likely to transmit the virus.

Other preventive treatments also are advancing. Patel, along with Rachel Presti, MD, PhD, the HIV director of the school’s AIDS Clinical Trials Unit, and other investigators, are leading a clinical trial testing an injectable drug that prevents HIV and only needs to be given every two months.

“Although AIDS is no longer a death sentence, HIV prevention remains a public health priority,” said William G. Powderly, MD, co-director of the infectious diseases division and one of the reasons Patel wanted to work at the medical school. “HIV/AIDS is not a situation that is going away any time soon. In a short period, Rupa Patel has done a remarkable job establishing PrEP in St. Louis and globally while also conducting influential research,” added Powderly, who also



**Rupa Patel, a PrEP advisory group member for the World Health Organization, travels around the globe raising awareness about HIV prevention.**

is the J. William Campbell Professor of Medicine and the Larry J. Shapiro Director of the Institute for Public Health. “She has become a leading expert on PrEP.”

## Serving at home and abroad

Truvada combines two medications — emtricitabine and tenofovir disoproxil fumarate, both used in HIV treatment regimes. For people exposed to HIV, Truvada inhibits virus replication while typically causing minimal side effects.

“It’s a primary prevention strategy like taking aspirin daily to prevent a heart attack,” Patel said.

Since 2014, Patel has led PrEP clinical trials in St. Louis with a focus on raising awareness among primary care physicians and high-risk individuals.

The drug — which costs approximately \$1,500 for a 30-day supply — is covered through health insurance or financial assistance from the manufacturer.

Patel sees patients in the Washington University PrEP clinic on campus and also monitors patients at a pharmacy-based clinic in a neighboring strip mall. PrEP patients undergo quarterly checkups and receive HIV testing.

“PrEP has been called the gateway to primary care for some at-risk populations. It’s important to seize this opportunity to connect this group with other prevention services,” Patel said.

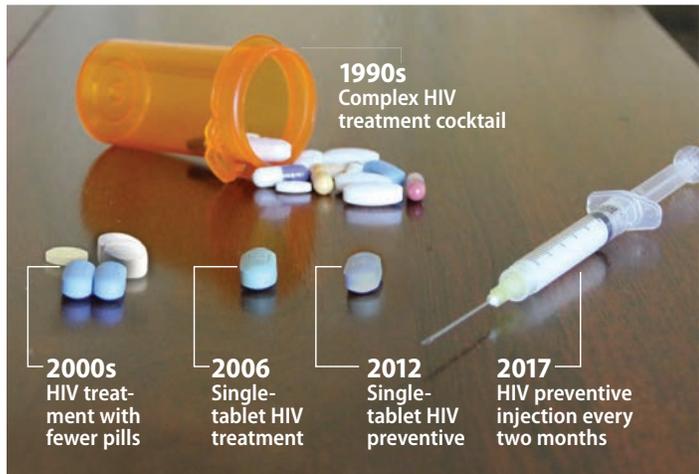
Despite published research acknowledging PrEP’s effectiveness, the drug is not widely prescribed. One-third of primary care physicians and nurses don’t know it exists, a 2015 CDC report found. PrEP programs are at various stages of implementation in the U.S., Canada and Australia, as well as clusters of countries across the globe.

At an international HIV research conference in 2016, Patel presented an analysis on missed opportunities for PrEP. Based on surveys of 102 patients in St. Louis, her research found two-thirds had asked their primary care physicians for PrEP but were not prescribed it. The physicians cited discomfort with discussing the medication, in part, because they knew little about it.

“Many physicians see PrEP as unnecessary because they believe their patients can just use a condom to prevent HIV,” Patel said. “But condoms are not 100 percent effective. The best scenario is to use both a condom and PrEP because, together, the likelihood of contracting HIV is miniscule.”



ROBERT BOSTON



SARA MOSEER

TOP: Bill Powderly, MD, right, holds an Outlook magazine cover from summer 2001 featuring his work with the multidrug “cocktails” then prescribed for patients living with AIDS. Rupa Patel holds the single daily pill called PrEP that now can help prevent HIV infections. Bottom: Therapies for HIV and AIDS have grown increasingly manageable.



Over the past 30 years, David B. Clifford, MD, left, and Lee Ratner, MD, PhD, have conducted groundbreaking research on HIV, AIDS and related treatments.

## Moving science forward

Researchers propel AIDS from death sentence to chronic disease

As the mysterious AIDS epidemic gripped the world in the 1980s, scientists at the School of Medicine went to work, contributing to groundbreaking research on HIV, as well as treatments such as the highly active antiretroviral therapy, commonly known as the AIDS drug cocktails.

In 1985, Lee Ratner, MD, PhD, the first to sequence HIV while at the National Institutes of Health (NIH), joined the School of Medicine and helped to steer HIV/AIDS research to prominence.

More than three decades later, Ratner, the Alan A. and Edith L. Wolff Professor of Oncology, is internationally renowned for his research on HIV and AIDS-related cancers and has been involved in dozens of clinical trials affiliated with the NIH's AIDS Malignancy Consortium.

In 1987, Washington University expanded its research opportunities by establishing the AIDS Clinical Trials Unit (ACTU), part of a prestigious national network known collectively as the AIDS Clinical Trials Group and funded by the NIH.

"Since the beginning of the AIDS epidemic, Washington University has been a significant, productive contributor to HIV/AIDS research and treatment therapies," said David B. Clifford, MD, ACTU director and the Melba and Forest Seay Professor of Clinical Neuropharmacology in Neurology. "Research here and worldwide is leading toward a cure for AIDS. Not long ago, I would have thought it improbable. But the science is moving forward."

At Washington University's ACTU, approximately 20 studies are underway examining all aspects of the disease. Clifford is leading research on whether statins reduce

heart attacks and strokes in HIV patients, who are more likely to develop heart disease than people without the virus. "The study is looking at starting the drugs earlier than in the general population for our HIV patients in an effort to reduce these complications," Clifford said.

Former ACTU Director William G. Powderly, MD, was a key researcher in evaluating the AIDS cocktail drugs, a concoction that decreased viral levels so patients could live longer. More recently, his research has focused on understanding long-term side effects of HIV medications, particularly metabolic problems such as diabetes, lipid abnormalities and osteoporosis.

"From a scientific perspective, it is incredible that over the past 30 years, the AIDS epidemic went from a deadly disease to a preventable, manageable and chronic disease," Powderly said.

...Continued from page 13

More people at high risk for HIV would take PrEP if they understood it better, said Matt Swango, 39, a social worker at Saint Louis Effort for AIDS who works with Patel on PrEP outreach. “Many people say PrEP has taken the fear out of sex so they are able to get on with their lives,” he said. “It’s incredible if you compare it to the 1980s when people were literally dying in the streets. Younger people may not realize how far we’ve come because they’ve always lived in a world with AIDS.”

Critics cite concerns such as PrEP’s lack of protection against sexually transmitted diseases as well as its dependence on people remembering to take a pill every day. There also is fear that PrEP will increase sexual promiscuity; however, studies have shown otherwise.

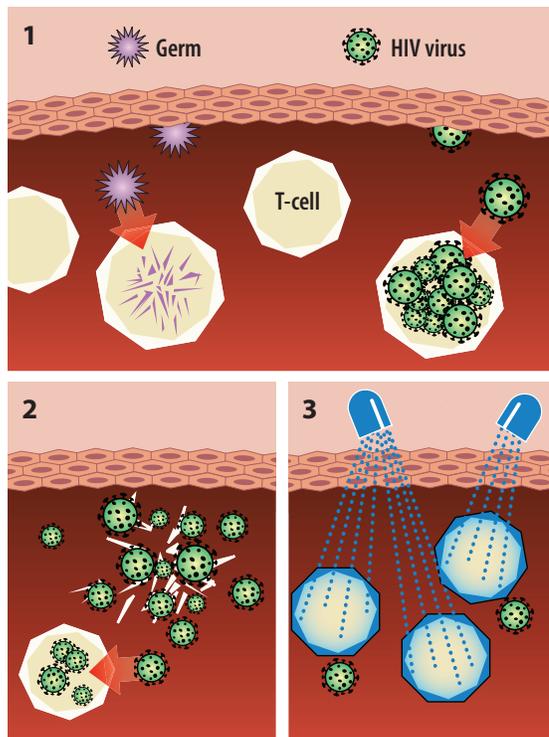
“One of PrEP’s biggest obstacles is a major reluctance to talk about sexual practices and sexual health in our society,” Patel said. “Men who are having sex with men may feel uncomfortable talking to a physician while physicians do not always view it as their role to discuss sexual health. Some never ask about a patient’s sexual preferences. This is a missed opportunity to identify a person who may be at risk for HIV.”

## Talking frankly about sex

Patel never misses an opportunity to discuss PrEP, said Dave Rueschhoff, 35, one of Patel’s patients who takes PrEP as “an additional layer of security regarding HIV prevention.”

Rueschhoff, who helps Patel with PrEP outreach and serves as a member of the community advisory board for the PrEP injection study, said Patel has a special talent for connecting with others. “She is caring and genuinely respects all individuals,” he said. “Dr. Patel knows her patients’ culture and asks about their lives. She uses LGBTQ (lesbian, gay, bisexual, transgender and queer) language to assess risky sexual behaviors. She is not judgmental about anything people tell her and that makes them feel comfortable opening up to her. Talking explicitly about sex does not faze her.”

Indeed. Patel distributes PrEP flyers everywhere she can, visits LGBTQ nightclubs and bathhouses to educate owners about PrEP, advertises on social media and coordinates community outreach through events and LGBTQ phone apps.



SARA MOSER (SOURCE: WHATISPREP.ORG)

**Preventing HIV infection:**  
1. The body can fight off and destroy most germs (purple) before they replicate, but HIV (green) infects immune cells called T cells. 2. HIV uses reverse transcriptase to rapidly copy itself inside the T cell. The T cell bursts, causing the virus to spread. 3. PrEP is a combination of two medications called emtricitabine and tenofovir disoproxil fumarate, which are nucleoside reverse transcriptase inhibitors. These two medications block the virus from entering the body’s immune cells and, thus, prevent HIV infection.

A craving for ice cream recently led Patel to Boardwalk Waffles & Ice-Cream, a new eatery in a trendy, LGBTQ-friendly St. Louis neighborhood.

“Can I hang a PrEP information poster here?” Patel asked co-owner Keith Cotton.

Patel chatted with Cotton about business, everyday life and PrEP. “I want you to know about PrEP in case customers see the poster and ask about it,” Patel said, eating an ice cream waffle.

Patients and colleagues agree that Patel’s blunt, yet empathetic, approach is a key strength in helping patients. It’s one she learned before graduating from medical school. In 1999, her 17-year-old brother came out as gay. “I went to LGBTQ dance clubs with him and immersed myself into his world to gain insight into what he was going through,” Patel said.

“My experience with my brother showed me how to approach communities at risk for HIV, de-medicalize or de-stigmatize sexual health, and create a clinic environment that offers more support and comfort for individuals.

“Washington University continues to be at the forefront of ending HIV because its physicians combine compassion with outstanding research.” □



An Air Force trauma team is activated at Bagram Air Base in Afghanistan.



# Battlefield to bedside

**High-intensity military medicine spurs  
innovations for civilians, too.**

BY REBECCA BOYLE

In a war zone in Afghanistan, a roadside bomb explodes and shrapnel tears through a U.S. soldier. The blast hurls him to the ground, and blood begins to flow from multiple wounds.

The soldier described here — a composite based on actual cases — faces a terrifying prospect: losing too much blood to survive before making it to a medical center. Bleeding out is the leading cause of potentially survivable deaths on the battlefield.

In this sandblasted combat setting, military medics must race to slow the bleeding and get the soldier to better-equipped facilities. To do this, they lean on skills they learned more than 7,000 miles away at Washington University School of Medicine prior to deployment. Their efforts are the first step in a long chain of military actions that ultimately will bring the injured war fighter home.

Surgeons and researchers here are training military medics in frontline readiness, inventing ways to control and replace blood loss, and shaping U.S. military-civilian trauma care policies. These efforts are positioning St. Louis as a national hub for research and control of traumatic bleeding, which could save not only lives like the soldier's, but that of civilians, too.



**W**hen the wounded soldier in Afghanistan is stable enough to move, a helicopter flies him to the next triage station: a tent hospital with equipment stored in canvas bags for easy transport in an emergency.

Doctors invoke a “walking blood bank,” and military personnel pre-screened for blood donation rapidly assemble. Within 30 minutes, one unit of whole blood is collected, and then transfused to the patient, while a surgical team works to control the bleeding.

## Pre-deployment trauma training

Before entering the war zone, many of these medical practitioners were trained in situations that mimic battlefield conditions — and they did it in St. Louis. The School of Medicine is the newest partner, along with the U.S. Air Force and SSM Saint Louis University (SLU) Hospital, in a national program called the Center for Sustainment of Trauma and Readiness Skills (C-STARS).

In C-STARS, military medical technicians, nurses and doctors undergo 19 two-week sessions yearly at one of five national training sites. Covered topics include: care under fire, pre-hospital triage, hemorrhage control and the particulars of air evacuation. In short, medics are trained to use the latest field-ready innovations to sustain life.

When these physicians and medics are not deployed to a war zone, they may work in private practice or be reservists on military bases in the U.S. Their daily work typically is nothing like a war hospital. Yet, next year or the year after, they may get redeployed and thrown into situations

**Col. Gerald Fortuna, MD, director of the C-STARS program and a vascular surgeon at the medical school, leads a REBOA training exercise. Developed by the military, REBOA (Resuscitative Endovascular Balloon Occlusion of the Aorta) is a relatively new blood-control technique only available at a handful of medical institutions. Using an ultrasound wand, trauma medics can guide placement of a catheter into the femoral artery and inflate a balloon to block the blood vessel. That way, a patient’s heart can still pump blood to the brain, without pumping it out of the open wound.**

where they need to be at the top of their game.

“It’s easy for skills to erode if you spend too much time at your home base,” said Col. Gerald Fortuna, MD, director of the St. Louis C-STARS program and a vascular surgeon newly recruited to the School of Medicine. He holds joint appointments at Washington University and Saint Louis University.

“Back at home, the No. 1 surgical procedure in our hospitals is delivering babies,” he said. “That’s drastically different than being over in Iraq or Afghanistan, where we’re seeing traumatic amputees, burns, multiple high-velocity gunshot wounds. When we go downrange,” — military term for deployment — “everything gets turned upside down.”

Washington University’s partnership with C-STARS ensures new training opportunities in this arena, even as the armed forces wind down their involvement in countries such as Afghanistan and Iraq, Fortuna said.

While St. Louis’ busiest hospital — Barnes-Jewish — is no battlefield, the principles of high-intensity emergency medicine are the same, said Timothy J. Eberlein, MD, the Bixby Professor of Surgery and head of the Department of Surgery. Barnes-Jewish cares for about 13,000 trauma patients each year, with a 99 percent survival rate.

“Not many of us get exposed to high-percussive bombs and armor-piercing bullets like our troops do,” Eberlein said. “But it’s the principles that we all benefit from: How do you stem blood loss? How do you treat the person who has had multiple traumatic injuries? How do you quickly get them out of the field and into a triage of care, in a stepwise progression?”

St. Louis is the oldest C-STARS site, established 15 years ago in partnership with SLU. With Washington University’s entry into the program, C-STARS can leverage the medical school’s many strengths, Eberlein said. Training now takes place on both campuses, and Washington University has plans to recruit more emergency physicians and trauma surgeons in connection with the program.

Eberlein added that the medical school has a long track record of translational research on acute and critical care, trauma surgery and cooperation with the U.S. Defense Department, plus a strong research program focused on traumatic bleeding.

“C-STARS brings concepts from the military that we can adapt, and it makes Washington University and the Department of Surgery better,” said Eberlein, who lobbied for the collaboration.

“But there are things we do that are going to help them. It’s an exchange. It really is a partnership.

“These are women and men who put their lives on the line, and develop the casualty programs that take care of our troops. If we can help in keeping their skill levels at the highest level, well, that’s a way for us to give back, frankly.”

## How to save a life

As part of the care continuum, the wounded soldier in Afghanistan is moved again — from the austere tent to a Combat Support Hospital at Kandahar Air Base.

After another surgery, he flies on a cargo plane to Landstuhl, Germany, home of the only Level 1 trauma center not on U.S. soil to be certified by the American College of Surgeons. The next day, teams of medics and military workers ready the soldier for his flight across the Atlantic Ocean. Injured U.S. troops ultimately are sent to Walter Reed National Military Medical Center in



Timothy J. Eberlein, MD, center, head of the Department of Surgery, leads a cohort of military personnel on a tour of the Medical Campus. Above, Maj. Gen. Robert D. McMurry Jr., left, and Brig. Gen. Mark A. Koeniger.



During Operation Iraqi Freedom in Baghdad, critical care doctor Phil Spinella, MD, right, first became interested in the efficacy and safety of blood products for the treatment of shock.

Bethesda, Maryland; Brook Army Medical Center in San Antonio; or Balboa Naval Medical Center in San Diego.

“With the whole operation running, it would not be uncommon for somebody to be injured on the battlefield and wake up in 72 hours in the U.S., having received three, four or five operations in that time,” said Fortuna, who served two tours of duty in Afghanistan. It’s one reason

why, in the most recent conflict in Afghanistan and Iraq, the U.S. armed forces experienced the lowest case fatality rate in the history of modern warfare, he said.

“If you made it off the battlefield, and made it to that tent hospital with a surgeon, your survival rate was over 98 percent. We were actually exceeding civilian hospitals, and with a higher acuity level,” Fortuna said.

It wasn’t always this way. Almost one-fourth of Americans who died in conflict during the past decade perished from wounds they might have survived given the proper care, according to a report from the military’s Joint Theater Trauma

System. This finding led the secretary of defense to impose standards for pre-hospital transport times in an effort to reduce death from severe bleeding.

Hemorrhagic shock is defined as a loss of more than 20 percent of the body’s blood supply. At its most basic level, bleeding occurs because blood vessels have ruptured. Injury, surgery, childbirth, infections and cancer therapy all can cause or promote serious bleeding. In the U.S., about 30,000 people die each year from preventable conditions after their initial injury, often due to inadequate therapies or untimely access to care.

If physicians can stop this bleeding, seal torn vessels and replace lost blood, they can save a person’s life. Washington University researchers are searching for novel ways to do this, including improved blood products, artificial blood and blood-clotting mechanisms.

## The case for whole blood

During Operation Iraqi Freedom in 2004, critical care doctor Phil Spinella, MD, and his Army colleagues couldn’t wait any longer for blood supplies to arrive in Baghdad. They rolled up their sleeves and gave their own blood directly to the casualties. Surprisingly, it worked better; hemorrhagic shock

*“It’s not intended to replace human transfusion, but to push transfusion capability into more austere settings.”*

*— Allan Doctor, MD*

**FROM THE COVER** ErythroMer is a red blood cell substitute formulated from purified hemoglobin. A polymer coating is “immune silent,” so anyone can accept the artificial cells regardless of blood type.



resolved sooner in patients receiving whole blood versus separated blood components (platelets, red blood cells and plasma) shipped from home.

“When you take blood and split it into components, it’s much more diluted. That affects blood’s ability to stop bleeding and to carry oxygen,” said Spinella, who served as active-duty Army for 12 years, earning the Bronze Star and Combat Medic Badge for providing care under fire.

It was during this deployment that Spinella became interested in the efficacy and safety of blood products for the treatment of shock.

Today, he is director of the Pediatric Critical Care Translational Research Program at St. Louis Children’s Hospital, director of the Blood Research Program and professor of pediatrics. He studies transfusion outcomes in children and adults with severe bleeding and the effects of red blood cell storage times on recovery.

Based on research and testimony provided by Spinella, the U.S. surgeon general issued changes supporting increased ratios of both plasma and platelets to red blood cell units for military casualties with severe hemorrhage.

Nationally, Spinella has been a vocal advocate for trauma care improvements. As part of a National Academy of Sciences committee, he helped write a 400-page report to ensure that lessons learned from the military’s experiences in Afghanistan and Iraq are integrated into future combat operations and into the civilian trauma system.

And following the Boston Marathon bombing and resulting concerns about inadequate blood supplies in the wake of terrorist attacks, Spinella organized a full-day conference at the White House for the National Security Service. Spinella said he felt it was important to expose the fact that all major U.S. cities are at risk of running out of blood in any mass-casualty event. Most emergency preparedness efforts focus on evacuations, he said, not on the blood supply. He advocates a whole-blood program in which pre-screened donors could be alerted to report to U.S. collection centers.



## Substitutes for real blood

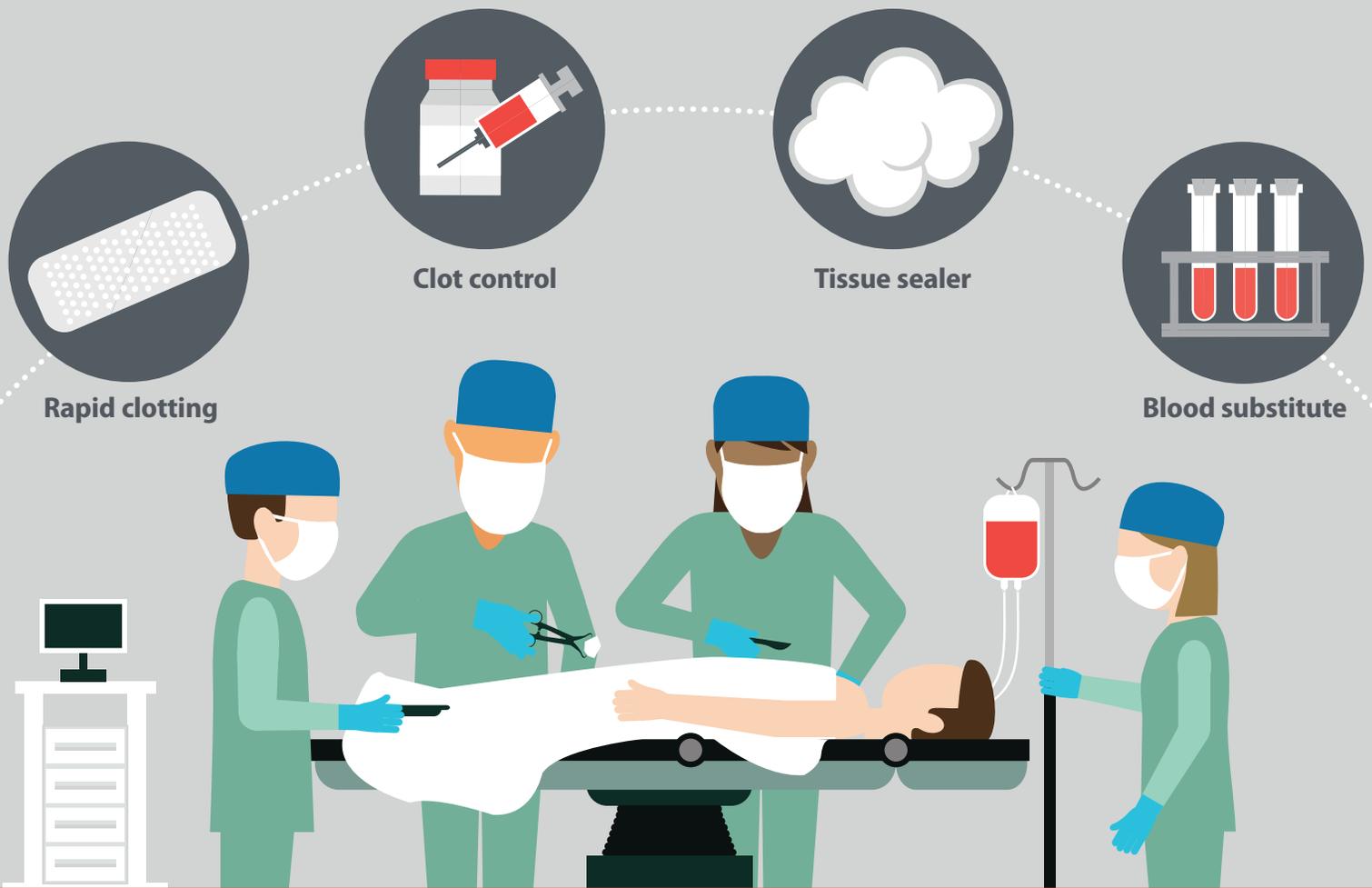
For more than 80 years, researchers have searched for artificial blood substitutes. The need is clear: in acts of mass violence, on the battlefield and in remote locations. Now, the School of Medicine is on the forefront in developing them.

Researchers here believe that red blood cells — in a powdered form — might be available to trauma patients within 10 years. This powder could be stored in a backpack for a year or more and reconstituted with water when needed. By contrast, fresh blood can be stored for about 40 days. Unrefrigerated, it only lasts a few hours.

Allan Doctor, MD, professor of pediatrics, immediate past director of the Division of Pediatric Critical Care and associate professor of biochemistry and molecular biophysics, worked with Spinella, Gregory M. Lanza, MD, PhD, the Oliver M. Langenberg Distinguished Professor of Science and Practice of Medicine, and Dipanjan Pan, PhD, (now at the University of Illinois at Urbana-Champaign) to create an artificial red blood cell that can pick up oxygen and transport it through the body, as a human red blood cell does.

The artificial cells, called ErythroMer, are made from purified hemoglobin, the oxygen-transporting component of red blood cells. The cells are freeze-dried into a powdered form. A polymer coating

Allan Doctor, MD, left, lead developer of ErythroMer, and research specialist Shivam Shah compare the vascular reactivities of artificial and real red cells. Emulating red cell physiology is a novel, unique feature distinguishing ErythroMer from other blood cell substitutes.



## Innovations in blood control and replacement

New options buy time, increase the odds for trauma patients

### EVARREST® Fibrin Sealant Patch



EVARREST contains two human biological components: fibrinogen and thrombin. When applied to a bleeding area, moisture causes the substances to react together, leading to rapid clot formation. In about eight weeks, the body absorbs the patch material. EVARREST does not require preparation, mixing, moistening with saline or refrigeration, and has a shelf life of 30 months.

### TAMPITI trial



Tranexamic acid, or TXA, reduces the breakdown of clots that form with bleeding and has been shown to minimize blood loss in patients with hemophilia, a genetic clotting disorder. Researchers are evaluating the drug's safety and optimal dosage in trauma patients. Patients who require at least one unit of blood or immediate transfer to an operating room are eligible for the trial.

### ClotFoam®



ClotFoam might help in cases in which a patient is bleeding so badly that compression of the wound doesn't help, in the operating room and on the battlefield. When mixed and injected, the adhesive hydrogel spreads throughout the body cavity, sealing lacerated tissue and promoting clotting. The product's technology generates a 3-D scaffold that carries a fibrin sealant.

### ErythroMer



This nanoparticle-based red blood cell picks up oxygen from the lungs and detects where it should be delivered based on the pH level of the blood. The cells are made from purified human hemoglobin and coated with synthetic polymer. As hemoglobin can cause blood vessel constriction — increasing the risk of heart attack and stroke — the coating is a key differentiator to past attempts.

is “immune silent” so anyone can accept the powdered blood cells regardless of blood type.

Of course, red blood cells perform many functions beyond carrying oxygen. Artificial blood never will replace the real thing, but it can buy critical time for a wounded patient.

“It’s not intended to replace human transfusion, but to push transfusion capability into more austere settings,” Doctor said.

Clinical trials in small animals already have shown success, and the researchers are moving into larger animal studies.

The researchers’ vision extends beyond the battlefield. Such a substitute could be stored where people congregate — in stadiums, malls and other public venues that might fall under large-scale terrorist attacks.

## Stopping the bleeding

Washington University researchers also are involved in a variety of blood-clotting innovations.

Spinella and Grant Bochicchio, MD, MPH, the Harry Edison Professor of Surgery and chief of the Section of Acute and Critical Care Surgery, are studying the use of a tranexamic acid, a blood-clotting drug that could improve survival.

The trial, Tranexamic Acid Mechanisms and Pharmacokinetics in Traumatic Injury (TAMPITI), received the first consent exemption ever granted by the School of Medicine’s Institutional Review Board. Patients who arrive at Barnes-Jewish Hospital with traumatic injuries requiring transfusion are automatically placed in the trial, and informed that they received the drug after they are stabilized.

Sometimes a drug might not be enough to help clot a wound; in that case, the FDA-approved EVARREST patch could help. It looks like ordinary cotton gauze, but the patch contains blood-clotting agents, so it not only seals a wound, but also actively works to stop blood from flowing, explained Bochicchio, who was involved in the development.

In addition, use of specialized foam to stop severe internal bleeding due to trauma is a step closer to reality, largely through Bochicchio’s efforts.

He is principal investigator of a phase I clinical trial evaluating the safety of ClotFoam. The foam, administered via an applicator device during surgery, binds to the bleeding site and fills the body cavity.

“That way, you can get the patient to a surgeon further afield. It’s kind of like ‘fix-a-flat’ technology, if you will,” he said. Bochicchio also has worked at the R. Adams Cowley Shock Trauma Center in Baltimore, which is another C-STARS center.

Bochicchio and colleagues already have established the foam’s effectiveness in animals; their clinical trial evaluates safety and effectiveness in humans.

In the future, a wounded soldier like the one in Afghanistan might face better odds because of technology and protocols developed or tested in St. Louis — from a transfusion of ErythroMer or whole blood, to the EVARREST patch and ClotFoam, to seamless triage and transport.

While all these changes would improve a wounded war fighter’s chance of survival, the truth is that these advances benefit civilians, too. Spinella said all types of patients could have better outcomes — adults and children alike, trauma and surgical patients and those with internal bleeding.

“This affects everybody, no matter who you are.” □



Grant Bochicchio, MD, MPH, and a colleague assemble the device used to apply a specialized foam to control severe bleeding in trauma patients. Bochicchio is heading a clinical trial testing its safety and effectiveness in humans.



# Match Day

March 17, 2017  
Eric P. Newman Education Center

On Match Day, thousands of graduating medical students across the country simultaneously find out where they will head for residency training.



With 137 graduating students, the Class of 2017 at Washington University is exceptionally large and also boasts an exceptional match rate — 96 percent as compared to the national match rate of 94 percent.

**31** Internal Medicine   **13** Emergency Medicine   **13** Pediatrics   **9** Obstetrics-Gynecology   **9** Radiology   **6** Orthopaedic Surgery   **6** Anesthesiology

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ORTHOPAEDIC SURGERY  
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Sunmin Park  
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See more photos online:  
[wumcnews.org/match2017](http://wumcnews.org/match2017)

# Caring for mom & baby

BY HILARY DAVIDSON

**Children's outcomes improve when perinatal mental health issues are addressed.**

**R**obin Torrence-Webber was thrilled when, at 37, she became pregnant with her second child. But a diagnosis of preeclampsia and an emergency caesarian section at 23 weeks presented a difficult reality. Babies generally are not considered medically viable before 24 weeks of gestation.

She woke to learn that her newborn son, Baby Ray Webber III, who weighed just 1 pound, 1.6 ounces, had been taken from Barnes-Jewish Hospital to St. Louis Children's Hospital, where doctors were trying to save his life.



From left, Robin Torrence-Webber with her son, Baby Ray, and therapist Anna Constantino-Pettit, MSW '14.

Three days later, Torrence-Webber finally got to see her baby. “He was so little,” she said. “He could literally fit in the palm of my hand.” Torrence-Webber spent days and nights at the neonatal intensive care unit (NICU), not knowing if her son would survive.

While Ray clung to life, Torrence-Webber grew more anxious and depressed. She was torn between taking care of her daughter at home and visiting Ray in the NICU.

“I was having anxiety attacks,” she said. “I couldn’t sleep. I couldn’t function.”

Torrence-Webber sought help after NICU staff told her about the Perinatal Behavioral Health Service (PBHS) at the School of Medicine. The PBHS offers counseling and psychiatric care for pregnant women and new mothers with anxiety or depression.

## Physical, emotional toll on baby

Fifteen percent of women experience perinatal anxiety or depression. Although women with a history of psychiatric disorders are predisposed to the condition, it can strike anyone. For women with babies in the NICU, the number jumps to 40 percent. Parents of babies in the NICU undergo enormous stress and often face unaddressed mental health issues.

Cynthia Rogers, MD, one of the PBHS founders, determined that by setting up services to treat these mothers, she could improve the outcomes of their children.

Rogers, an assistant professor of child psychiatry, has studied how exposure to a parent with behavioral health issues affects brain development in young children, increasing the likelihood of childhood psychiatric disorders.

Left untreated, such issues can affect a child physically and emotionally, beginning in the womb. Studies suggest that the mother’s physiology during pregnancy can change the baby’s physiology.

Elevated levels of the stress hormone cortisol, common in depressed patients, are believed to affect development of a part of the brain called the amygdala. Other research has revealed differences in the thickness of the cerebral cortex between infants of depressed mothers and a control group. Behaviorally, such infants are at increased risk for fussiness, failure to thrive, and developmental delay at 1 year of age.

Mental health issues also affect how moms are able to care for and interact with their children. “Mothers with untreated mood disorders are less likely to engage in a host of nurturing behaviors proven to promote healthy development and attachment, including breastfeeding, being emotionally responsive and affectionate, reading, and singing to babies,” Rogers said.

Moreover, studies have shown that children whose parents have untreated mental health issues are at much greater risk to experience abuse and neglect. As they grow,



Cynthia Rogers, MD, right, co-founder of the Perinatal Behavioral Health Service, discusses the progress of infant Tycen Reisch with his mother, Stacy Reisch.

these children are more likely to develop mental issues such as depression and attention deficit/hyperactivity disorder.

“When you don’t treat moms, you see a significant impact on child mental health, academic performance and many other outcomes,” Rogers said.

## Serving a critical need

Rogers began treating parents of NICU babies in 2010 — first by meeting them in the NICU, and later via a Children’s Hospital clinic. She realized, over time, that these families needed more help than she alone could provide. As a child psychiatrist, Rogers’ schedule already was full.

At the same time, Kelly Ross, MD, assistant professor of pediatrics, was searching for a way to help anxious and depressed mothers who had delivered babies at Barnes-Jewish.

Rogers and Ross joined forces to create the Perinatal Behavioral Health Service in 2012. They chose the term “perinatal” rather than “postpartum” because the PBHS works with both new mothers and pregnant women, who are also at increased risk for depression.

Supported by grants and private philanthropy, the PBHS is a team of social workers, psychiatrists and psychologists who offer testing, counseling, medication and case management.

The service screens women for anxiety, depression and trauma at multiple locations, including the maternity floors at Barnes-Jewish, the NICU at St. Louis Children's Hospital, and the Obstetric Clinic at the Barnes-Jewish Center for Outpatient Health. The service also accepts community and self-referrals.

In Missouri, obstetrician-gynecologists commonly screen new mothers for depression at the six-week postpartum checkup. Because mental illness can affect a mother's ability to bond, PBHS screenings take place as early as eight weeks of pregnancy — potentially improving those first mother-child interactions. Rogers said women need to understand that mental health issues, such as anxiety and depression, occur commonly in pregnancy and in those often-grueling months after bringing home a newborn.

Screening is particularly important because, all too often, mothers of newborns are afraid to admit they are unhappy.

"Everybody believes that the experience of childbirth is supposed to be an ecstatic experience," Rogers said. "So when that doesn't happen, women feel that there is something wrong with them, or that they're bad mothers."

## Learning to adjust

Torrence-Webber developed coping skills through weekly sessions in the NICU with PBHS therapist Anna Constantino-Pettit, MSW '14. "Anna lifted my spirits," she said.

Talking to Constantino-Pettit helped ease Torrence-Webber's guilt as she split her time between Baby Ray and family at home. At her therapist's suggestion, Torrence-Webber began meditating and writing in a journal. Constantino-Pettit also taught Torrence-Webber to be mindful of situations that trigger negative feelings.

Perhaps most importantly, Constantino-Pettit provided Torrence-Webber a safe space to talk about her difficulties without being judged.

At 8 months of age, Baby Ray was ready to come home. Despite much progress, his homecoming presented new challenges. "I went from having 24-hour nursing care to taking care of a baby who's on oxygen and a heart monitor," Torrence-Webber said.

Once again, Torrence-Webber realized she needed help to adjust to the new routine. She and Constantino-Pettit resumed their sessions. Today, Torrence-Webber has successfully adjusted to caring for Baby Ray.

Hundreds of families have been helped through the PBHS, and Rogers remains passionate about its mission.

"Seeing parents who, even after a difficult start, are raising emotionally healthy children is the most worthwhile outcome I can think of," she said.

## Gift strengthens services for high-risk families

One St. Louis couple with firsthand knowledge of postpartum depression is boosting the efforts of the Perinatal Behavioral Health Service (PBHS). Mary Steward and David Steward II are committed to helping mothers and babies get off to the best possible start.

With a generous gift from the Steward Family Foundation, the couple created the Steward Family Perinatal Behavioral Health Service Fund to provide necessary support. The gift helps high-risk families that might not otherwise have access to mental health resources. At Barnes-Jewish Hospital, for example, many expectant moms are uninsured or on Medicaid.

The Stewards learned about the PBHS while touring the medical school. They immediately were struck by how early intervention can translate into lifelong benefits for moms and their kids.

"We like the proactive aspect of the service," said Mary Steward. "It's not waiting around for something awful to happen, but getting women help on the front end."

"To not allow someone to be lifted out of that state and have a great experience with her child because she doesn't have access to proper medical care or prescriptions — we just can't allow that to happen," she added.

The subject hits close to home: Mary Steward recalls the exhaustion and isolation she felt several weeks after the birth of her first child. Whether her depression was caused by hormonal changes, being cooped up during a bleak winter, or the transition to full-time motherhood, she said she knew that something was wrong.

"It was apparent that it wasn't just the normal 'I just had a baby and I'm a little tired from getting up in the middle of the night,'" Mary Steward said. She confided in loved ones, who encouraged her to seek medical care. The treatment was effective, and, in talking openly about the problem, the Stewards realized that so many others are affected.

"We hope that our support will help make programs like this the standard of care," David Steward II said. "It's so important that women across cultures realize that this is a common condition that can be treated."



Mary and David Steward

# Needed: 500 alumni

## Take the Warren Challenge and transform the lives of medical students

**In gratitude for financial support** and training opportunities that Bob Warren, MD/PhD '78, MPH, received at the School of Medicine, he and wife Nancy Warren, PhD, are challenging fellow alumni to give back to Washington University. The couple has issued a \$500,000 William Greenleaf Eliot Society Challenge dedicated to scholarships.

The challenge continues a long tradition of alumni helping future students. Scholarships and financial aid enable Washington University School of Medicine students to graduate with average debt of \$97,000 — well below the national average of \$180,000.

“If we can encourage 500 people to join us, together we can make a significant difference in the lives and careers of medical students,” said Bob Warren.

“Nancy and I have been members of the Eliot Society for many, many years. We’re delighted that we can now help more than we ever imagined with an additional estate gift. We hope alumni will accept our challenge and join us now as members of the Eliot Society, and also consider becoming Washington University Brookings Partners with an estate gift.”

All unrestricted gifts to the university of \$1,000 or more qualify the donor for membership in the Eliot Society. Eliot Society donations support scholarships, student assistance programs, educational resources, faculty development and recruitment, and other initiatives.

The challenge runs through June 30, 2018, the conclusion of *Leading Together: The Campaign for Washington University*.

“We want our fellow alumni to reflect upon what their experiences in medical and graduate school at Washington University have meant to them and their families,” Bob Warren said. “The extraordinary medical education I received catalyzed my professional life,” he added.

“The financial support Bob received while he was in the Medical Scientist Training Program and I was getting

my doctorate in psychology from Saint Louis University was transformative,” said Nancy Warren.

In particular, being free from medical school debt enabled the pair to pursue careers in academic medicine.

In his roles as division chief of pediatric rheumatology and immunology at the University of North Carolina at Chapel Hill (UNC) and as chief of pediatric rheumatology at Baylor College of Medicine in Texas, Bob Warren trained hundreds of physicians in the rare specialty of pediatric rheumatology. He also championed caring for chronically ill children via a team approach, which included family members and other health-care practitioners.



**Robert and Nancy Warren**

*“The financial support Bob received ... was transformative.”*

Similarly, while on the faculties of both UNC and Baylor, Nancy Warren developed transition programs to help family members cope with crises or a loved one’s mental illness. In addition to treating patients, Nancy now teaches at the Medical University of South Carolina in Charleston.

Bob Warren is still focused on quality of care, but mostly from a different angle. He is now the chief medical information officer at the Medical University of South Carolina. He continues to see children with rheumatic diseases.

Reflecting on their path, Bob and Nancy Warren want to support and transform the lives of young doctors in the same way they were helped.

### THE GOAL

**Eliot Society**

500 new or upgraded memberships



**Brookings Partners**

Through bequests or planned gifts

For information on establishing a scholarship at the School of Medicine, contact Medical Alumni and Development at (314) 935-9686 or [medicalannualfund@wustl.edu](mailto:medicalannualfund@wustl.edu).

To give securely online, visit [medicalalumni.wustl.edu/give](http://medicalalumni.wustl.edu/give).

## Find your friends.

Classnotes are organized first by year of degree/training completion and then in alphabetical order.

## How about you?

Share your news via the online form at [wumcnews.org/classnotes](http://wumcnews.org/classnotes). Submissions will be printed in a subsequent issue of Outlook magazine as space allows. Photos are welcome.

## 1960s

**Curtis J. Krock, HS 65**, retired from full-time pulmonary practice in 2001. He served with the medical residency program at Carle Foundation Hospital in Urbana, Ill., until 2003 and, as interim chief of medicine at the University of Illinois at Urbana-Champaign College of Medicine until 2005. Krock enjoys spending winters in San Francisco.

## 1970s

**Toby L. Simon, MD 70**, is senior medical director at global biotherapeutics firm CSL Behring and on the voluntary faculty at the University of New Mexico School of Medicine. He recently completed a four-year term as industry representative for the FDA Blood Products Advisory Committee. He is also senior editor of the recently published fifth edition of "Principles of Transfusion Medicine."

**Robert Weiss, MD 74**, returned to Uganda for a second year of teaching, this time to Mbale, a city in Eastern Uganda. He is at a newly established university, teaching its first fourth-year (clinical) class. His wife is accompanying him as an assistant librarian at the university. Weiss retired from office practice with Cleveland Clinic in December 2015.

## 1980s

**Linda R. Struckmeyer, OT 82**, recently earned a PhD in occupational therapy from Texas Woman's University and was promoted to clinical assistant professor in the Department of Occupational Therapy at the University of Florida.

**Ellis J. Neufeld, MD/PhD 85**, has been appointed clinical director, physician-in-chief and executive vice president of St. Jude Children's Research Hospital, based in Memphis.

In this role, Neufeld oversees the organization's academic clinical departments and all clinical operations. Neufeld previously served as associate chief of the Division of Hematology/Oncology at Dana-Farber/Boston Children's Cancer and Blood



Disorders Center. He also was medical director at the Boston Hemophilia Center and held the Egan Family Foundation Chair in Transitional Medicine at Harvard Medical School as a professor of pediatrics.

## 1990s

**Gary Steven Solomon, LA 92, OT 93**, is president of the American Society of Hand Therapists. He is manager of Chicago Metro Hand Therapy and works as a certified hand therapist. Solomon lives in Deerfield, Ill., with his wife **Debbie (nee Handler), LA 93, OT 94**, and their two daughters, Ilana and Talia.

**Bernadette Aulivola, MD 97**, was appointed director of the Division of Vascular Surgery and Endovascular Therapy at Loyola University Medical Center in Maywood, Ill., this past July.

**Parveen Chand, HA 98**, has served as the chief operating officer at Indiana University Health-Academic Health Center, Adult Hospitals, in Indiana since August 2016.

## Beloved former professor turns 100

The second physician to complete a residency within the School of Medicine's Division of Urologic Surgery (in 1949) celebrated his 100th birthday in March.

Robert Royce, MD '42, HS '49, was on the medical school faculty for 45 years, including a three-year stint as head of the urologic surgery division and 15 years leading its residency program. Teaching, Royce said, was one of the great joys of his career. To honor his legacy as a beloved professor, in 2010, the division created the Robert Killian Royce, MD, Distinguished Professorship in Urologic Surgery. Gerald L. Andriole Jr., MD, holds the professorship.

Although retired from medicine for 25 years, Royce remains active. Among his favorite pastimes: riding an all-terrain vehicle on his ranch, golfing, hiking, playing poker and spending time with friends, children and grandchildren. "I can't believe I've been so lucky," he said. "I've had a heck of a lot of fun in my life, and I'm still having fun." Royce lives in St. Louis.



Leanne Lin, MD 15, GM 13, a radiology resident at the University of Kentucky in Lexington, competes in powerlifting.

Her current stats:

SQUAT — 215 pounds

BENCH — 140 pounds

DEADLIFT — 270 pounds



## Alum co-founds online tutoring company



While earning an MD/PhD from the School of Medicine, Leonid Shmuylovich co-founded Virtual Nerd LLC, an online tutoring company. As a passionate, part-time tutor eager to reach even more students, he began recording video explanations of common trouble topics and sharing them online. He then partnered with industrial designer Josh Salcman to further enhance the platform. Virtual Nerd was developed as a supplemental learning resource, with a focus on middle school and high school mathematics. Eventually, the pair sold the business to Pearson, the world's leading education company, and helped develop Pearson's award-winning Mobile Math App.

Shmuylovich, MD/PhD '15, is now a second-year dermatology resident at Barnes-Jewish Hospital. He also completed an internship in pediatrics at St. Louis Children's Hospital, where he received the James P. Keating Outstanding Resident Award.

Shmuylovich and his wife, Ilana Rosman, MD '08, assistant professor of dermatology and pathology, live in St. Louis with their two children.

He lives in Indianapolis with his wife, Dianne, and 13-year-old son, Cameron. Their daughter, Amy, lives in St. Louis with her husband, Richard.

**Michael Finley, PhD 98**, started a new position as principal scientist in research and development at Janssen Pharmaceutical Companies of Johnson & Johnson in Spring House, Pa.

**David A. Dorr, LA 94, MD 99**, was promoted to professor at Oregon Health & Science University, where he studies how to use data, information and knowledge to improve systems for vulnerable populations. He is married to Gabrielle Meyers, an oncologist. The couple has two daughters, ages 5 and 8.

**Katherine Nowak, PT 99, EMBA 07**, became vice president for care management informatics and business support for Mercy, based in Chesterfield, Mo., in August 2016. She assumed the role of Missouri regent for the American College of Healthcare Executives in March 2017.

## 2000s

**Greg Janicki, PT 02**, works as a physical therapist in Geneseo, Ill. He invented and is patenting and manufacturing the TriForce, a functional fitness and rehabilitation tool intended to help people achieve their movement goals.

## OT honorees

The Program in Occupational Therapy is celebrating its 100-year anniversary in October 2018. As part of the Centennial Gala, the program is recognizing outstanding alumni for individual achievements in or contributions to the field of occupational therapy in research, education, leadership, professional development or community participation. This is the first time the program has offered the award. Nominations for the Distinguished OT Program Alumni Award are being accepted July 1, 2017-Jan. 31, 2018, at [ot.wustl.edu/otalumniaward](http://ot.wustl.edu/otalumniaward).

**Jonathan Chung, MD 04**, recently started a new job at The University of Chicago Medicine as associate section chief of thoracic imaging and associate professor of radiology.

**Valencia Gant, HA 07, SW 07**, was promoted to assistant director of ambulatory surgery services for Texas Children's Hospital The Woodlands.

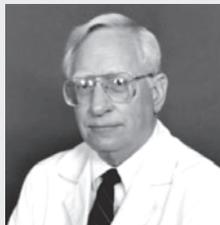
**Shandiz Tehrani, MD/PhD 08**, is an assistant professor of ophthalmology at Oregon Health & Science University, where he specializes in the clinical and surgical care of adult glaucoma. His research interests include the cellular and molecular mechanisms of glaucomatous optic nerve damage, with the ultimate goal of identifying novel pathways for therapeutic intervention.

**Amit Patel, MD 10**, recently moved to North Carolina to take a position as assistant professor of medicine in the Division of Gastroenterology at Duke University School of Medicine.

**Daniel Seitz, MD 13**, graduated from the Indiana University School of Medicine Emergency Medicine Residency Program and has started a fellowship in clinical informatics at the Regenstrief Institute in Indianapolis.

## Transplant pioneer dies at 78

Helped establish kidney transplantation program at Barnes-Jewish Hospital



**C**harles B. Anderson, MD, a former professor and director of the Division of General Surgery, died of congestive heart failure Monday, Nov. 7, 2016, at his home in St. Louis. He was 78.

Anderson's research and surgical expertise advanced the understanding of kidney transplantation and helped to establish the kidney transplantation program at Barnes-Jewish Hospital, where he served as general surgeon-in-chief.

**Charles B. Anderson, MD** He is widely respected for his work to combat organ rejection in kidney transplant patients. He proposed pre-surgical blood transfusions from organ donors, which provided recipients with protective antibodies and immunosuppression. The scientific community considered the concept controversial in the 1970s when introduced by Anderson and his associate William T. Newton, MD, a former professor of surgery. However, it since has been accepted internationally.

He and Newton also established the pediatric kidney transplant program at St. Louis Children's Hospital.

With colleague Gregorio A. Sicard, MD, a professor emeritus of surgery, Anderson developed vascular surgery into a specialty. Anderson was among the first U.S. surgeons to be certified in vascular surgery by the American Board of Surgery.

Anderson earned a bachelor's degree from Johns Hopkins University in 1958 and medical degree from Yale University in 1962. He also completed an internship and residency in surgery at then-Barnes Hospital. Anderson served as a U.S. Navy medical officer from 1963 to 1965.

He was named full professor in 1979 and became director of the general surgery division in 1984.

Anderson married Marilyn Virginia Wolf in 1967. She preceded him in death. Survivors include his children, Kristin A. Redington (Jim), Cheryl A. Colonnello (Jamie) and Beth A. Stiska (Matt); and eight grandchildren.

**Matthew R. Barton, MD**, a physician-scientist in his seventh and final year of residency in otolaryngology at Barnes-Jewish Hospital and Washington University School of



Medicine, died unexpectedly Monday, Jan. 23, 2017, at his home in Webster Groves, Mo., of an undiagnosed medical condition. He was 35.

While in medical school, a research rotation at the National Institutes of Health (NIH) in Bethesda, Md., introduced him to academic medicine and clinical investigation. The experience made him want to become a physician-scientist aimed at developing better treatments for otolaryngology patients.

Barton is survived by his wife, Allison Barton; their children, Noah and Brooklyn; his parents, Michael and Deborah Barton; and his sister, Katie Barton.

**Brian T. Collins, MD**, an associate professor of pathology and immunology, died Friday, Dec. 23, 2016, in his sleep at his home in Creve Coeur, Mo. He was 52.



Chief of the cytopathology section at the school, his work focused on studying and diagnosing diseases on the cellular level, with a particular emphasis on using fine needles to rapidly obtain samples for molecular and other diagnostic tests.

Collins is survived by his wife, Virginia "Gini" Collins; children, Virginia A. "Gini," Laura, John, Dianne and Maria Collins; parents, Steven and Virginia Collins; and brother, Scott Collins.

## 1940s

**Joseph Hunter Allen Jr.**, MD 48; Sept. '16

**Aaron Birenbaum**, MD 48; Nov. '16

**Charles Glendenning Fullenwider**, MD 43; Oct. '16

**Wilbert "Bill" Edgar Hieb**, MD 44; March '16

**Richard A. Preston**, MD 42; Sept. '16

**Clarence G. Schulz**, MD 45; Nov. '16

**Ruth E. Werner**, OT 49; Jan. '17

## 1950s

**Melvin H. Becker**, LA 44, MD 50; Dec. '16

**Richard Vernon Bradley**, MD 52; Jan. '17

**John Whitfield Drake II**, MD 56; Nov. '16

**Robert Echols**, MD 50; Aug. '16

**M. Ann Hunt**, LA 47, MD 51; Oct. '16

**Kathryn Mary Defler Lavrich**, MD 51; Nov. '16

**Ruth Lynch**, NU 55; Nov. '16

**Joseph Kent McKinney**, MD 58; Nov. '16

**Robert Calvin Newell**, MD 57; Aug. '16

**Lloyd Hamilton Ramsey**, MD 50; Oct. '16

**Irwin "Izzy" Schultz**, HS 56; Nov. '16

**L.D. (Lari Daniel) Slane**, DE 50; Jan. '17

**Ethelee R. Smith**, MD 56; Sept. '16

**Stanley B. Smith**, MD 56; Nov. '16

**Herbert Sunshine**, LA 50, MD 54, HS; Dec. '16

**Gordon Clay Thompson**, DE 52; Oct. '16

**John C. Whitsell**, MD 54; Oct. '16

**Robert D. Winship**, MD 53; Sept. '16

## 1960s

**Sheftel Japhe "Shep" Cohen**, MD 63; Oct. '16

**Joann Miriam Gellman**, NU 63; Nov. '16

**John Hered**, MD 67; Oct. '16

**Michael J. Perley**, MD 61; Sept. '16

**Collyn Franzenburg Schmidt**, GN 61; Oct. '16

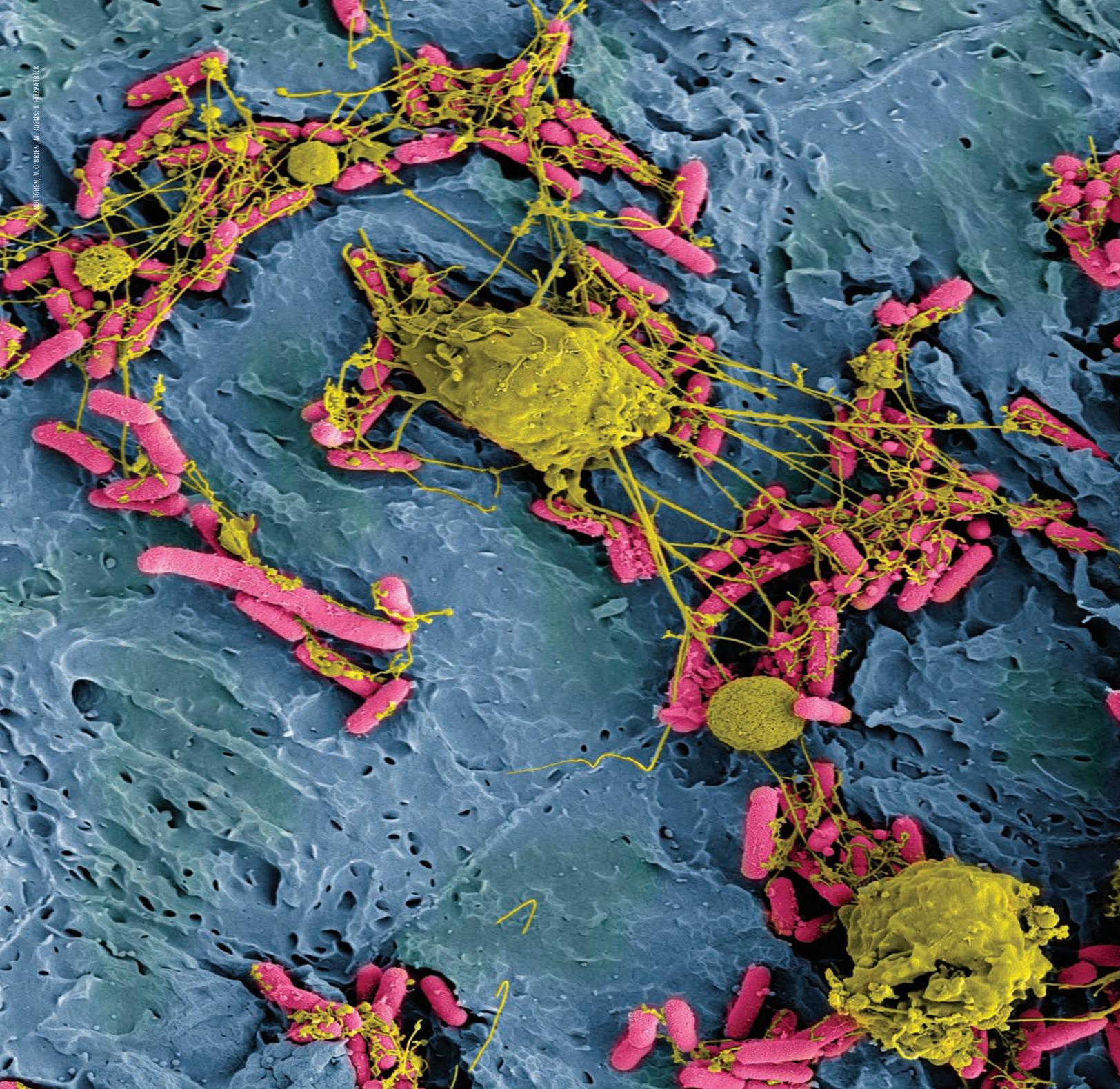
## 1970s

**Aaron M. Bernstein**, LA 48, HS 73; Nov. '16

**Chauncey C. Maher III**, MD 72; Dec. '16

**Janet Williamson**, OT 71; Oct. '16

**For full obituaries, visit:**  
[wumcnews.org/obits](http://wumcnews.org/obits)



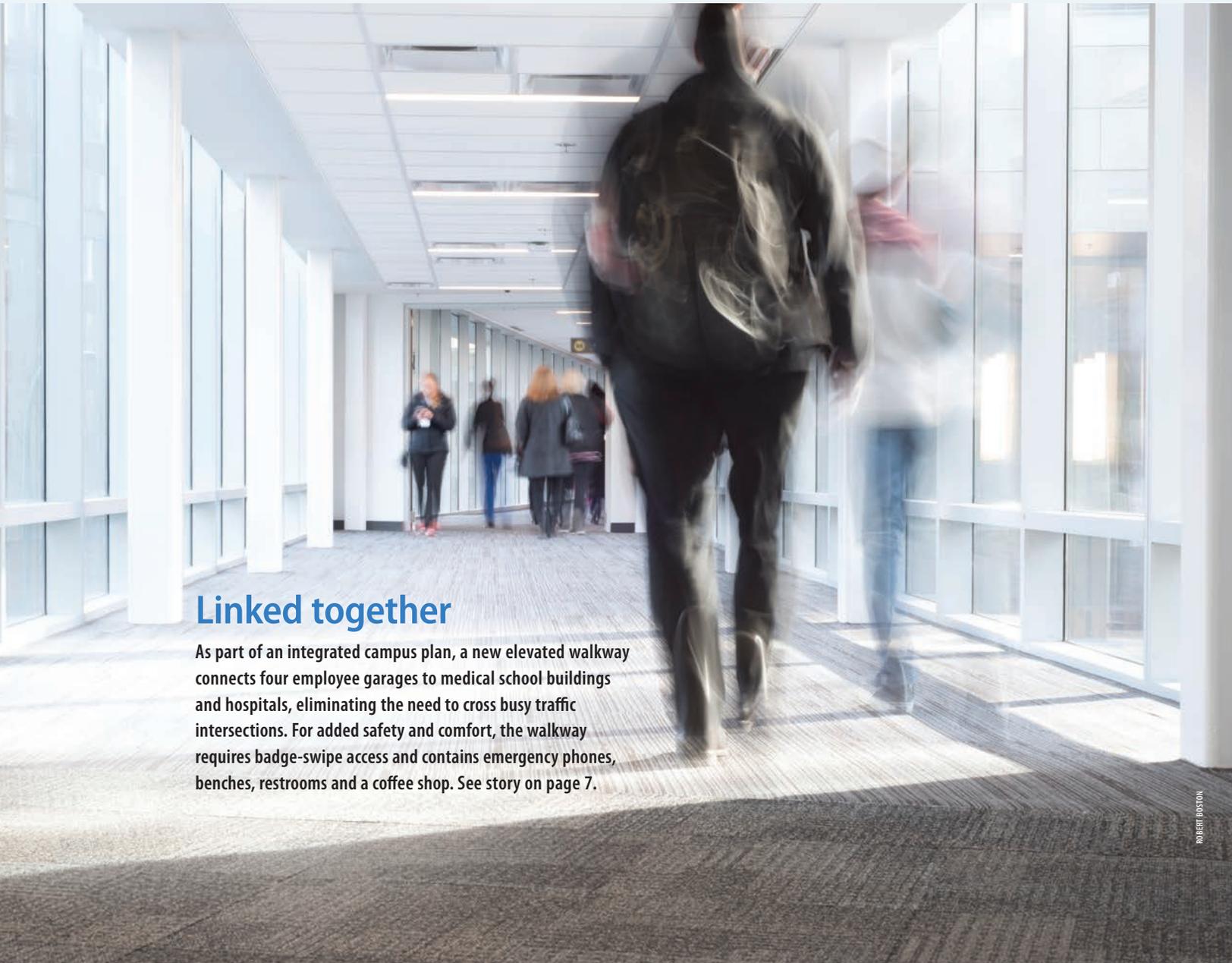
S. HULTGREN, V. O'BRIEN, M. JOENS, J. FITZPATRICK

## Science as art

In this scanning electron microscope image, white blood cells (yellow-green) fail to control the bacteria (pink) causing a urinary tract infection in a mouse bladder (blue). The alluring image is a winner in the annual BioArt competition sponsored by the Federation of American Societies for Experimental Biology. The image was submitted by Scott Hultgren, PhD, the Helen L. Stoeber Professor of Molecular Microbiology; Valerie O'Brien, a graduate student in Hultgren's lab; James Fitzpatrick, PhD, director of the Center for Cellular Imaging; and Matthew Joens, a staff scientist in the Department of Neuroscience.

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## Linked together

As part of an integrated campus plan, a new elevated walkway connects four employee garages to medical school buildings and hospitals, eliminating the need to cross busy traffic intersections. For added safety and comfort, the walkway requires badge-swipe access and contains emergency phones, benches, restrooms and a coffee shop. See story on page 7.