

Outlook



Washington
University in St. Louis

SCHOOL OF MEDICINE

SUMMER 2022

How fragmented sleep
may cause dementia



Outlook

Washington University School of Medicine
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COVER Multiple studies conducted at the School of Medicine suggest that fragmented sleep might be as much a cause as a consequence of dementia, showing up years before names, thoughts and memories began to dissolve. See page 14.

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MATT MILLER

Joshua M. Landman, a fourth-year student in the Computational and Data Sciences doctoral program, has been working intensely on data support projects since the pandemic began. Partnering closely with doctoral co-advisers Randi E. Foraker, PhD, and Albert M. Lai, PhD, he's building graphs, heat maps and other visualizations that bring pandemic data to life, making it more accessible to audiences on and off campus. See page 8.

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WashU was first to reveal the intricate link between fragmented sleep and dementia

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The class gathers in person to learn where they will train as residents

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Free clinic treats early signs of psychosis, improves outcomes



MATT MILLER

The Match Day ceremony allowed collective, palpable excitement — an atmosphere not experienced by graduates since before the COVID-19 pandemic. See page 20.

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Photos of unmasked people in this magazine were taken prior to the COVID-19 pandemic or in accordance with School of Medicine masking protocols at that time.



THE ST. LOUIS AMERICAN FOUNDATION

The Washington Early Recognition Center is exploring whether advances in brain imaging can help identify psychosis earlier. Here, Daniel T. Mamah, MD (right), center director, and Christina Kasting, a senior data control coordinator, discuss MRI findings. See page 22.



MATT MILLER

Blood test for Alzheimer's highly accurate in international study

A blood test developed at the School of Medicine has proven highly accurate in detecting early signs of Alzheimer's disease in a study involving nearly 500 patients from across three continents, providing further evidence that the test should be considered for routine screening and diagnosis.

"Our study shows that the blood test provides a robust measure for detecting amyloid plaques associated with Alzheimer's disease, even among patients not yet experiencing cognitive declines," said senior author Randall J. Bateman, MD, the Charles F. and Joanne Knight Distinguished Professor of Neurology.

"A blood test for Alzheimer's provides a huge boost for Alzheimer's research

and diagnosis, drastically cutting the time and cost of identifying patients for clinical trials and spurring the development of new treatment options," Bateman said. "As new drugs become available, a blood test could determine who might benefit from treatment, including those at very early stages of the disease."

Developed by Bateman and colleagues, the blood test assesses whether amyloid plaques have begun accumulating in the brain based on the ratio of the levels of the amyloid beta proteins A β 42 and A β 40 in the blood.

Researchers have long pursued a low-cost, easily accessible blood test for Alzheimer's as an alternative to the expensive brain scans and invasive spinal

taps now used to assess the presence and progression of the disease within the brain.

Known as Precivity AD, the commercial version of the test is marketed by C2N Diagnostics, a Washington University startup founded by Bateman and his colleague David Holtzman, MD, the Barbara Burton and Reuben M. Morriss III Distinguished Professor. Bateman and Holtzman are inventors on a patent the university licensed to C2N.

The \$1,250 test is available for doctors to aid in the medical evaluation and care of patients who already have symptoms of cognitive decline. It is not yet covered by most health insurance.

 Neurology | Dec. 14, 2021

Poverty may influence infant brain structure

Poverty and crime can have devastating effects on a child's health. But a study from School of Medicine researchers suggests that some environmental factors influence the structure and function of young brains even before babies make their entrances into the world.

MRI scans of full-term newborns born to mothers living in poverty revealed smaller volumes across the entire brain — including the cortical gray matter, subcortical gray matter and white matter — than found in the brains of babies whose mothers had higher household incomes. The brain scans, which were conducted only a few days to weeks after birth, also showed evidence of less folding of the brain among infants born to mothers living in poverty. Fewer and shallower folds typically signify brain immaturity.

A second study of data from the same sample of 399 mothers and their babies — this one published online April 12 in the journal *Biological Psychiatry* — reports that pregnant mothers from neighborhoods with high crime rates gave birth to infants whose brains functioned differently

during their first weeks of life than babies born to mothers living in safer neighborhoods. Functional MRI scans of babies whose mothers were exposed to crime displayed weaker connections between brain structures that process emotions and structures that help regulate and control those emotions. Maternal stress is believed to be one of the reasons for the weaker connections in the babies' brains.

"These studies demonstrate that a mother's experiences during pregnancy can have a major impact on her infant's brain development," said Christopher D. Smyser, MD, one of the principal investigators and a professor of neurology, of pediatrics and of radiology.

 JAMA Network Open | April 12, 2022



Lourdes Bernardez, professional rater II in psychiatry and neurology, prepares an infant for an MRI scan as part of ongoing research.



GETTY IMAGES

ADVERSE EFFECTS: Nonhospitalized children who were prescribed antibiotics inappropriately were up to eight times more likely to develop complications such as diarrhea and skin rashes than children who were treated according to medical guidelines, according to a study from the School of Medicine and The Pew Charitable Trusts. This misuse, leading to antibiotic treatment failures and additional complications that require follow-up health-care visits, resulted in at least \$74 million in excess U.S. health-care costs in 2017. The study was published in *JAMA Network Open*.

Lenze appointed head of psychiatry

Eric J. Lenze, MD, the Wallace and Lucille Renard Professor of Psychiatry and a leader in the treatment of psychiatric disorders in older adults, has been named the head of the Department of Psychiatry, effective Aug. 1.



Eric J. Lenze, MD

Lenze's research has advanced evidence-based medicine for depression, anxiety and cognitive disorders in older adults. His work has led to improvements in the care of treatment-resistant depression, sometimes employing completely new strategies, including work with colleagues that has led to the use of infusions of the anesthesia drug ketamine to treat depression that hasn't responded to other therapies.

He also directs the university's Healthy Mind Lab, which under his leadership has grown into one of the top treatment-focused laboratories in the country and has received more than \$60 million in funding from the National Institutes of Health (NIH), as well as from various philanthropic foundations.

Charles F. Zorumski, MD, head of psychiatry since 1997 and the Samuel B. Guze Professor, will continue his role as director of the Taylor Family Institute for Innovative Psychiatric Research.

To learn more about stories in Pulse, go to medicine.wustl.edu/news



As a child looks at pictures on a screen, computers track eye movements to see what the child is actually focused on.


Visual system changes may precede autism

A research team, led by WashU Medicine and the University of North Carolina School of Medicine, has identified differences in the development of the brain’s visual system in infants that may predispose them to developing autism. Such irregularities may alter the way that some babies experience their surroundings and interact with others, thus further affecting brain development and potentially contributing to autism spectrum disorder (ASD).

The researchers conducted MRI brain scans on 384 babies at high risk of autism because they have older siblings with ASD. Almost 25% of the infants in the study went on to be diagnosed with autism. Their brain scans revealed differences in the size, white matter and functional connectivity of the babies’ visual systems, and such irregularities were present long before any symptoms of autism were detectable.

“In this study, we’ve seen that abnormal development of the visual system may be rooted in genetics because the extent of alterations in the visual systems in children as young as 6 months old was associated with the severity of autism traits in their older siblings,” said John N. Constantino, MD, one of the study’s senior authors, the Blanche F. Ittleson Professor of Psychiatry and Pediatrics and director of the Division of Child & Adolescent Psychiatry at Washington University.

Though more studies are needed, researchers said, behavioral interventions aimed at the visual system potentially could decrease the likelihood that children will develop some of the more severe traits associated with ASD.

 American Journal of Psychiatry | May 26, 2022

Neural pathway transmits pleasant touch sensation


Studying mice, School of Medicine scientists have identified a neural circuit and a neuropeptide — a chemical messenger that carries signals between nerve cells — that transmit the sensation known as pleasant touch from the skin to the brain.

In humans, such touch — delivered by hugs, holding hands or caressing, for example — triggers a psychological boost known to be important to emotional well-being and healthy development. Identifying the neuropeptide and circuit that direct the sensation of pleasant touch eventually may help scientists better understand and treat disorders characterized by touch avoidance and impaired social development, including autism spectrum disorder.

“Pleasant touch sensation is very important in all mammals,” said principal investigator Zhou-Feng Chen, PhD, director of the Center for the Study of Itch & Sensory Disorders at Washington University. “A major way babies are nurtured is through touch. Holding the hand of a dying person is a very powerful, comforting force. Animals groom each other. People hug and shake hands. Massage therapy reduces pain and stress and can provide benefits for patients with psychiatric disorders.”

Chen’s team found that when they bred mice without the neuropeptide, called prokineticin 2 (PROK2), such mice could not sense pleasant touch signals but continued to react normally to itchy and other stimuli.

“This is important because now that we know which neuropeptide and receptor transmit only pleasant touch sensations, it may be possible to enhance pleasant touch signals without interfering with other circuits, which is crucial because pleasant touch boosts several hormones in the brain that are essential for social interactions and mental health,” he explained.

 Science | April 28, 2022



Mice engage in grooming behavior, experiencing a phenomenon researchers call pleasant touch.

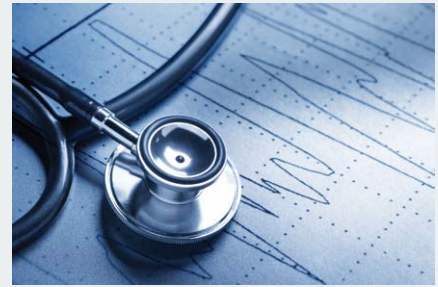
COVID-19 increases risk of heart conditions

An in-depth analysis of federal health data indicates that people who have had COVID-19 are at increased risk of developing cardiovascular complications within the first month to a year after infection. Such complications include disruptive heart rhythms, inflammation of the heart, blood clots, stroke, coronary artery disease, heart attack, heart failure or even death.

Such problems occur even among previously healthy individuals and those who have had mild COVID-19 infections, according to the study, from researchers at the School of Medicine and the Veterans Affairs St. Louis Health Care System. Data showed an increased

risk of heart damage for young people and old people; males and females; Blacks, whites and all races; and people with and without obesity, diabetes or heart disease.

“COVID-19 infections have, thus far, contributed to 15 million new cases of heart disease worldwide,” said senior author Ziyad Al-Aly, MD, an assistant professor of medicine, who is also director of the Clinical Epidemiology Center and chief of the Research and Education Service at the Veterans Affairs St. Louis Health Care System. “This is quite significant. For anyone who has had an infection, it is essential that heart health be an integral part of post-acute COVID-19 care.”



GETTY IMAGES

The researchers analyzed de-identified medical records in a database maintained by the U.S. Department of Veterans Affairs, the nation’s largest integrated health-care delivery system.

 Nature Medicine | Feb. 7, 2022

Gut bacterium shows promise in treating malnutrition

About 18 million children under age 5 suffer from severe acute malnutrition, and over 3 million children die from it each year. Treatment with high-calorie supplemental foods and antibiotics can prevent deaths, but these interventions often have limited impact on the long-term effects of severe acute malnutrition, such as persistent stunted growth, disrupted immune function and impaired brain development.

Researchers from the School of Medicine and the International Centre for Diarrhoeal Disease Research in Dhaka, Bangladesh, found that a standard milk-based therapy plus treatment with a gut bacteria strain known as *Bifidobacterium infantis* (*B. infantis*) for four weeks promotes weight gain in infants with severe acute malnutrition, with accompanying reductions in gut inflammation. The clinical trial was conducted in Dhaka.

B. infantis, a commercially available probiotic, has been shown to be safe for infants and is known to thrive on carbohydrates present in human breast milk. The strain was isolated from the gut microbes of a healthy infant in the U.S.

Although *B. infantis* produced significant growth improvements in Bangladeshi infants with severe acute malnutrition, its level of colonization was still tenfold to a hundredfold lower than levels documented in healthy Bangladeshi infants. To identify strains that

might colonize to a greater degree and produce superior clinical responses, the research team cultured *B. infantis* strains from healthy children living in the same community. The scientists found one strain that contained genes that allow it to utilize complex carbohydrates present in the local diet more efficiently than the strain investigated in the clinical trial.

These findings set the stage for clinical studies to test the effects of this new strain on restoring growth in children with severe acute malnutrition.

“This pilot study not only shows promising results in treating children with severe acute malnutrition but also underscores how proper development of the gut microbiota is linked to healthy growth of infants,” said co-senior author Jeffrey I. Gordon, MD, the Dr. Robert J. Glaser Distinguished University Professor and director of the Edison Family Center for Genome Sciences and Systems Biology.

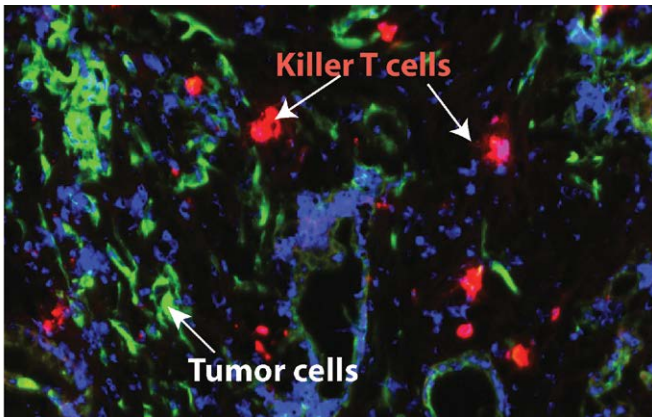
 Science Translational Medicine | April 13, 2022

RIOWAN ISLAM, INTERNATIONAL CENTRE FOR DIARRHOEAL DISEASE RESEARCH, BANGLADESH



In Bangladesh, a mother feeds her infant, who has severe acute malnutrition.

LIM LAB



Pictured in green are pancreatic cancer cells; T cells are shown in red.

Pushing past defenses in pancreatic cancer

Pancreatic cancer is one of the most aggressive and deadly tumor types, notorious for its resistance to virtually all types of treatment, including newer immunotherapies.

A School of Medicine study — in mice — suggests that blocking a major inflammatory pathway that is activated in pancreatic cancer makes the tumors sensitive to chemotherapy and a type of immunotherapy that prompts the immune system’s T cells to attack the cancer cells. The therapy more than doubled survival in a mouse model of pancreatic cancer.

The study’s results lend additional support for the rationale behind a new national clinical trial that will evaluate the same treatment strategy in patients with pancreatic ductal adenocarcinoma — the most common malignant tumor of the pancreas. The researchers plan to enroll about 50 patients nationwide.

Researchers at The Alvin J. Siteman Cancer Center at Barnes-Jewish Hospital and Washington University School of Medicine will lead the national trial that is part of the National Cancer Institute’s Experimental Therapeutics Clinical Trials Network. This network, including more than 30 clinical sites in the U.S. and Canada, focuses on early clinical investigations of innovative cancer therapies.

“The results of this study are promising in that they showed a way to break through the defenses of this tumor type, making it susceptible to our therapeutics, including combinations of chemotherapy and newer immunotherapies that stimulate T cells to fight the cancer,” said senior author Kian-Huat Lim, MD, PhD, an associate professor of medicine and principal investigator for translational science on the national trial.

 Gastroenterology | March 7, 2022

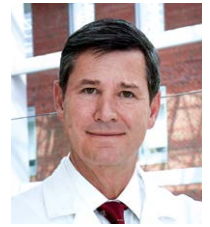
Olson named surgery department head

John A. Olson Jr., MD, PhD, noted for his clinical and scientific expertise in endocrine surgical diseases, has been named the William K. Bixby Professor and head of the Department of Surgery, effective July 1.

During the 1990s, Olson completed his postdoctoral research fellowship at Washington University and his surgical training at then-Barnes Hospital, where he rose to chief resident in surgery.

Olson comes from the University of Maryland School of Medicine in Baltimore, where he served as: head of the Division of General and Oncologic Surgery, the Campbell and Jeannette Plugge Professor of Surgery, the founding director of the University of Maryland Cancer Network, and associate director of the Greenebaum Comprehensive Cancer Center (designated as a top U.S. cancer institution by the National Cancer Institute).

Olson succeeds Timothy J. Eberlein, MD, who has led the Department of Surgery for 24 years. Eberlein will continue as director of the Siteman Cancer Center, senior associate dean for cancer programs, and the Spencer T. and Ann W. Olin Distinguished Professor.



John A. Olson Jr., MD, PhD



MATT MILLER

LESSONS LEARNED: Rochelle P. Walensky, MD, director of the Centers for Disease Control and Prevention, took part in the Department of Medicine Grand Rounds series in March. She sat down with William G. Powderly, MD (right), the J. William Campbell Professor of Medicine and co-director of the Division of Infectious Diseases, for a livestreamed conversation on pandemic successes and challenges. Walensky, a Washington University alum, was the 2022 Gerald Medoff Visiting Professor in the Department of Medicine.

Strategy helps more patients quit smoking

Researchers at Siteman Cancer Center have found that a smoking-cessation program targeting patients while they're visiting a cancer care clinic gets more cancer patients into such treatment than previous methods. The program also helps more cancer patients quit successfully, and costs

less than prior methods that involved referring cancer patients to specialists.

Quitting smoking doubles the survival rate and lowers the risk of cancer recurrence, no matter the cancer stage, the team found.

"The key thing is that treatment is offered on site," said first author Alex T. Ramsey, PhD, an assistant professor of psychiatry. "Past care has tended to rely on referrals to smoking-cessation specialists, requiring patients to make appointments in a different clinic. That creates hurdles involving time and transportation. When we built this program, we kept those barriers to treatment in mind, understanding that for a program like this to be sustainable, and to reach large numbers of people, it would need to be fully embedded in the care patients already receive."

The researchers used electronic health records to determine which patients at Siteman were smokers. Then, while the patients were in the clinic to see oncologists, nurses and medical assistants, they offered the patients help to quit smoking. This strategy has increased the percentage of patients receiving smoking-cessation treatment from about 2% to nearly 30%. Further, the number of patients who successfully quit smoking increased from about 12% to more than 17%.

Patients are offered access to phone- or text-based counseling, an app designed to help them quit, referral to a smoking-cessation group, and evidence-based medications to support attempts to quit.

 **Journal of the National Comprehensive Cancer Network | May 11, 2022**

GETTY IMAGES



Tracing roots of rare mitochondrial diseases

When something goes wrong in mitochondria, the tiny organelles that power cells, it can cause a bewildering variety of symptoms such as poor growth, fatigue and weakness, seizures, developmental and cognitive disabilities, and vision problems. Mitochondrial diseases are a group of rare genetic conditions that collectively affect one in every 4,300 people.

Since mitochondria provide energy for almost all cells, people with defects in their mitochondria can have symptoms in any part of the body, although the symptoms tend to be most pronounced in the tissues that require the most energy, such as the heart, brain and muscles.

The culprit could be a defect in any of the 1,300 or so proteins that make up mitochondria, but scientists have very little idea what many of those proteins do, making it difficult to identify the faulty protein and treat the condition. "We have a parts list for mitochondria, but we don't know what many of the parts do," said co-senior author David J. Pagliarini, PhD, the Hugo F. and Ina C. Urbauer

Professor and a BJC Investigator at Washington University.

Researchers at the School of Medicine and the University of Wisconsin-Madison systematically analyzed dozens of mitochondrial proteins of unknown function and suggested functions for many of them. Using these data as a starting point, they identified the genetic causes of three mitochondrial diseases and proposed another 20 possibilities for further investigation. Understanding how mitochondria's hundreds of proteins work together to generate power and perform the organelles' other functions could be a promising path to finding better ways to diagnose and treat such conditions.

The researchers identified a multisystemic disorder caused by defects in the main energy-producing pathway and a linkage between cerebrotendinous dysplasia and mutation in gene *RAB51F*. They also provided data that contributed to the identification of a fatal autoinflammatory




GETTY IMAGES

Some 1,300 proteins make up mitochondria (illustrated above), the tiny organelles that power cells.

syndrome involving a disrupted gene that causes problems with sugar storage.

To aid scientific discovery, the researchers designed an app with user-friendly analysis tools — MITOMICS (mitochondrial orphan protein multi-omics CRISPR screen) — and made it available to the public.

 **Nature | May 25, 2022**

Pandemic *road map*

Big data drives decision-making across the region

BY GERRY EVERDING

When the School of Medicine established its Institute for Informatics in 2016, no one could have foreseen the indispensable role it would play in helping the St. Louis and campus communities respond to the COVID-19 pandemic.

From the beginning, the pandemic has been a story told in numbers.

As harrowing stories of human suffering played out in factories, meatpacking plants and hospital emergency rooms, ordinary people the world over began calculating their pandemic fear factor based on the grim statistics of infection rates, case counts and deaths.

In St. Louis, health leaders watched anxiously as the pandemic drew closer and the numbers grew larger, rising inexorably and exponentially toward the realm of big data, toward the big challenges of population health that the Institute for Informatics (I²) was being built to address.

Philip R.O. Payne, PhD, founding director of I² and a leader in clinical informatics and biomedical data science, was preparing for action.

His growing I² team included experts in public health, epidemiology and biomedical informatics, as well as an army of data scientists, data brokers and database administrators — just the expertise necessary to track a pandemic and model its consequences.





MATT MILLER

Philip R.O. Payne, PhD (center), director of the Institute for Informatics, and Cynthia L. Marich (right), executive director of the Office of Health Information and Data Science, participate in a hybrid stakeholder meeting to discuss the university's digital infrastructure needs in the post-pandemic environment.

Payne's data team, in collaboration with an array of medical experts and community leaders, soon would become the analytic engine behind much of the science-based forecasting that continues to drive pandemic decision-making across the St. Louis region.

The I² team, in partnership with analytics teams from regional health systems, would build the models that early in the pandemic gave local governments the evidence-based rationale to issue mask mandates, close schools and lock down public gatherings — decisions that published research since has shown to have saved countless lives.

Later, I² programmers would help build online registration forms and computer databases to ensure that the first precious vaccine doses went to those who needed them most.

They would provide public health agencies with street-level heat maps of virus outbreaks so that pop-up testing clinics, outreach programs and educational interventions could be focused on the low-income, underserved neighborhoods hit hardest by the pandemic.

And with unprecedented “hackathon” speed, a team of I² programmers would stand up the smartphone-friendly interface behind a saliva-based, rapid testing system that helped keep front-line medical workers safe and allowed students back on campus.

While much of this data analytics support work went on behind the scenes, its contributions did not go unnoticed by front-line health-care

workers and local leaders making tough, daily pandemic decisions.

“I truly believe the analytics team, which included the Institute for Informatics at Washington University, was one of the unknown crown jewels of the Pandemic Task Force,” said Alex G. Garza, MD, chief community health officer at SSM Health and commander of the St. Louis Metropolitan Pandemic Task Force (PTF).

“The institute in particular was able to give us sophisticated insights into the pandemic, including where the cases were coming from and identifying at-risk populations,” said Garza, who led weekly news briefings through much of the pandemic.

“We would not have been nearly as successful in understanding the challenges of COVID-19, and providing communications to the public, had it not been for their expertise.”

● A single source of truth

In January 2020, as the virus was spreading in China, Payne began getting nail-biting phone calls from infectious disease specialists and other informatics scientists across the globe who could see what might be coming and were worried about readiness.

Payne, who serves as the Janet and Bernard Becker Professor and associate dean for Health Information and Data Science, joined other leaders from the School of Medicine, BJC HealthCare and Washington University

Physicians to plan for an outbreak. These groups formed a Joint Incident Command Center for the BJC HealthCare system.

Likewise, clinical leaders from other regional hospital networks began communicating before the first case was found in St. Louis, and soon were joined by the health-care system CEOs, laying the groundwork for an unprecedented, collaborative effort.

Local elected officials and their public health directors also were brought into the conversation, leading to the formation of the PTF.

Early in the group's formation, it was understood that the PTF needed a single source of truth for data and analytics. The leaders realized there was no current reliable system in place to gather regional pandemic data. If a pandemic brought patients flooding into emergency rooms, or hit certain populations more severely than others, it would be challenging for local leaders to get a handle on what was happening across the metropolitan area or for the PTF to inform the public about what it was seeing.

Payne soon received a call from Clay Dunagan, MD, BJC's senior vice president and chief clinical officer and a professor of infectious diseases. With that conversation, the Incident Command Center added a data analytics function to be co-led by Payne, chief data scientist at the medical school, and Keith Woeltje, MD, chief medical information officer at BJC (who later left the institution). Deborah O'Dell, chief data officer at BJC, along with Jordan Shapiro at BJC's Center for Clinical Excellence, assumed leadership following Woeltje's departure.

Their mission: Develop the systems necessary to collect rapidly evolving critical pandemic response data, streamline its format and store it in a central depository where it could be analyzed and accessed by authorized users.

BJC's team brought a wealth of existing patient information and analytics expertise to the table through both the hospital network's electronic health records (EHRs) and its business intelligence capabilities. O'Dell and Shapiro already had been developing data and analytics solutions to support patient care and health system operations during the pandemic.

I² brought expertise working with research partners across campus in managing big data sets and supporting their analysis with sophisticated artificial intelligence tools.

Key players on Payne's I² team include Albert M. Lai, PhD, deputy director at I² and chief research

information officer for the School of Medicine, and Randi E. Foraker, PhD, associate director at I², director of I²'s Center for Population Health Informatics and a professor of medicine and professor at the Brown School.

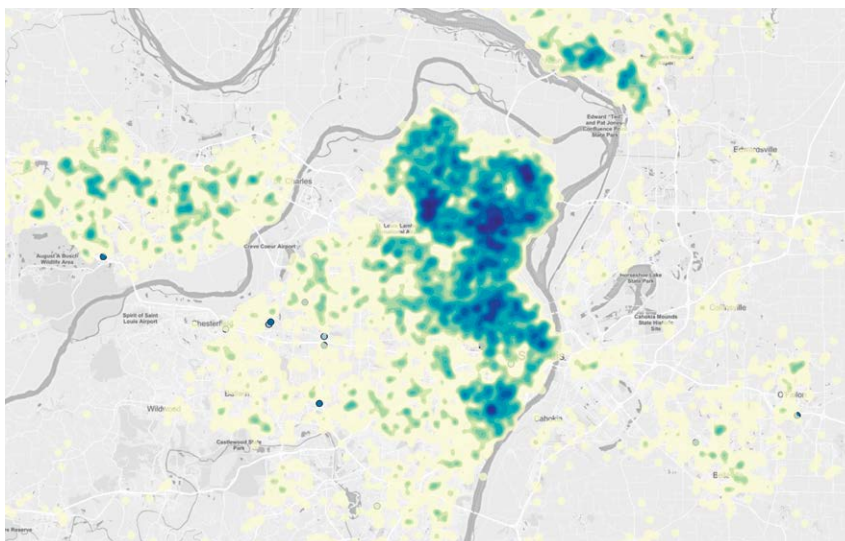
Foraker, a cardiovascular disease epidemiologist whose research focuses on the prevention of chronic diseases, brought years of experience forging data-sharing agreements among external partners.

Her first priority was finding a way to unlock the treasure trove of patient demographic and health data stored in the regional hospitals' electronic record systems. EHRs offer incredible opportunities for developing real-time, data-driven insights on pandemic trends, but getting access poses huge challenges.

Locked behind high-security firewalls as dictated by federal privacy laws and held close to the vest for competitive reasons, this sort of patient health data had never been freely shared among the region's health providers.

Foraker called a special meeting to discuss data-sharing with the leaders of local public health agencies and hospital networks, most of whom brought their lawyers.

Rather than negotiate dozens of one-to-one data-sharing contracts, Foraker proposed an arrangement where all parties would provide their data to a single "honest broker" who would be contractually obligated to safeguard their data interests with anyone requesting access.



A 2D density heat map shows St. Louis-area COVID-19 hospitalizations per 100,000 people over two weeks preceding March 26, 2020. This type of modeling helped pinpoint hospitalization burden within the region.



Your smartphone can alert you if you've been near another MO/Notify app user who has tested positive for COVID-19. The Institute for Informatics launched MO/Notify, a smartphone system that privately sends pop-up alerts to users in Missouri. On Android, find the app on Google Play. On iPhone, opt-in to Exposure Notifications in Settings > Exposure Notifications on the device.

DENNIS GOLDFARB



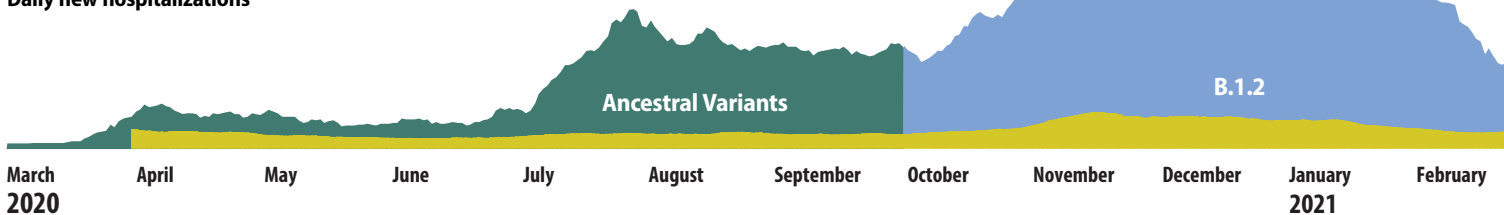
Randi E. Foraker, PhD (center), director of the Center for Population Health Informatics at the Institute for Informatics, has worked closely during the COVID-19 pandemic with Matt Haslam (left), an epidemiologist for the City of St. Louis, and Paul Sorenson, director of the St. Louis Regional Data Alliance.

Tracking COVID-19 across the region

Medical Campus leaders tracked daily St. Louis regional cases (rolling seven-day average) to make informed decisions about whether to defer elective care or add staffing.

Daily new cases

Daily new hospitalizations



designed to fill gaps in the data management needs of local health departments and collaborated with Paul Sorenson, director of the St. Louis Regional Data Alliance at the University of Missouri-St. Louis, to make these tools available to other pandemic response groups.

Lai, an expert in informatics infrastructure, manages dozens of research databases and oversees I2's core services team of software engineers, database administrators, data analysts and bioinformaticians.

In August 2020, when the Department of Genetics and the McDonnell Genome Institute co-developed a saliva-based rapid COVID-19 test, Lai's special projects team quickly stood up a user-friendly computer interface to handle sample submission and reporting functions — a system that was essential in bringing students back into dorms that fall.

Lai's team also worked closely with Student Health and Occupational Health to develop the campus daily health self-screening tool and other pandemic-related dashboards and reporting tools that were used to keep the campus and workplace safe.

As the pandemic surged, most of I2's ongoing research got put on hold so its workforce could support data-sharing, data visualization and predictive modeling around COVID-19. I2 teams, along with other regional hospital networks, participated in real-time pandemic analysis.

This multisystem collaboration produced one regional COVID-19 scorecard on behalf of all the major health systems, helping providers learn from each other and sending a unified message about what was going on in the community.

“I think we gained a lot of credibility with public health officials and agencies by speaking with one voice as the health-care system rather than competing with one another on projections,” Shapiro said. “It allowed us to use data analytics in a way that drives public policy decision-making.”

At I², the daily reporting took on an “all-hands-on-deck,” 24/7 urgency driven by the realization that people could die if the pandemic modeling went wrong. It was an intense, daily immersion in getting and making sense of the latest data. How many beds do we have? How many ventilators? How many doctors do we need in the ICU this weekend?

“We really used our informatics to guide operational decision-making within the health-care system,” Shapiro said. “We produced weekly projections about what will happen to our hospital census, the number of patients who are COVID-19-positive in our system, and that was used to make decisions about whether we needed to defer elective care, or whether we needed to add additional staff or change our nurse-to-patient ratio to cope with the increased COVID-19 demand.”

Payne, Foraker and Lai realized that they had to maintain a razor-sharp focus on the urgency of the moment.

● A new era in data-sharing

The pandemic has shown how essential the sharing of patient data can be for making informed, real-time decisions.

“Our experience has shown that there are responsible, privacy-preserving ways of sharing data for the greater good,” Payne said. “Why would we return to siloed information and incomplete regional pictures on a whole range of public health and health-care issues? Not sharing patient data actually does a disservice to the health of real people in our community.”

Prime examples of the continued need for patient data-sharing, Payne said, are the “long-hauler” COVID-19 patients who struggle with a range of post-acute symptoms.

Long COVID-19 patients with debilitating symptoms are showing up for treatment at local hospitals, but Payne worries that patients with more subtle symptoms may never be diagnosed. He’s seeking funding for a study that would use big data to identify “unknown” long COVID-19 patients based on symptoms they discuss with primary care physicians.

For Foraker, the success of big data analysis during the pandemic illustrates how these tools might benefit the community going forward.

“The partnerships and data-sharing infrastructure that we’ve built have been critical for dealing with a fast-paced pandemic, but they are also critical to the future health of our region, so that we can tackle chronic diseases — such as diabetes and cancer — in the region,” Foraker said.

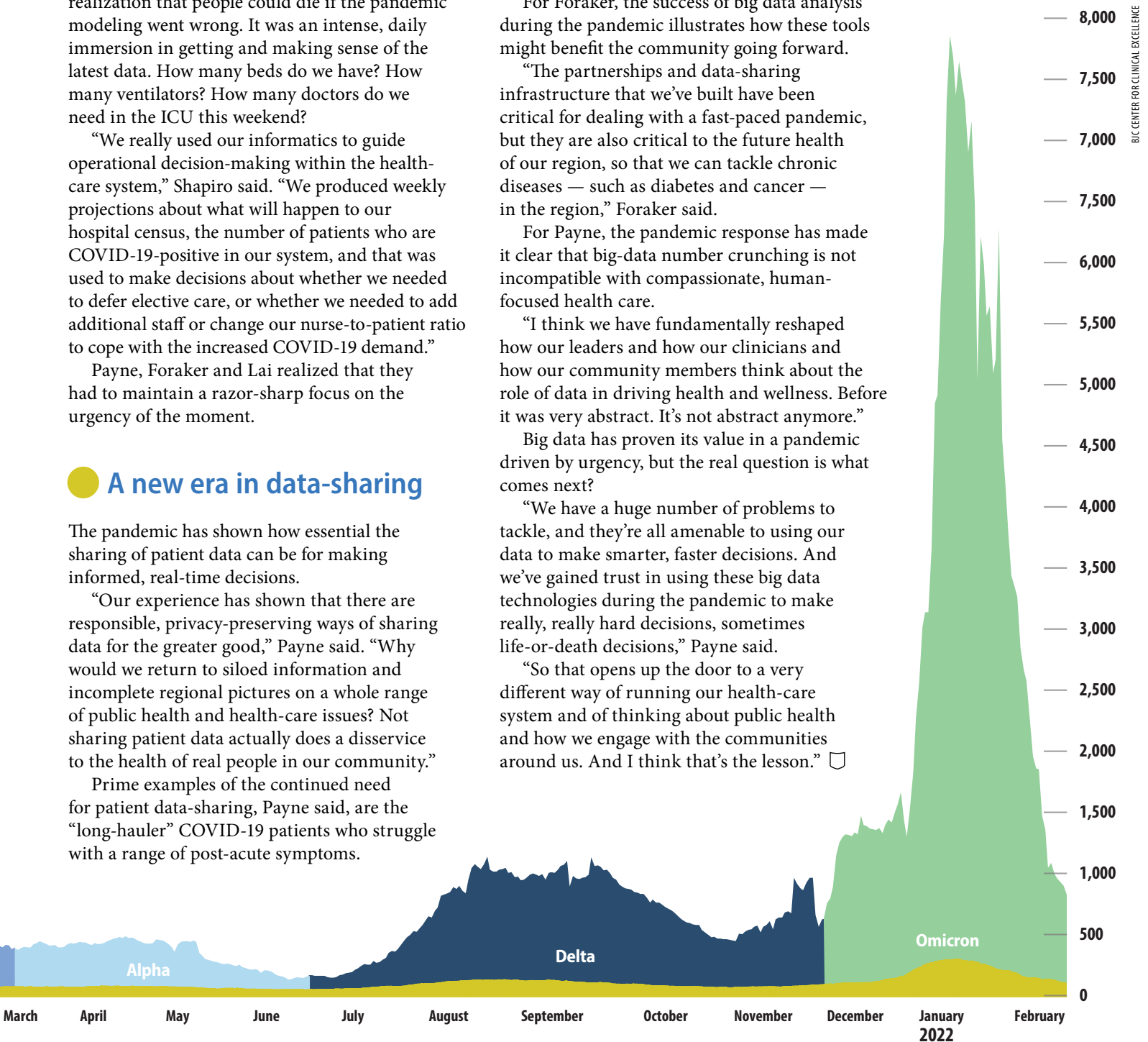
For Payne, the pandemic response has made it clear that big-data number crunching is not incompatible with compassionate, human-focused health care.


“I think we have fundamentally reshaped how our leaders and how our clinicians and how our community members think about the role of data in driving health and wellness. Before it was very abstract. It’s not abstract anymore.”

Big data has proven its value in a pandemic driven by urgency, but the real question is what comes next?

“We have a huge number of problems to tackle, and they’re all amenable to using our data to make smarter, faster decisions. And we’ve gained trust in using these big data technologies during the pandemic to make really, really hard decisions, sometimes life-or-death decisions,” Payne said.

“So that opens up the door to a very different way of running our health-care system and of thinking about public health and how we engage with the communities around us. And I think that’s the lesson.” □





How *deep sleep* keeps our brains intact

WashU was first to reveal the intricate link between fragmented sleep and dementia

BY JEANNETTE COOPERMAN



A patient undergoes a sleep study at the Washington University Sleep Medicine Center.

When you live with dementia, your sleep breaks apart, the nights a strobe-lit blur, the grayed days lost to catnaps. Physicians — and families — have known this for years. But what no one realized, until landmark research at Washington University in 2009 set a series of studies in motion, was that fragmented sleep might be as much a cause as a consequence of dementia. And good sleep in middle age just might ward off a decline.

Sleep disturbances are not normal and inevitable parts of aging, despite what conventional wisdom might say. Often they are early signs of a condition that is treatable.

Dementia is not an inevitable consequence of aging, either. But it is associated with aging — about one-third of Americans over 85 live with some form of dementia. In the U.S., more than 6 million people are living with dementia, and it impacts their ability to think and remember, their personalities and their sense of identity and well-being. The disease also impacts the lives of all who love them. The National Institutes of Health (NIH) predicts this number could double in the next 40 years, as the population grows older and lives longer.

Alzheimer's disease is the most common cause of dementia. Though symptoms can be temporarily improved, there is no way to prevent the disease or halt its progression.

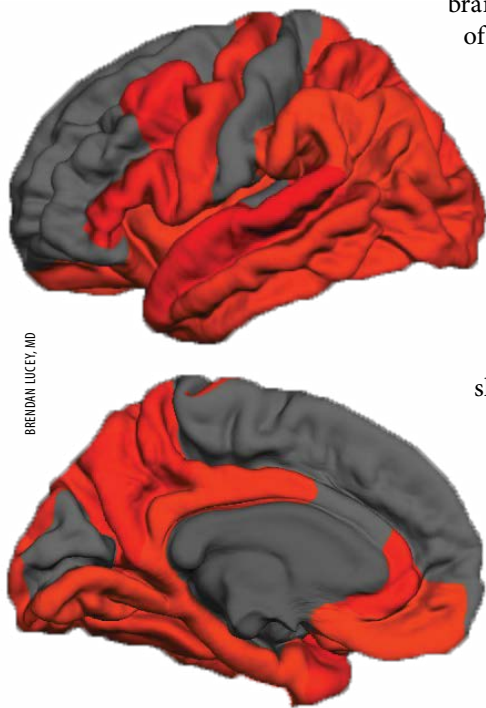
Except — that landmark study in 2009 opened a channel. Its principal investigator was David M. Holtzman, MD, the Barbara Burton and Reuben M. Morriss III Distinguished Professor, scientific director of the Hope Center for Neurological Disorders, and associate director of the Charles F. and Joanne Knight Alzheimer Disease Research Center (ADRC). Back in 2009, he was not yet thinking about the role sleep might play. He wanted to understand what causes the amyloid beta protein to build up in the brain, contributing to the development of Alzheimer's.

Holtzman's team studied mice, checking their amyloid beta levels as they were awake and moving about or slept, and found that amyloid beta was higher when the animals were awake and active. The longer they were awake, the more amyloid beta they released. When they were given a medication that induced sleep, that suddenly lowered the amyloid beta level. Sleep deprivation increased it again — all that awake time, their tiny brains buzzing.

Normally, amyloid is harmless and floats freely throughout the brain. "It's probably just a waste product of a larger protein," Holtzman said. But a buildup of amyloid beta leads to the formation of amyloid plaques — think of them

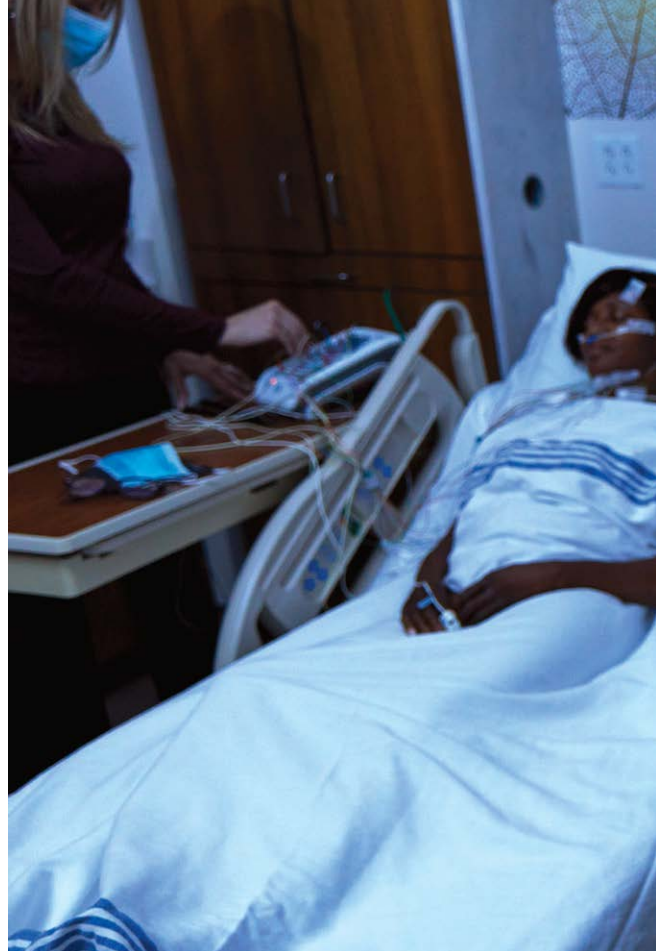
as weighted blankets draped outside the brain cells. They might cause no symptoms for years, but their presence can accelerate a more ominous process: an accumulation of the protein tau, which begins to clump up and tangle inside the neurons, eventually killing the cells and causing that area of the brain to shrink.

Waking the mice again and again caused both amyloid and tau levels to shoot up to daytime levels due to neurons releasing more amyloid beta and tau during the time when animals were awake and particularly if they were sleep deprived. "Then we wanted to see whether, if you start developing tangles, whether these pathologies found in Alzheimer's disease cause worse sleep," Holtzman



BRENDAN LUCEY, MD

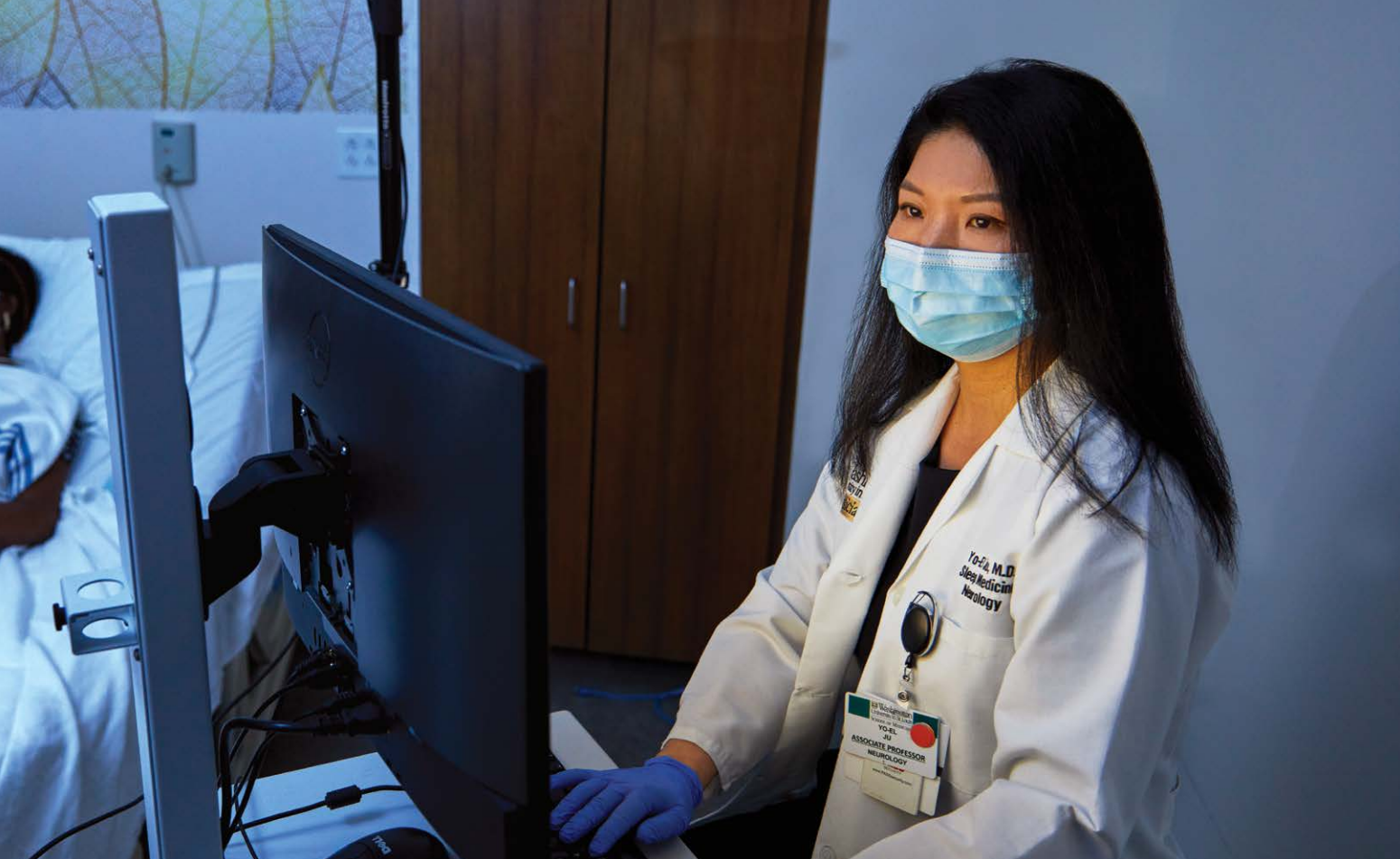
Reduced amounts of slow brain waves — the kind that occur in deep, refreshing sleep — are associated with high levels of the toxic brain protein tau. This computer-generated image maps the areas where the link is strongest, in shades of red and orange. This 2019 School of Medicine study provided more evidence that decreased deep sleep is associated with early signs of Alzheimer's disease.



said. "And we were able to show that amyloid and tau pathologies both worsen sleep." This was the very definition of a vicious cycle, with sleep deprivation causing brain pathology that then made it even harder to get good sleep.

Holtzman's amyloid research was published just as Yo-El S. Ju, MD — now the Barbara Burton and Reuben Morriss III Professor — was finishing her residency. "How can we look at this in people?" she asked him. They designed a study with 142 cognitively normal participants from the ADRC, most of whom were part of the Adult Children Study that WashU already was monitoring for Alzheimer's. Half of the 124 had a parental history of late-onset Alzheimer's.

Ju's team monitored the participants' sleep and wake times using a wearable, watch-like device. The team then compared biomarkers, such as protein levels, found in cerebrospinal fluid. "We found that people who had worse quality sleep were more likely to have other evidence of preclinical Alzheimer's," she said. Just like Holtzman's mice, the individuals with consistently fragmented sleep had amyloid buildup in the brain, even though their thinking and memory were still normal. Poor sleep was itself an early biomarker for Alzheimer's, showing up years before names, thoughts and memories began to dissolve.



MATT MILLER

The results were published in 2013. “It was the first paper that showed a link between preclinical Alzheimer’s and sleep in humans,” she said, “and that result has now been replicated multiple times.”

The human volunteers’ circadian rhythms were off, too. That day-and-night pattern is set, not by our Apple watches, but by a master clock in the brain. Circadian rhythms orchestrate a startling array of biological processes, varying, by time of day, the way we absorb sugar, our body temperature, our blood pressure, hormone levels, immune response, and dozens of other physical responses. While not identical with sleep-and-wake cycles, circadian rhythms affect our energy by day and our sleep at night. The study volunteers with high levels of amyloid and tau had fragmented activity patterns, feeling sluggish when the sun shone and restless while the world slept.

Clearly, early Alzheimer’s was linked to quality of sleep. The path for future research had opened.

The right amount of sleep

If sleep is that important, should those of us who toss and turn take sleeping pills? “That is rarely our first recommendation,” said Brendan Lucey, MD, an associate professor of neurology and the director of Washington University’s Sleep

Medicine Clinic. For those who want to ward off later dementia by getting more restful sleep, he recommends a regular sleep routine that allows plenty of time for sleep; for patients whom sleep eludes, the first step is to find out why.

But Lucey is studying whether suvorexant, an FDA-approved sleep medication (Belsomra), can help prevent Alzheimer’s disease in a phase 2 clinical trial. In one of Holtzman’s mouse models, a drug in the same class as suvorexant inhibited the formation of amyloid plaques. Lucey is hoping for the same results in humans.

Meanwhile, Lucey began monitoring more than 400 people in 2014, testing whether poor sleep quality is a biomarker for future cognitive impairment. Published in January 2019, the results showed that when people get less restful, deep, slow-wave sleep, tau levels increase.

The data also drew a U-shaped link between amount of sleep and cognitive performance. “There’s a sweet spot,” Lucey explained — roughly six or seven hours of sleep a night — “where cognitive performance was stable.” When people slept less than that — or more — cognitive performance declined over time. The brain knows just how much deep rest it requires.

In another of Lucey’s studies, the research team continuously sampled cerebrospinal fluid (think of doing a spinal tap and leaving the tube in) while

Yo-Ei S. Ju, MD (right), the Barbara Burton and Reuben Morriss III Professor, prepares a study participant for a sleep study on rapid eye movement sleep behavior disorder.



MATT MILLER

“There are no walls here. We probably have more people working on the intersection between sleep and neurodegenerative disease than any other research institution.”

— David M. Holtzman, MD

doing various sleep interventions. When subjects were sleep-deprived, amyloid and tau levels rose 30% to 50%. “If this is happening night after night for years,” he said, “sleep deprivation could be playing a role in the progression of Alzheimer’s.”

Eventually, he hopes to solve the maddening chicken-or-the-egg puzzle. We still don’t know, he said, “if the sleep disturbance is causing Alzheimer’s, or if it is an early marker that shows that Alzheimer’s is developing. I think it likely could be both.”

Other clues, other conditions

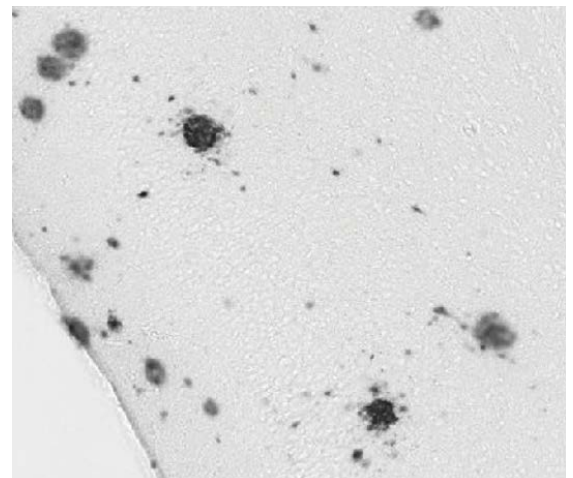
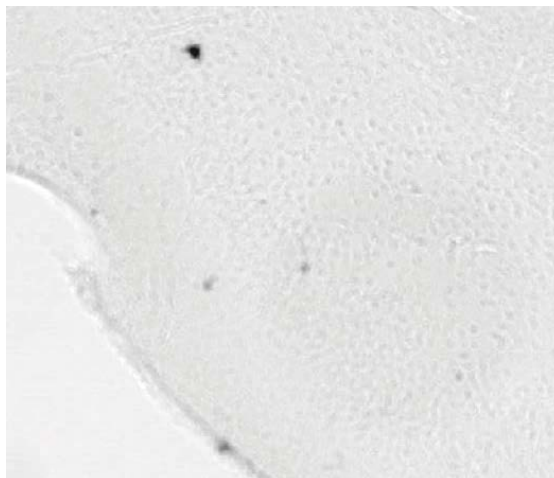
When she is not analyzing sleep’s effect on Alzheimer’s proteins, Ju studies a different protein, this one involved in rapid eye movement (REM) sleep behavior disorder (RBD). RBD is a rare condition in which people act out their dreams as they sleep. Their gestures — unselfconscious, uninhibited, theatrical — are fascinating, but what they imply is grim. “Telling someone they have REM disorder is generally the worst news I have to give,” Ju said, explaining that a high percentage of these

patients go on to develop Parkinson’s disease or Lewy body dementia, “and the treatments we have now for RBD will not slow or stop that progression.”

RBD, Parkinson’s, and Lewy body dementia all fall into the category of Alzheimer’s-related disorders, and they are all characterized by the clumping of proteins. With RBD, the crucial protein is alpha synuclein, and again, the problem is overaccumulation. Normally, excess would be cleared away by enzymes within the cells. That’s not happening, so either too much is being produced, or the enzymes are somehow being prevented from clearing it — or both. The clumps, called Lewy bodies, can lead to either Parkinson’s or Lewy body dementia. WashU leads the North American Prodromal Synucleinopathy Consortium for RBD, which follows over 350 individuals with RBD across 10 sites in the U.S. and Canada, to better understand the disease process and develop preventive treatments.

Ju also hunts for clues in common, everyday sleep disorders. Obstructive sleep apnea, for example, interrupts breathing, stuttering the flow of oxygen to the brain, and it also disrupts the restful slow-wave sleep stage, so you wake

Amyloid plaque accumulation (brown stain) is much greater in the brain of sleep-deprived mice (right) vs. mice with normal sleep. In 2009, Science published this finding from the lab of David M. Holtzman, MD, the Barbara Burton and Reuben M. Morriss III Distinguished Professor. This landmark study was among the first to associate sleep deprivation with the development of Alzheimer’s disease.



DAVID M. HOLTZMAN, MD

feeling as though you haven't slept at all. Slow-wave sleep is the neurons' chance to rest, letting the brain clear away all the waste products of its mental activity, so apnea disrupts that respite as well. Untreated, it causes inflammation that both increases the risk of dementia and hastens its arrival: People develop cognitive impairment about 10 years earlier, on average, than those without apnea. "If we can identify how apnea is leading to inflammation and how that contributes," said Ju, "we can target the cause, going beyond treating the apnea to address some of these downstream consequences."

Research synergy

Dementia has a slippery list of causes and exacerbations, and not everyone agrees that sleep quality plays a pivotal role. A paper published last year in *The Lancet* did not even include sleep in a list of preventive measures for dementia. But the evidence is building fast.

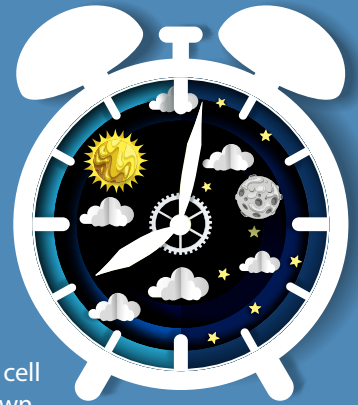
"Multiple layers of research are happening at WashU, all at the same time," Lucey said. "That sort of synergy doesn't exist on this level anywhere else." Measurements collected in one study form the basis of multiple new studies, and steadily, a scaffolding rises, supporting investigations into new ways to predict and diagnose dementia and new treatments that could halt its progression — or stop it altogether.

To continue moving basic science closer to care, WashU's new Center on Biological Rhythms and Sleep is pulling together ongoing research in sleep, circadian rhythms, Alzheimer's and other human diseases. "There are no walls here," Holtzman said. "We probably have more people working on the intersection between sleep and neurodegenerative disease than any other research institution. And the collaborative spirit is better than I've seen anywhere."

Ten years out, he hopes that "we will be able to affect sleep in some way that will reduce disease risk. And that we can use different sleep assessments to determine whether a treatment is having an effect, instead of measuring only someone's memory. We want to be able to measure before cognitive decline starts, and then, if we give a treatment, know right away if it is helping." □

Circadian rhythms and Alzheimer's

Circadian rhythms and sleep cycles are both tied to the rising and setting sun, but the two operate independently. Pull an all-nighter, and your body's rhythms will not join in; your immune system will still sneak away for a break in the middle of the night, and your gut will slow down, too. Though circadian rhythms are set by a master clock tied to daylight, every human cell — including neurons — has a clock of its own.



"Circadian rhythms are found in all our organs, our blood pressure, our hormones, our gut, our eyes," said Erik S. Musiek, MD, PhD, the Charlotte & Paul Hagemann Professor of Neurology. He compares all these little 24-hour clocks to musicians in a symphony orchestra: Harmony is only possible when they are all in sync.

In 2011, Musiek joined Holtzman's lab, one of the few labs studying the role of sleep in Alzheimer's disease, and he chose a related project: how circadian rhythms affect brain function.

One of Musiek's early studies yielded a surprise: The gene for the protein *YKL-40* was highly regulated by circadian clock genes. He recalled that previous research from the Holtzman lab had linked *YKL-40* to Alzheimer's disease.

Everything connected. Alzheimer's was linked to disrupted sleep. High *YKL-40* levels were linked to Alzheimer's. *YKL-40* was linked to the circadian clock — which, if thrown off, disrupts sleep. Alzheimer's also is characterized by chronic inflammation — which is controlled by the circadian clock.

Musiek's team kept going. They found that mice who lack the *YKL-40* gene have less amyloid in their brain. Then a WashU geneticist — Carlos Cruchaga, PhD, the Barbara Burton & Reuben M. Morriss III Professor — found that humans with lower expressions of *YKL-40* have a slower progression of Alzheimer's, presumably because there is less amyloid clogging their brains. Why would somebody with high levels of *YKL-40* have more amyloid? Because *YKL-40* stops the microglia, the brain's immune cells, from cleaning up any excess.

Disrupted sleep also increases amyloid plaques. Is the disruption caused by a circadian clock that's lost the beat? Scientists don't know yet. But they do know the problem isn't a simple lack of sleep time. When Musiek's team genetically altered the circadian rhythms of mice, they took so many catnaps, they were getting slightly more sleep than usual, yet their amyloid plaques still increased.

In an idyllic pastoral life, we would naturally rise with the sun and sleep through the darkest night. But in a world filled with glowing screens and bright street lamps, angst and overwork, slumber often eludes us.

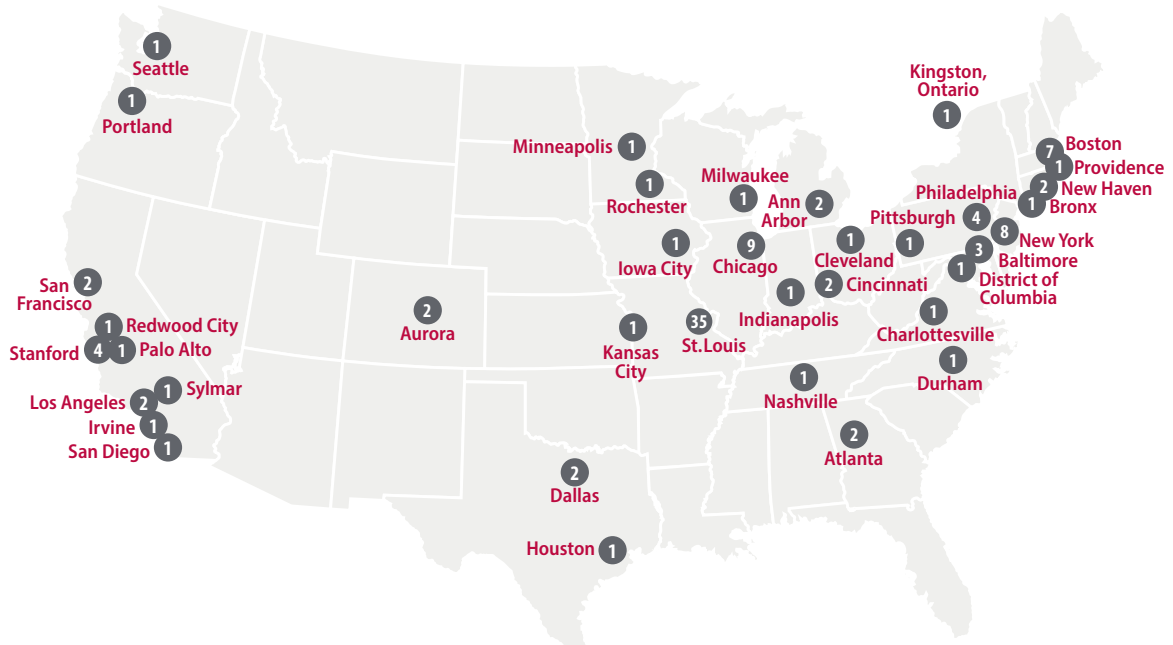
What if we learn to keep our circadian rhythms in tune? What if, starting in middle age, we optimize them, improving our sleep quality? "We think you would have less Alzheimer's," Musiek said simply.



Match Day 2022

The Class of 2022 gathered in person and with their loved ones March 18 to celebrate Match Day, the momentous milestone when U.S. medical students learn where they will train as residents after graduation. For many, the ceremony allowed collective, palpable excitement — an atmosphere not experienced by School of Medicine graduates since before the COVID-19 pandemic. Match Day was virtual in 2020 and modified with safety restrictions in 2021. The event took place at the Eric P. Newman Education Center.

- 28**
Internal
Medicine
- 24**
Surgery
- 10**
Pediatrics
- 9**
Emergency
Medicine
- 8**
Anesthesiology
- 7**
Ophthalmology



CALIFORNIA**Olive View-UCLA Medical Center**

INTERNAL MEDICINE
Olivia Roberts-Sano

Stanford Advanced Research Program

OPHTHALMOLOGY
Arnav Moudgil

Stanford Health Care

INTERNAL MEDICINE
Chetan Ambastha

Arman Odabas

INTERVENTIONAL RADIOLOGY (INTEGRATED)

Cathy Yu

ORTHOPAEDIC SURGERY

Jody Law

PEDIATRICS (RESEARCH TRACK)

John Steven Ekman

University of California-Irvine

OPHTHALMOLOGY

Sean Yuan

University of California-Los Angeles Medical Center

GENERAL SURGERY

Kelsey Haddad

OBSTETRICS-GYNECOLOGY (PRELIMINARY)

Sandy Hoang

University of California-San Diego Medical Center

DERMATOLOGY

Zachary Jaeger

University of California-San Francisco

MEDICINE (PRIMARY)

Tamara Sanchez Ortiz

Alanna Williams

COLORADO**University of Colorado-Aurora**

OPHTHALMOLOGY

Hosannah Evie

Tiffany Wu

CONNECTICUT**Yale-New Haven Hospital**

ANESTHESIOLOGY

Jose Grajales

MEDICINE (PRIMARY)

Karthik Rohatgi

DISTRICT OF COLUMBIA**MedStar Georgetown****University Hospital**

ORTHOPAEDIC SURGERY

Chukwuka Obiofuma

GEORGIA**Emory University****School of Medicine**

INTERNAL MEDICINE

(RESEARCH)

Jay Bowman-Kirigin

PEDIATRICS

Joel Ofori

ILLINOIS**Northwestern McGaw/NMH/VA**

EMERGENCY MEDICINE

Joshua Alinger

Skyler Kessler

INTERNAL MEDICINE

Amulya Joseph

Mengou Mary Zhu

RADIATION ONCOLOGY

Inema Orukari

Rush University Medical Center

NEUROLOGICAL SURGERY

Ayodamola Otun

OBSTETRICS-GYNECOLOGY

Iris Kuo

University of Chicago**Medical Center**

INTERNAL MEDICINE

Ryan Sachar

OPHTHALMOLOGY

Arjav Shah

INDIANA**Indiana University****School of Medicine**

GENERAL SURGERY

Linh Vuong

IOWA**University of Iowa****Hospitals and Clinics**

OPHTHALMOLOGY

Matthew Hunt

KANSAS**University of Kansas****School of Medicine**

DERMATOLOGY

Dana Sous

MARYLAND**Johns Hopkins Hospital**

ANESTHESIOLOGY (RESEARCH)

Chinwendu Amazu

EMERGENCY MEDICINE

Luxi Qiao

NEUROLOGICAL SURGERY

Emily Johnson

MASSACHUSETTS**Beth Israel Deaconess****Medical Center**

EMERGENCY MEDICINE

Ryan Pappal

Boston Children's Hospital

PEDIATRICS

Alaric D'Souza

Brigham & Women's Hospital

INTERNAL MEDICINE

Maliza Namude

Massachusetts General Hospital

ANESTHESIOLOGY (RESEARCH)

Justin Porter

EMERGENCY MEDICINE/

BWH-HARVARD

Jane Hayes

GENERAL SURGERY

Jason Yang

INTERNAL MEDICINE

Priyanka Pullarkat

MICHIGAN**University of Michigan****Hospitals-Ann Arbor**

ORTHOPAEDIC SURGERY

Emmanuel Arhewoh

Erik Nakken

MINNESOTA**Mayo Clinic School of****Graduate Medical Education**

INTERNAL MEDICINE

Brandon Jocher

University of Minnesota**Medical School**

ORTHOPAEDIC SURGERY

Anna Holten

MISSOURI**Barnes-Jewish Hospital**

ANESTHESIOLOGY

Gaurang Gupte

Stephen Renfroe

Thomas Van Horn

DERMATOLOGY

Neel Raval

EMERGENCY MEDICINE

Manoj Arra

Lindsey Hagberg

Prerak Trivedi

GENERAL SURGERY

Christopher Noda

Adrienne Visani

INTERNAL MEDICINE

Sophia Evans

Wesley Hodges (Preliminary)

Christine Ma

Eric Mittauer

Lauren Sachs (Primary)

Sajal Tiwary

David Zhang

INTERNAL MEDICINE/PSTP

Gregory Fox

Qianli Wang

NEUROLOGICAL SURGERY

Tatenda Mahlokoza

Jane Yuan

OBSTETRICS-GYNECOLOGY

Adriana Nigaglioni Rivera

PHYSICAL MEDICINE &

REHABILITATION

Christine Gou

PLASTIC SURGERY-INTEGRATED

Deng Pan

Arthur Sletten

PSYCHIATRY

Lena Jia

RADIATION ONCOLOGY

Kevin Chen

RADIOLOGY-DIAGNOSTIC

Brandon Lippold

Alexis McGraw

Michelle Wegscheid

(Research)

UROLOGY

Lauren Elson

Saint Louis University**School of Medicine**

PEDIATRICS

Christine Park

St. Louis Children's Hospital

PEDIATRICS

Monica Lim

Morgan Pfeiffer

St. Luke's Hospital

INTERNAL MEDICINE

Andrew Nunno

Washington University

OPHTHALMOLOGY

Maggie Xing

NEW YORK**Hospital for Special Surgery**

ORTHOPAEDIC SURGERY

Taylor Cogsil

Icahn School of Medicine/**Mount Sinai Hospital**

GENERAL SURGERY

(PRELIMINARY)

Eric Rome

INTERNAL MEDICINE-

MEDICAL GENETICS

Drew Sinha

PSYCHIATRY

Benjamin Geselowitz

Montefiore Medical**Center-Einstein Campus**

GENERAL SURGERY

Tarik Phillips

New York Presbyterian**Hospital-Columbia University****Medical Center**

NEUROLOGY

Gina Rhee

ORTHOPAEDIC SURGERY

Dongyeon Joanna Kim

PEDIATRICS

Isabelle Ziebold

New York University Grossman**School of Medicine**

NEUROLOGY

Dillan Newbold

NORTH CAROLINA**Duke University Medical Center**

INTERNAL MEDICINE-

PSYCHIATRY

Michael Rauschenbach

OHIO**Cincinnati Children's Hospital****Medical Center**

PEDIATRICS

Talia Pearl

Cleveland Clinic Foundation

THORACIC SURGERY

Nadia Bakir

University of Cincinnati**Medical Center**

ORTHOPAEDIC SURGERY

Priyanka Parameswaran

OREGON**Oregon Health &****Science University**

ORTHOPAEDIC SURGERY

Yash Tarkunde

PENNSYLVANIA**Hospital of the University****of Pennsylvania**

DERMATOLOGY (RESEARCH)

Caroline Snowden

EMERGENCY MEDICINE

Sydney Sillart

PSYCHIATRY

Zachary Rosenthal

RADIOLOGY-DIAGNOSTIC

Priscilla Stecher

University of Pittsburgh**Medical Center**

ANESTHESIOLOGY (RESEARCH)

Marianne Ligon

RHODE ISLAND**Brown University/Rhode****Island Hospital**

MEDICINE (PRELIMINARY)

Michael Vittorio

TENNESSEE**Vanderbilt University****Medical Center**

INTERNAL MEDICINE

(ABIM RESEARCH PATH)

I-Ling Chiang

TEXAS**Baylor College of Medicine**

PEDIATRICS

Jennifer Berrian

University of Texas**Southwestern Medical School**

INTERNAL MEDICINE

John Deng

RADIATION ONCOLOGY

Brett Tortelli

VIRGINIA**University of Virginia**

PHYSICAL MEDICINE &

REHABILITATION

Reid Collis

WASHINGTON**University of Washington****Affiliated Hospitals**

PEDIATRICS

Amisha Parikh

WISCONSIN**Medical College of Wisconsin****Affiliated Hospitals**

ANESTHESIOLOGY

Lillianx Lu

CANADA**Queen's University**

RADIOLOGY-DIAGNOSTIC



Psychosis is a state of mind that occurs when the brain cannot properly process information, causing a splintered reality in which sufferers cannot distinguish between what is real and what is not.

Young people at risk

Free clinic treats early signs of psychosis, improves outcomes

BY KRISTINA SAUERWEIN

Phantom voices instructed a 13-year-old girl to store knives in her bed, taunted her with vulgarities and convinced her that she could see god, even be a god.

For months, the voices destroyed peace in the family's home.

"I felt helpless because my daughter's inner demons wouldn't go away," said the teenager's mother, Takisha, recalling the psychotic episodes that began in early 2020. "Seeing my baby girl being tormented by her inner demons was more horrific than I could ever have imagined."

Most parents and caregivers feel frightened and helpless when their teenagers and young adults start exhibiting early signs of psychosis. It's why Daniel T. Mamah, MD, started the Washington Early Recognition Center, a free, outpatient clinic that opened in January 2020 and serves patients ages 13 to 25. It is the only comprehensive clinic in Missouri — and one of a handful in the Midwest — specializing in youth psychosis, including conditions such as schizophrenia and bipolar disorder.

Psychosis is a state of mind that occurs when the brain cannot properly process information, causing a splintered reality in which sufferers cannot distinguish between what is real and what is not. They may hear phantom voices and noises, or see people, creatures and other things that do not exist. They may exhibit paranoia, behave in erratic or strange ways or espouse bizarre beliefs.

As the center's director, Mamah leads a team of licensed counselors, social workers and psychiatric physicians who collaborate using neuroimaging, elaborate clinical assessments and cognitive testing to diagnose psychotic disorders and monitor symptoms. They develop personalized treatment plans that include a range of services, from individual and group therapy to medication management and programs that support family caregivers. Patients are referred to the clinic by community organizations, schools, pediatricians, psychiatrists or physicians at hospitals.

Funding from philanthropists, foundations and the university allows the center to remove the financial burdens that often impede a person's ability to receive medical care. "Poverty is a major roadblock to accessing mental health treatment," Mamah said. "The center's goal is to provide well-rounded care to young people in an early stage of a psychotic disorder or someone on the psychosis spectrum because we know effective treatment means more than seeing a psychiatrist or getting a counselor."

Many people with psychosis also experience anxiety, depression or substance abuse. "These conditions can obscure diagnosis and treatment because there is a lot of overlap with psychosis," said Mamah, also a Washington University professor of psychiatry. "But psychosis goes beyond being nervous or sad. It's a loss of reality. The person experiencing hallucinations, paranoia or odd behaviors has no insight that there's something wrong. The person actually thinks those things are happening."

Although symptoms vary in severity and frequency, a commonality of psychosis is its propensity to confuse, isolate and shame, creating feelings of helplessness among sufferers and their loved ones.

"Mental illness, in general, is stigmatized and misunderstood, but the unpredictability and seemingly bizarre behaviors associated with



Daniel T. Mamah, MD

MATT MILLER

psychosis can make the disease even more confounding and unsettling,” Mamah said.

Psychosis is more common than many realize. According to federal statistics, about 3% of the overall population will experience a psychotic episode during their lifetimes. Often, the illness begins in early adulthood, with approximately 100,000 young people in the U.S. experiencing a first episode of psychosis every year.

“One of the highest priorities of any clinical program in psychiatry is to offset risk for severe and persistent mental health conditions,” said John N. Constantino, MD, the Blanche F. Ittleson Professor of Psychiatry and Pediatrics, director of the university’s Division of Child and Adolescent Psychiatry and psychiatrist-in-chief at St. Louis Children’s Hospital.

“Dr. Mamah’s center epitomizes this objective and lies on the cutting edge of hope for better long-term outcomes for young people affected by schizophrenia and other forms of psychosis. By delivering comprehensive treatment at the earliest possible juncture, Dr. Mamah and his team are filling a tremendous need in the region,” he said.

Finding mental health treatment in the U.S. long has been riddled with obstacles. Services are scarce, costs are expensive, and health insurance coverage is limited. An escalating mental health crisis among U.S. teens has caused shortages and long wait times for counseling — problems exacerbated by the pandemic. And although psychosis affects people across all racial and socioeconomic backgrounds, additional hurdles confront people from marginalized groups, such as Takisha and her daughter, who are Black and had to overcome cultural stigmas about mental health care.

“To even think about getting outside help was a leap because, in Black culture, you don’t go telling people your private business,” Takisha said. “Mental illness is more of a personal problem or weakness than a medical issue.”

Desperation prodded Takisha to seek medical care for her daughter, despite an inherent distrust of doctors and hospitals. The first few months of treatment included her daughter being institutionalized at a facility not affiliated with Washington University. The experience seemed to confirm her suspicions.

“They gave drugs that made my creative, energetic girl withdrawn and lethargic,” Takisha said tearfully. “She had a hard time speaking and couldn’t walk. Her eyes rolled to the back of her head. She was like a zombie. I felt afraid and alone because I didn’t understand what was happening. I asked, but the doctors just said they were helping my daughter.”

Takisha felt proper treatment didn’t arrive until her daughter was released from the facility and, a few weeks later, admitted and treated at St. Louis Children’s Hospital, and the teenager was referred to Washington Early Recognition Center.

“Dr. Mamah informed us at every step,” she said. “The most important thing was that he genuinely cared about my daughter’s well-being and also mine, as her caretaker. He knew we were scared, so he educated us about medications and other treatments. He and his team helped me to trust them.”

Her daughter, now 15, has shown improvements. She sometimes attends school and channels her creativity into artistic projects.

However, mental health is often a circuitous path. Some days — or months — are better than others. “Our journey began almost three years ago, and there have been many ups and downs,” Takisha said. “But we didn’t start to see light until Dr. Mamah and the clinic.”

Racial barriers

Several studies cite an overall lack of awareness about mental health conditions among many nonwhites as well as a higher likelihood of misdiagnosis. Mamah and other experts noted that white youth are more likely than Blacks to receive mental health care — and, subsequently, Blacks are more likely to receive disciplinary actions for symptoms associated with mental illnesses. Long-standing systemic racism also sows distrust of

the medical field and deters care, according to the American Psychiatric Association, the National Alliance on Mental Illness and other groups.

Overcoming such barriers is essential. “The goal of the Washington Early Recognition Center is to accurately identify young people during the early stages of psychosis and provide research-backed interventions to lessen symptoms and improve social, educational and vocational functioning,” said Mamah, who also has a master’s degree in psychiatric epidemiology.

Some sufferers never receive medical care. Among those who seek treatment, many wait years after the first psychotic episode. “This is lost time,” Mamah said. “Most people with psychosis experience an inability to function. Grades drop in school. On-the-job performance declines. Relationships suffer. It’s hard for family members dealing with sudden personality changes and, often, being the target of wrath stemming from a psychotic episode. Socially and economically, the fallout from psychosis is problematic.”

Multiple studies have found that adolescents with psychotic symptoms are at an increased risk for attempting suicide compared with adolescents in the general population. Similarly, they’re also more likely to die by suicide than their non-afflicted peers.

However, psychosis doesn’t have to ruin lives. “A lot of people believe a psychotic disorder is a life sentence of disability and despair,” Mamah said. “But that’s not the case. With medication and treatment, a lot of people do well. That’s why early treatment is critical.”

Psychosis can result in a rapid, degenerative process. Advanced brain imaging techniques used at the Washington Early Recognition Center have shown that the longer psychosis goes untreated, the worse it gets. Brain matter shrinks. Brain wiring misfires. Irregular connections form between neurons, the billions of cells responsible for transmitting nerve impulses that allow a body to function and be alive. A person who remains undiagnosed over a five-year span typically fairs worse in later decades than someone who received earlier treatment.

Psychosis across the life span

Psychosis is a disorder of abnormal brain development, which usually takes a dramatic turn in adolescence and young adulthood. The peak age of onset for schizophrenia is 15-25 years in men and 20-30 years in women. The earlier the disorder is identified and treated, the better the prognosis.

Teens “Prodromal phase”

- Vague, nonspecific symptoms: social isolation, lack of motivation, difficulty concentrating, increased anxiety, mildly/poorly formed delusions and hallucinations.
- Substance use is common.
- Identification of the prodrome can be very difficult. If recognized, early intervention can begin.

Birth to pre-teens

- No or few symptoms.
- Brain vulnerability markers may be present.

20s to early 30s “Active phase”

- Psychotic symptoms: hallucinations/phantom voices, delusions, disorganized thoughts, speech and behavior.
- Functional impairment, apathy, poor insight.
- Coincides with brain changes: increased inflammation, excessive pruning of synapses, cortical atrophy.
- Intervention (anti-psychotic drugs, therapy, cognitive training) can slow illness progression and prevent more severe symptoms.

Mid-30s and beyond “Chronic/residual phase”

- Hallucinations and delusions are muted, though odd beliefs can persist.
- Social withdrawal, reduced or absent facial expressions, general disinterest.
- Attention and memory deficits.
- Ongoing treatment.



DANIEL MAMAH, MD

Half Hungarian and half Nigerian, Daniel T. Mamah, MD, has been conducting early psychosis research in Africa for 13 years. He is one of the few researchers studying this clinical high-risk population on the continent.

“It’s like other aspects of medicine,” Mamah explained. “If you wait until a heart attack to treat hardening arteries, it’s less effective than if you had started treatment earlier. Same thing with cancer. If you wait until the cancer spreads, your health outcomes worsen. If you can thwart the process of psychosis in earlier stages, your chances for healthier long-term outcomes increase.”

As the field of psychiatry advances, MRI scans of brain structure and function could help clinicians pinpoint specific psychotic conditions — schizophrenia is heterogenous and does not always affect the same parts of the brain — and monitor the effectiveness of treatments such as medications.

Besides imaging, the center relies on other diagnostic tools such as neurocognitive assessments that measure a range of capabilities associated with memory, attention, emotions, sensory processing and IQ. “All of these things can give you a clue about what is going on in a person’s brain,” Mamah said.

For instance, people with schizophrenia tend to have impaired memory function and attention deficits. Knowing this ensures co-existing conditions are not overlooked. It also enables clinicians to make an accurate diagnosis and provide their patients with specialized training to improve cognitive abilities. “All of these factors work together to uplift a patient’s prognosis,” Mamah said.

Research at the clinic is also helping improve treatments. It is part of an international, multi-institution study that focuses on the 1 million adolescents and young adults at risk for schizophrenia. Funded by a \$65 million grant from the National Institutes of Health (NIH), Washington University researchers led by Mamah plan to classify clinical trajectories of those at high risk for psychosis, and identify biomarkers in the blood and brain that can help determine who


requires specific treatments. Their hope is to find drug therapies for preventing the onset of schizophrenia.

Mamah is leading another study, based in Africa, examining psychosis in Kenyan youth over a five-year period. Researchers will analyze behavioral traits, genetics and neuroimaging data to improve early intervention and prevention tactics aimed at combating psychotic disorders.

This study is providing new insights into the varied experiences of living with schizophrenia as a Black person in the U.S. and in Africa. “One of the reasons our work in Africa is interesting is because we’re studying people with similar genetics who live in a different society, and we’re not seeing the increased rates of schizophrenia in Blacks in Kenya as we do in the U.S.”

Half Hungarian and half Nigerian, Mamah spent his childhood in both Eastern Europe and Africa during the 1980s. “I realized people in Africa didn’t have access to adequate health care, and hospitals weren’t as great as they were in other countries,” he recalled. “The experiences helped crystallize my interest in medicine. But my goal from the get-go wasn’t to become a psychiatrist. It’s not something most people think of when they were raised in Africa or lived there for a long time. Mental health is not a big focus. People are worried about infectious diseases and other basic health needs.”

Mamah initially wanted to become a brain surgeon when he entered Semmelweis Medical School in Budapest. “I’ve always been fascinated with the brain, but as I went through my training, I realized that I really liked talking with people and forming connections. Psychiatry combines all of these interests. I value the connections I’ve made with my patients at the center. It makes me even more determined to improve treatments for psychosis.” □



(Left to right) Sarah Chiang, Michelle Cai and Stanley Chibueze participate in their final day of dissection in anatomy class during their first year of medical school in 2018.

Why scholarships matter

BY MARY LEE

At the most basic level, scholarships help students pay for medical school. But the impact of this support extends far beyond aspiring physicians and their tuition bills.

Scholarships enhance the School of Medicine's ability to enroll the most talented students and enable them to take advantage of a vast array of training and mentorship opportunities from world-class faculty members. This, in turn, shapes students' goals and their futures as leaders in medicine.

Read more about how scholarships affect the education of individual students and empower the school in its recruitment efforts.

Stanley S. Chibueze

Class of 2023

Hometown

Anambra, Nigeria

Undergraduate degreeNeurosciences,
Vanderbilt University

Improving medical care in Nigeria

Stanley Chibueze's path to medical school began with a life-threatening illness. While he was finishing secondary school in Nigeria in 2006, he contracted cerebral malaria and fell into a coma. His treatment and recovery sparked a desire to become a physician and improve the medical system in his country.

After working in Nigeria for several years to help put his siblings through school, Chibueze made his way

"I want to play a bigger role in improving health-care access for people who really need it."

to North Texas and eventually Nashville, Tenn., where he earned a bachelor's degree at Vanderbilt University. Though he planned to attend medical school close to family in Texas, he visited WashU on a lark during Second Look Weekend.

"That trip changed my mind," he said. "From the get-go, I noticed the people here are down to earth and super smart. These amazing clinicians and researchers seemed very open to interacting with students and connecting them to resources."

A scholarship offer made it possible for Chibueze to come to WashU, and his time here has exceeded all expectations, he said. Backed by another scholarship from the university's Olin Business School, he took a year off from medical studies and recently completed coursework for an MBA. He leveraged skills gained through the program to advance a health-care startup he helped found in 2018 that provides clinical and diagnostic services in the Nigerian capital, Abuja.

"In addition to being a doctor, I want to play a bigger role in improving health-care access for people who really need it," Chibueze said. "To do that, I needed other skills to help me understand the business side of health care. Scholarships have allowed me to get those skills."

Scholarships also have opened doors to other experiences, including research with otolaryngology faculty members and a role as co-leader of the student team working on the medical school's accreditation review process.

"Before coming here, I didn't understand the concept of giving back to an institution that had supported you financially, intellectually and emotionally. I do now. I am so grateful to those who make it possible for WashU to offer scholarships, and I want to pay it forward in the future."

A portrait of Sarah Y. Cohen, a young woman with long brown hair, smiling and wearing a maroon sweater. She is standing in a hallway with stone walls and a doorway in the background. The photo is taken from the waist up, with her arms crossed.

Sarah Y. Cohen

Class of 2023

Hometown

St. Louis

Undergraduate degree

Molecular, cellular and developmental biology, Yale University

Advocating for change

Before she ever applied to medical schools, Sarah Cohen was attracted to patient care, education and research. By the time she completed her undergraduate degree and a gap year that followed, she had worked in a hospital emergency department, educated high school students about reproductive health, and conducted quality-improvement research.

So when she visited WashU as an applicant, she was excited to learn about opportunities to strengthen her academic medicine skill set. “The fact that the school was planning to build a new curriculum really drew me in,” she said. “I wanted to be involved. And it seemed like the administration welcomed student voices and participation.”

A full-tuition scholarship helped bring Cohen to WashU, where she joined a student committee that helped build the Gateway Curriculum. “I loved it even more than I expected to,” she said. “Our meetings became one of the best parts of my week.” She currently serves as a medical education representative within Medical Student Government and co-leader of a student team preparing for the medical school’s accreditation visit in 2023.

Cohen, who plans to specialize in obstetrics and gynecology, also conducts research with associate professor Tessa E. Madden, MD, on premature rupture

of the membranes during pregnancy. And she worked with two other students to draft policies on sex education and immunization exemptions that were adopted by the Missouri State Medical Association.

The policy work and an interest in health program design spurred her to pursue a master’s degree in public health at WashU’s Brown School. She will complete her coursework there this summer before returning to the medical school for her final year.

“My scholarship has allowed me to recognize how I might build a career that improves the health of patients and communities.”

The breadth of her activities has strengthened Cohen’s desire to become an academic physician. “My scholarship has allowed me to recognize how I might build a career that improves the health of patients and communities,” she said. “I know my training will make me a better clinician and give me tools to advocate for and implement change in medical education, the health-care system and beyond.”

Read A. Streller

Class of 2025

Hometown

Edmond, Okla.

Undergraduate degreeChemical biosciences,
University of Oklahoma

MATT MILLER

Exploring new pathways

When Read Streller played competitive tennis in high school, he warmed up for St. Louis tournaments on the courts at Hudlin Park, adjacent to the medical school and Barnes-Jewish Hospital. He never imagined he would see those courts on a regular basis as a medical student.

Streller didn't plan to attend medical school at WashU. He applied to the University of Oklahoma, his undergraduate alma mater, where he played basketball as a walk on, and other schools. At his mother's suggestion, he added the School of Medicine late in his application process.

“Having one of those huge burdens taken away has allowed me to enjoy my time here.”

“After interviewing at different schools, WashU was my favorite,” said Streller, who scored in the 100th percentile on the MCAT. “The school's Gateway Curriculum was a big factor. But I also was impressed with the effort the school put into interacting with

applicants via Zoom during the pandemic. It made me feel important and welcome.”

Initially placed on the waitlist, he made plans to attend another top-tier school — one that did not offer financial assistance. Later, when WashU called with a scholarship offer, he made the switch. “I have four younger siblings in college,” he said. “My parents couldn't help me pay for medical school, and I didn't want to take on so much debt.”

The financial assistance relieved some of Streller's concerns about attending medical school. “The expectations, length of training and then going under the hood for \$260,000 — that's a lot of pressure. Having one of those huge burdens taken away has allowed me to enjoy my time here.”

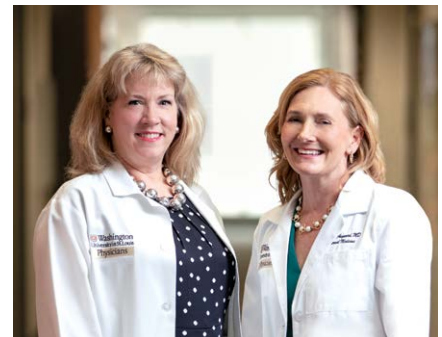
Medical school faculty members have opened his eyes to different career options. The Gateway Curriculum's Explore program, an immersive professional development experience that spans all four years, will further that process. He is pursuing the program's innovation pathway, which focuses on advancing medicine through entrepreneurship, leadership and systems change. “This isn't an area I would have considered before,” he said. “But I am really excited to see where it takes me.”

Cultivating tomorrow's leaders in medicine

Few people understand better than Eva M. Aagaard, MD, and Valerie S. Ratts, MD, how scholarships affect the School of Medicine's mission to prepare physician leaders. As vice chancellor for medical education, Aagaard spearheaded the development of the school's Gateway Curriculum, which debuted in 2020. And Ratts oversees efforts to attract the best students to the medical school.

Beyond training students to become exceptional clinicians, the revamped curriculum builds on the medical school's recognized expertise in educating physician-scientists. The addition of specialized pathways that nurture the development of physician-teachers, -innovators and -advocates has bolstered the school's efforts to produce graduates capable of tackling society's greatest health-care challenges.

Scholarships support this vision by helping the school recruit students whose talents and passions align with academic medicine. That's one reason Aagaard and Ratts championed the school's 2019 decision to allocate \$100 million over 10 years for scholarships and curriculum renewal. The money supplements scholarships provided to students through philanthropy, which totaled nearly \$8 million in fiscal year 2020.



**Valerie S. Ratts, MD (left), and
Eva M. Aagaard, MD**

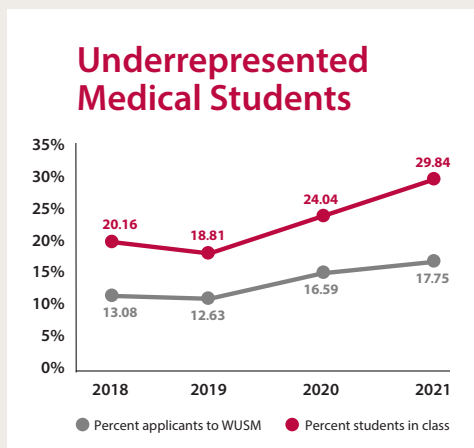
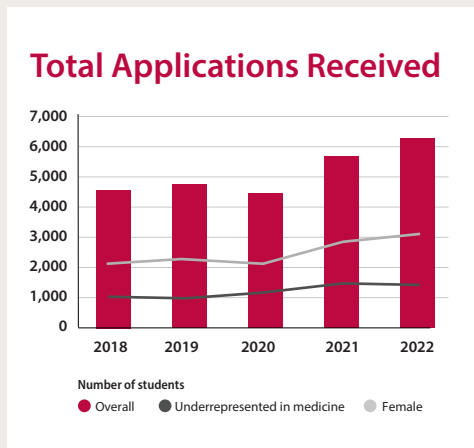
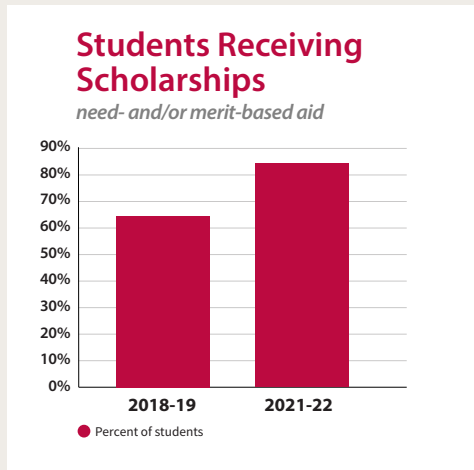
Here, Aagaard and Ratts discuss how scholarships set students free to explore their passions.

How has increased scholarship funding affected recruitment?

Ratts: Over the last few years, we've seen our application numbers increase. We were up about 25% in 2021 and 8% in 2022. That compares to a national decrease in applications in 2022. Also, the data show more students choose to attend WashU when we extend offers of admission.

Aagaard: We have increased the proportion of students who receive full or partial scholarships to 85%. And we continue to rank nationally among medical schools whose graduates accrue the least amount of debt. But the landscape around scholarships in medical education

In April 2019, the School of Medicine committed \$100 million to fund scholarships and innovation in medical education.



has fundamentally shifted. Several medical schools have instituted steep tuition-reduction programs in recent years. If we want to continue to be at the top of our game, we have to be proactive.

Do we ever lose students to medical schools that offer better scholarship packages?

Ratts: It definitely happens. I have students come to me and say, “I just can’t afford to come to WashU.” Sometimes, these students choose to attend medical schools that don’t offer them as many opportunities as we do. I haven’t seen this quite as much in the last few years because of the increased scholarship funding. It’s very clear that even when we give partial scholarships, it makes a huge difference in how students view us and their future.

Aagaard: There’s no question that financial considerations have a significant influence, whether you are talking about a student who comes from an under-resourced background or a middle-class background. In fact, medical students from middle-class families often accumulate the largest debt because parental income still is a part of the financial aid equation for most.

How does debt affect students?

Aagaard: It causes incredible stress. We know it impacts their well-being and their long-term decisions about buying a house, getting married, having a baby and whether they should delay those things. And it also impacts their career decisions.

When students today have a giant amount of debt weighing on them,

they start asking, ‘Which career can I choose to ensure I can make enough money?’ It prevents some of them from going into academic medicine because, in general, academic physicians earn less than community physicians. And that’s a real problem for society. We need the best and brightest students to focus their energy on improving the health-care system, generating discoveries that enhance health and well-being, and educating future generations of physicians.

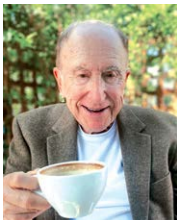
How do scholarships support student development?

Ratts: They provide a financial buffer that allows students to take advantage of experiences available at a top-tier academic medical center to broaden their skills and mindset. Besides getting involved in community outreach and service, some students take an extra year to conduct research or pursue a degree in public health, population health sciences or another area. This really corresponds with what I believe always has been the medical school’s philosophy: Give students outstanding resources, knowledge and mentorship and then set them free to develop their potential.

Aagaard: This place has a special ability to produce people who can fundamentally change human health. We have a truly unique environment that I have never encountered anywhere else, where students are welcomed into every space and given access to so many opportunities. That’s why scholarships at WashU mean more. The impact is bigger.

1960s

Robert Edelman, LA '58, MD '62, retired in 2018 as professor emeritus of medicine after a 30-year career as an associate director of the Center for Vaccine Development and Global Health at the University of Maryland School of Medicine. During the last three years, he has remained active in clinical research testing candidate dengue virus vaccines and as a consultant to the vaccine industry. Edelman also teaches and advises Jewish schools and organizations in Baltimore about COVID-19 illness and vaccines. Edelman and his wife have four children, 24 grandchildren and 41 great-grandchildren living in the U.S. and Israel.



Gordon Schaye, MD '63, retired after 49 years of practicing ear, nose and throat surgery and now acts full time in films and videos under the name Grant Rivers in Los Angeles.



Morris W. Pulliam, MD '66, has worked since 2019 as a certifying physician for a company that processes applicants for medical marijuana cards in Ohio. He retired

from active neurosurgery practice in 2014.

William Clifton Smith, MD '69, retired from practice in August 2021.

1970s



David Scharp, MD '70, is working at Prodo Laboratories in Aliso Viejo, Calif., providing human pancreatic islets as the largest global producer for islet research. He also

is working on completing a book, titled "Palmar Fascial Fibromatosis (Dupuytren): Disease, Contracture, Diathesis: History, Current Presentations and Considerations for Treatment." Publication date is forthcoming.



Michael, MD '72, and **Mary (Mimi), MD '72, Glode**, are happily married 50 years after graduating

together. They are both retired from the University of Colorado faculty but remain engaged with its departments/divisions. They are loving travel and their grandchildren and wish all of their classmates happy 50th-year memories.

Bela Denes, LA '69, MD '73, HS, is vice president, global medical affairs, at Lantheus Medical Imaging.

Barry Wershil, LA '75, MD '79, received the 2021 Margaret Stallings Distinguished Service Award given by the North American Society of Pediatric Gastroenterology, Hepatology and Nutrition, in recognition of excellence and service by achieving national and/or international recognition in the field. He is the division chief of gastroenterology, hepatology and nutrition at the Ann & Robert H. Lurie Children's Hospital of Chicago and a professor of pediatrics at Feinberg School of Medicine at Northwestern University.

1980s

Douglas Cole, OT '82, retired after 39 years of practice and now is "living the good life in Tennessee on 42 acres," spending time mowing, trimming trees, pruning bushes and laying out by the pool.



(Left to right) **President Terry York, DO**, honored lecturer **Marcela Bohm-Velez, MD**, and **Thomas S. Chang, MD**.

Thomas S. Chang, MD '85, was honored with the Gold Medallion Award from the Pennsylvania Radiological Society for contributions to the field of radiology and to the society.

Cheryl A. Parsons, PT '85, after 34 years of providing direct patient care as a physical therapist, now works as a senior regulatory auditor for the Missouri Department of Health and Senior Services. She surveys nursing homes for licensure and investigates complaints in nursing homes initiated by the Missouri Elder Abuse and Neglect Hotline. Parsons reports this has been a welcome change of pace and she continues to use her physical therapy training.



Michael Cher, MD '86, reports that he is happily married to Lisa Yuft and lives in the Detroit area.

His son Benjamin soon will graduate from the University of Michigan Medical School, and son Jonathan graduated from WashU and works at Carnegie Hall. Cher is chair of urology at Wayne State University and received the 2021 Compassionate Caregiver Award from the Karmanos Cancer Institute.

LeRoy Jones, MD '88, was promoted from associate to clinical professor of urology at The University of Texas Health Science Center at San Antonio.



Stephan Taylor, MD '88, was elected a fellow of the American Association for the Advancement of Science for 2021. He is a professor of psychiatry and associate chair for

research and research regulatory affairs at the University of Michigan.

1990s



Melissa Piasecki, LA '87, MD '91, a longtime member of the University of Nevada, Reno School of Medicine (UNR Med) senior leadership team, executive associate dean

and professor of psychiatry, was recruited to the role of acting dean at UNR Med to provide leadership continuity following the retirement of Thomas L. Schwenk, MD,

who served as dean for 10 years before stepping down. Piasecki started in her new role Sept. 1, 2021.

Daniel McGraw, HS '92, received the Society for Vascular Surgery's Excellence in Community Service award in 2021.

Jeffrey Ojemann, GM '92, MD '92, was appointed senior vice president and chief medical officer at Seattle Children's Hospital, joining the executive leadership team. Ojemann joined the Seattle Children's neurology team as a physician in 2003 and served as division head of neurosurgery from 2009 to 2019. He then served as surgeon-in-chief until April 2021, when he assumed the role of interim senior vice president and chief medical officer. Ojemann also will continue in his clinical practice in the surgical treatment of epilepsy and ongoing research into brain function and stroke recovery.



Craig Treptow, MD '92, has been elected president of the Catholic Medical Association (CMA) in the U.S. to serve a two-year term in 2022-23. The CMA forms and supports current

and future physicians to live and promote the principles of the Catholic faith in the science and practice of medicine.

Brett M. Kissela, MD '95, was appointed executive vice dean for the College of Medicine, a new position at the University of Cincinnati. He will continue to direct the Office of

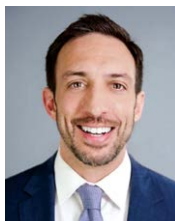
Clinical Research and remains the Albert Barnes Voorheis Endowed Chair and Professor, leading the Department of Neurology and Rehabilitation Medicine. He is a member of the American Academy of Neurology Business and Innovation Subcommittee and its Special Commission on Racism, Inequity and Social Justice. He also serves as vice chair of the American Heart Association/American Stroke Association EPI Stroke Statistics Subcommittee of the Council on Epidemiology and Prevention.

COLLEEN KELLEY/OLIC CREATIVE + BRAND



Jamey Gordon, MSPT '97, DPT '07, opened a physical therapy clinic, in partnership with Team Rehabilitation Physical Therapy, within Pro X Athlete Development (a separate venture for athlete training).

2000s



Shawyon Shadman, MD '01, HS '08, was named the president and CEO of Madison Radiologists, SC, a large multi-subspecialty radiology practice

based in Madison, Wisc. He has the pleasure of practicing with several WashU alumni. Shadman also serves as the chief of medical imaging at SSM Health-St. Mary's Hospital in Madison.

Jessica Dashner, OTD '02, and **Sue Tucker, OTD '14**, have been chosen to serve on the Community Practice Advisory Board of Gateway Housing Service Project of St. Louis (GHSP). They guide GHSP with their expertise in community accessibility and also connect students with real-life volunteer experiences,



Belinda Yauger, MD '01, retired from the U.S. Army after 20 years of service in July 2021. She recounts that it was an incredible experience to have trained in obstetrics-gynecology (ob/gyn) and reproductive endocrinology and infertility (REI) and then to use these skills for military beneficiaries. Additionally, Yauger provided leadership in women's health and guided national policy as the Army ob/gyn consultant to the surgeon general. In July 2021, she became a civilian physician and the REI division director at UT Health San Antonio and is excited to see what the next 20 years will hold!

building ramps, learning about Americans with Disabilities Act (ADA) compliance and making home modifications.

Jessica Henderson Boyd, GM '03, MD '03, is the new CEO of Unity Health Care — Washington D.C.'s largest community health network, serving one in seven district residents. She is a pediatrician by training and still practices, in addition to her role as CEO. She was formerly the organization's chief medical officer. She has been on the front lines of the city's COVID-19 fight and is strongly committed to health equity.

Rachel Hern, DOT '05, married Cody Hern in August 2020. The couple is pleased to announce the birth of Benjamin in August 2021.

John R. Sedy, PhD '05, has taken a new position as associate director in discovery at AnaptysBio.



Terri Moncrief, LA '02, MD '06, was appointed by Gov. Mike DeWine in 2021 to the Ohio Commission on Minority Health and serves as secretary.

2010s

Erin Rodes, MS '11, completed a doctoral degree in Education: Teaching and Learning Processes at the University of Missouri-St. Louis in August 2021.



Lisa Carson, OTD '14, is care director at Truehold, a residential real estate and services business with a goal to help seniors age in place. Carson is applying the practice model that she created in her third year in the Program in Occupational Therapy under the mentorship of Carolyn Baum, PhD, professor of occupational therapy, neurology and social work.

2020s

Carly Rusek, DOT '20, is a full-time occupational therapist at Encompass Health Rehabilitation Institute of Tucson, Ariz., and certified brain injury specialist.



Gregory I. Goldberg, PhD, a former professor of dermatology and longtime researcher at the School of Medicine, died of heart failure

Saturday, May 21, 2022, at Barnes-Jewish Hospital in St. Louis. He was 74.

Goldberg, who retired in 2020, also was a professor of biochemistry and molecular biophysics. He had joined the School of Medicine in 1980 as a research associate in molecular microbiology. He later transferred to the Department of Medicine, in dermatology, as an assistant professor, and remained at the school his entire career.

Among his many scholarly works, he and colleagues described how an enzyme that degrades collagen is activated. The research is considered a seminal contribution to the field of dermatology.

A quote posted at the entrance to his former office summed up his life motto, his family said. The quote, from German writer and scientist Johann Wolfgang von Goethe, reads: "One ought, every day at least, to hear a little song, read a good poem, see a fine picture, and, if it were possible, to speak a few reasonable words."

Goldberg, who was born in Moscow, earned a bachelor's degree from Moscow University and then a doctorate in molecular biology from Weizmann Institute of Science in Rehovot, Israel.

In addition to his career as a researcher, he was also an avid sailor, cook and devoted father.

He is survived by his children, Ilya Goldberg, Avi Shimon Goldberg and Rebecca Ellen Goldberg, and three grandchildren.

Memorial contributions may be made to Forest Park Forever and the Forsyth School, both in St. Louis.



Robert E. Kleiger, MD, a noted, longtime electrophysiologist in the Cardiovascular Division at the School of Medicine, died of prostate cancer Friday, Jan. 21, 2022, at his home in St. Louis. He was 87.

Kleiger, a professor of medicine, was a cardiologist widely known for his deep expertise in electrocardiography, the measurement and analysis of the electrical activity of the heart. A textbook he co-wrote on the subject, "Clinical Scalar Electrocardiography," was first published in 1972 and is still in use today. He also was a dedicated teacher and mentor to students, residents, fellows and faculty. In recognition of his outstanding teaching and training, he received the Benico Barzilai Teaching Award from the cardiology fellowship program in 2021.

Kleiger helped establish cardiovascular care at what was then Jewish Hospital. He joined the School of Medicine faculty in 1969 and, at Jewish Hospital, served as director of the heart station, the medical intensive care unit and the graphics laboratory. He was acting chief of the Division of Cardiology at the hospital from 1981 to 1985.

Kleiger's first published study, in a 1961 issue of the Journal of the American Medical Association, described the initial use of electric countershock for the treatment of ventricular tachycardia, a life-threatening arrhythmia. Heavily involved in clinical research, Kleiger also served as the site principal investigator or the electrocardiography consultant for numerous clinical trials.

Through his philanthropic contributions to the Cardiovascular Division, the Robert E. Kleiger, MD, Endowment in Cardiology recently was established. The endowment will be used to support the division and an annual lectureship in his honor.

Kleiger was an avid bird watcher and photographer, interests he pursued on his many travels, including to Antarctica and the Gobi Desert.

He is survived by his nieces, Susan Kushner and Nancy Wasserman, their spouses and their children.

Memorial contributions may be made to the Robert E. Kleiger, MD, Endowment in Cardiology, fund number 127472, Washington University in St. Louis, University Advancement, MSC 1247-414-2100, 7425 Forsyth Blvd., St. Louis, MO 63105.



David Norman Menton, PhD, a longtime School of Medicine professor, speaker, researcher and writer, died from COVID-19 Saturday, Dec. 11, 2021, at St. Elizabeth Hospital in Edgewood, Ky. He was 83.

Menton earned an undergraduate degree from Mankato State University in Minnesota and a master's degree and doctoral degree in biology from Brown University. He worked as a faculty member in the then-Department of Anatomy and Neurobiology at Washington University School of Medicine for 34 years. Particularly popular with students for his histology course, he was elected "Teacher of the Year" by the class of 2000. He also served for many years on the Admissions and Financial Aid committees. In 2000, Menton retired as an associate professor emeritus. During his professional life, he was a consulting editor in histology for Stedman's Medical Dictionary, a standard medical reference work.

He then served with Answers in Genesis (AiG) as a speaker, writer and researcher. Until recent years, Menton and AiG founder Ken Ham often spoke together at conferences across the U.S. Menton's remarkable knowledge of anatomy and ability to share such information in an easy-to-understand way (along with a great sense of humor) made him a very talented communicator.

He retired from AiG in October 2021. His hobbies included being a professional magician and musician.

His parents, his first wife, Marcia Menton, and granddaughter, Chloe Lange, preceded him in death. Menton is survived by his wife, Debbie Menton (nee: Humphries), daughters, Michelle (Douglas) Lange and Lisa (Scott) Anderson, and grandchildren, Haiden, Garrett, and Audrey Lange, as well as several nieces and nephews.



Binyam Nardos, an instructor in the Program in Occupational Therapy, died Saturday, Jan. 29, 2022, in St. Louis. He was 39.

Nardos joined the faculty in summer 2021 as an instructor in occupational therapy and neurology. As an instructor, his focus was research methods, evidence-based practice and neuroscience. His research focus was neural mechanisms of learning in rehabilitation. Through everything he did in academia, he worked to mentor students from underrepresented populations, with the goal of

advancing their careers in science, technology, engineering, math and medicine fields.

“Binyam was kind and caring, with a sharp intellect and wit,” said Lisa Tabor Connor, PhD, associate dean for occupational therapy. “He put everyone who interacted with him at ease. He exuded warmth and had genuine interest in people and how to make the world a better place. We will sincerely miss him. He was beloved by his students.”

Nardos earned a bachelor’s degree in economics in 2004 from Franklin & Marshall College in Lancaster, Pa., and a doctorate in neuroscience in 2015 from Washington University.

His hometown was Addis Ababa, Ethiopia, and he had strong ties to the Ethiopian community in St. Louis. While in graduate school at Washington University, he was co-founder of a book drive that resulted in \$2,000 and 2,000 medical books being sent to the medical school libraries at Addis Ababa University, the main teaching hospital in his home country’s capital city.

He is survived by his mother, Zewditu Kebede; his sister, Rahel Nardos (Damien Fair); and his brothers Surafel Nardos, Brook Nardos, Kirubel Nardos and Gedion Nardos. He was preceded in death by his father, Nardos Abebe.



Michael J. Noetzel, MD, a leading pediatric stroke researcher at the School of Medicine, died of heart failure on Sunday, Feb. 20, 2022, at Barnes-Jewish Hospital. He was 70.

Noetzel, a professor of neurology and of pediatrics, was a respected clinician, researcher, teacher and administrator. He spent his entire 45-year career at Washington University and St. Louis Children’s Hospital.

Noetzel was best known for his research involving strokes in children, especially so-called silent strokes that often go unnoticed by parents and doctors. He played an important role in several major clinical trials, including the Diabetes Control and Complication Trial, and Silent Cerebral Infarct Multi-Center Clinical Trial, which focused on sickle cell disease. Both studies resulted in landmark publications in *The New England Journal of Medicine* and guide the management of these diseases today. Most recently, he published a paper on strokes in children linked to infection with the virus that causes COVID-19.

Noetzel served as medical director for the Neurorehabilitation Program at St. Louis Children’s Hospital from 1990 to 2020, and as director of the Division of Pediatric and Developmental Neurology from 2007 to 2014. He stepped down as division director to take on the duties of vice chair of pediatric and developmental neurology for the department. In that role, he oversaw expansion of the division’s neurological services to facilitate growth in inpatient and outpatient treatments. He also directed the development of subspecialty clinics for children with brain disorders and stroke.

Noetzel received the 2022 Roger Brumback Lifetime Achievement Award from the Child Neurology Society.

He is survived by his wife of 45 years, Mary Noetzel; sons, Justin (Janine) Noetzel and Evan (Julia Reardon) Noetzel; daughters, Anna (Anthony Gattuso) Noetzel and Katy Noetzel; four siblings, Mary Brevard, Margaret Ellison, Monica Hurley and Mark Noetzel; eight grandchildren; and numerous in-laws, nieces and nephews.

Memorial contributions may be made to Forest Park Forever and Access Academies.

1940s

Patsy Chandler Walker, NU ’47; Oct. ’21

1950s

Virginia “Ginger” Allingham, NU ’51; Oct. ’21

Edwin King Burford Jr., MD ’58; April ’21

Gustine “Gussie” Crawford, NU ’55; Feb. ’22

Martha Jean Dilthey, OT ’52; Nov. ’21

Col. Stanley M. Galas, MD ’56; Dec. ’21

Jean Marion Kautzman, OT ’54; Sept. ’21

John H. Kendig, LA ’52, MD ’56; Nov. ’21

Harvey Liebhaber, HS ’59; Jan. ’22

Walter A. Ruch Jr., MD ’55; Dec. ’21

Horace W. Scott, MD ’56; Oct. ’21

Esther M. Turner, NU ’53; Oct. ’20

Maxwell M. Urata, MD ’59; Aug. ’21

1960s

Kirby L. Allen, MD ’66; July ’21

Betty Ann Gilbert, OT ’69; Oct. ’21

Walter B. Goldfarb, HS ’65; Oct. ’21

Nurul Huda, HS; Dec. ’21

William M. Irvin, HS ’61; Sept. ’21

Reita Keyes, NU ’65; Dec. ’21

Henry D. Onken, HS ’66; Nov. ’21

James R. Rowan, DE ’64; July ’21

Carolyn W. Terry, LA ’56, MD ’60; Nov. ’21

Dean Wochner, MD ’60; Nov. ’21

1970s

Robert Joseph Baglan, MD ’76, HS; Jan. ’22

Abraham M. Phillips, LA ’64, HS ’71;

Sept. ’21

Laurence Eric Stempel, MD ’76; July ’21

1980s

William J. Ott, HS ’83; Sept. ’21

Steven Richard Wilson, DE ’81; Nov. ’21

2010s

Laurie Marie Delaney, OTD ’19, MSOT ’17, OT ’03; Nov. ’21

Gary Francis Hammen, MD/PhD ’16; Sept. ’21



MATT MILLER

Where's Waldo?

While construction continues on the medical school's Neuroscience Research Building, children at the neighboring day care delight each week in looking for Waldo. Waldo — bespectacled and dressed in his signature red-and-white-striped shirt, knit cap and jeans — began greeting the children in February, thanks to workers at McCarthy Building Companies, the main contractors for the site. The workers enjoy hiding a 6-foot-tall cutout of the children's book character in new spots. The soon-to-be 609,000-square-foot, 11-story building sits across the street from the day care and faces the playground.

"The kids love looking for Waldo," said Margie Zitko, manager of the St. Louis Children's Hospital Child Development Center, which serves BJC HealthCare and School of Medicine employees. "Everyone involved with the neuroscience building has been phenomenal. They keep us informed about the construction, make it as convenient for us as possible and the workers are so friendly. The kids love seeing the trucks and cranes. They've been excellent neighbors."

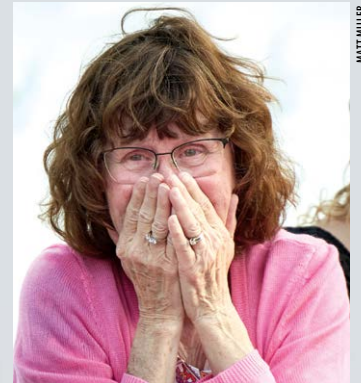
The building is on track for completion in 2023.

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Commencement 2022 Right: Donna Piper watches as her granddaughter, Lauren Elson, becomes a doctor May 20 during the School of Medicine Commencement Ceremony at Francis Field on the Danforth Campus. Piper's late husband was treated for colon cancer for seven years at Barnes-Jewish Hospital. "I was just thinking how proud Jim (Lauren's grandfather) would have been!" Below: Elson, MD, gets hooded by Thomas De Fer, MD, chief of the Division of General Medicine, professor of medicine and associate dean for medical student education.



MATT MILLER



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