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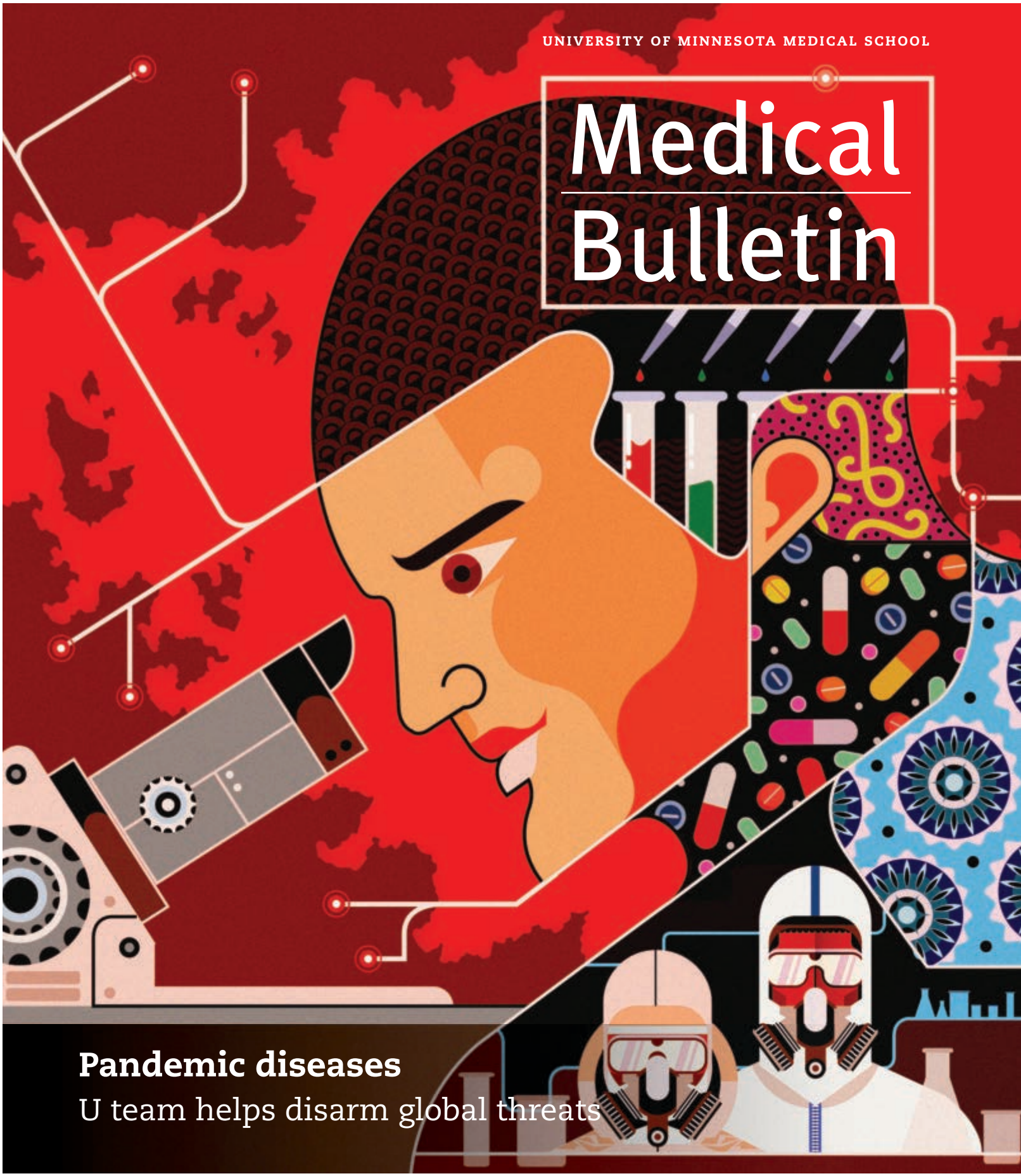
UNIVERSITY OF MINNESOTA MEDICAL SCHOOL

Medical Bulletin

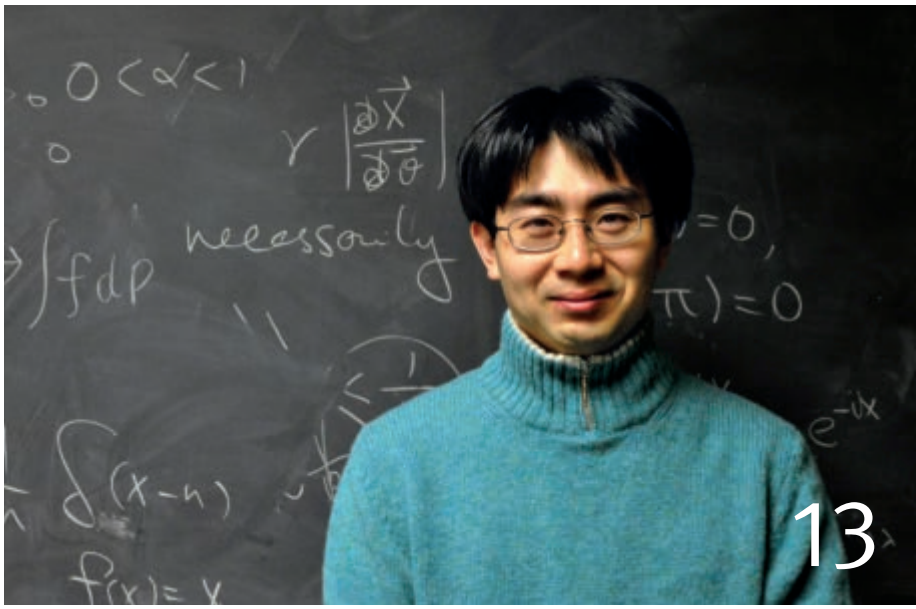


Pandemic diseases

U team helps disarm global threats

SPRING 2015 Applying the power of math in medicine ▭ Gaining ground on Parkinson's disease ▭ Alumna takes the reins at Allina Health ▭ 100 years of achievement in U pediatrics

SPRING 2015 Contents



About the Medical School

THE UNIVERSITY of Minnesota Medical School encourages collaborations that spur innovations – discoveries that advance biomedical knowledge, patient care, and educational programs. The Medical School now trains 1,000 medical students and more than 900 residents and fellows and is home to 1,600 full-time faculty physicians and scientists.

Brooks Jackson, M.D., M.B.A.
Medical School Dean and
Vice President for Health Sciences

UNIVERSITY OF MINNESOTA
Medical School

Features

ON THE COVER: Illustration by Jonny Wan

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Medical School News

New Wilf Family Center unveiled at U's Masonic Children's Hospital

UNIVERSITY OF MINNESOTA Masonic Children's Hospital has a new hub for information sharing among pediatrics specialists that will also serve as a gathering place for patients and families: the Wilf Family Center.

Designed to be the intellectual center of children's health care in the Midwest, the center is named in honor of the Wilf Family Foundation and its $5 million gift in December 2013 to build the center and support its initial operations. The name was unveiled at a February 11 press event.

"Over the past 10 years, Minnesota has become a second home for our family," says Zygi Wilf, who is an owner and chairman of the Minnesota Vikings. "This gift was an opportunity to show our appreciation for the community in a way that will have a lasting impact."

The Wilf Family Center includes an auditorium, two conference rooms, and a telehealth room that allows communication between patients and medical staff, as well as technology to transmit medical, imaging, and health informatics data from one site to another. Advance conferencing capabilities make the center an ideal site for hosting professional symposia and workshops.

The auditorium also is designed to accommodate patients' medical needs, so that hospitalized children and their families can enjoy the space as well. The center will host movie premieres, special performances, and opportunities to meet local celebrities, including members of the Minnesota Vikings and other teams.

Patients and their families can enjoy movie premieres and parties with local celebrities in the Wilf Family Center auditorium, which also serves as an ideal space for U pediatrics experts to share knowledge.

Young patients who are unable to leave their rooms can still enjoy the events through an in-hospital broadcasting system.

"The Wilf Family Center provides an important and accessible way for children and their families to have fun and forget they are in a hospital, which is so important to the healing process," says Carolyn Wilson, R.N., copresident of University of Minnesota Health.

In its 50-year history, the Wilf Family Foundation has donated more than $200 million to various charitable causes, including several in Minnesota since the Wilfs purchased the Vikings in 2005. MB

PHOTOS: JIM BOVIN

The center's two conference rooms feature the latest teleconferencing technologies.

Termuhlen named regional campus dean for Duluth

Paula Termuhlen, M.D.

With a passion for helping underserved, rural communities meet their health care needs, Paula Termuhlen, M.D., now plays a leading role in supporting that mission as regional campus dean for the Medical School's Duluth campus.

"I strongly believe we need to build a workforce that looks like the people we serve," Termuhlen says. "We have a great opportunity to attract students, support them through school, train them, and return them to their communities. This is an extremely important goal and one that the Duluth campus is uniquely qualified to address."

Termuhlen, who began in her new role on March 31, succeeds Alan Johns, M.D., M.Ed., who was named interim regional campus dean in July. Johns will resume his role as Duluth's assistant dean for medical education and curriculum.

"Dr. Termuhlen brings a combination of energy and experience to this role," says Brooks Jackson, M.D., M.B.A., dean of the Medical School. "I look forward to working with her to raise the profile of the Duluth campus and to support her efforts to build on the legacy of that campus as an innovative leader in medical education."

Termuhlen comes to the University from the Medical College of Wisconsin, where she led the Community Medical Education Program and worked to establish regional campuses to help address workforce issues in smaller, rural communities in Wisconsin.

A graduate of the St. Louis University School of Medicine, Termuhlen completed her surgical training at the University of Texas Health Science Center in Houston. She then completed a surgical oncology fellowship at M.D. Anderson Cancer Center before joining the faculty at the University of Nebraska. Termuhlen also has been a faculty member at the Wright State University Boonshoft School of Medicine in Ohio, where she became medical director of the High-Risk Breast Center. MB

Gov. Dayton, blue-ribbon committee call for investment in U Medical School

A blue-ribbon committee created by Gov. Mark Dayton in August has made budget and policy recommendations to the state Legislature aimed at strengthening the U of M Medical School's position as a national leader in medical training, research, and care.

The recommendations support two primary goals: improving the Medical School's national standing by expanding health care research focused on the state's health priorities, and strengthening its educational programs to ensure that medical students and residents are prepared to meet Minnesota's future physician workforce needs.

To help achieve those goals, Gov. Dayton's proposed FY2016–17 budget calls for a $30 million investment in the Medical School to expand the school's research, improve its National Institutes of Health (NIH) ranking from 30th to 20th in the next five to eight years, and expand physician training programs that benefit rural and underserved communities.

That investment would enable the Medical School to hire up to 50 top researchers over eight years to form "medical discovery teams" that will focus on the state's most pressing health concerns and help attract NIH grants.

Seven strategies underlie the committee's recommendations:

- Building a culture of excellence and increasing faculty productivity
- Building a vibrant academic clinical enterprise
- Investing in medical discovery teams to restore the Medical School's tenured faculty to 1990 levels
- Investing in clinical research infrastructure
- Investing in innovative programs to meet Minnesota's health workforce needs
- Developing new models of health promotion and care
- Investing in new education and research facilities

To learn more, see the related legislative update on page 28, and find the blue-ribbon committee report at z.umn.edu/blueribbon.

Final report links exposure to taconite mine dust and mesothelioma

THE FINAL REPORT on a University of Minnesota study investigating the health of Minnesota's taconite industry workers shows an association between mining dust exposure and cases of a rare cancer and, in response, urges increased monitoring and disease prevention initiatives for employees.

Findings from the project, called the Minnesota Taconite Workers Health Study, were released December 1.

"Mining is of great importance to the people of Minnesota and to our state's economy," says School of Public Health Dean John Finnegan, Ph.D., who led the project with principal investigator Jeffrey Mandel, M.D., M.P.H. "The state invested significant funds and time into the [study], and we felt it was important to indicate follow-up activities in order to continue to improve the health and safety of all miners moving forward."

The study was launched in 2008 at the request of the state Legislature after the Minnesota Department of Health detected an unusually high number of cases of mesothelioma, a rare cancer of the lung lining, in Minnesota taconite workers. (In February, the department announced that another 21 cases had been identified, bringing the total number to 101 of about 69,000 people who worked in the industry from the 1930s to 1982.)

The study sought answers to three major questions:

Is working in the taconite industry associated with mesothelioma and/or other diseases?

The study found that taconite workers had higher than expected death rates from three diseases when compared with the general Minnesota population: mesothelioma (2.77 times higher than the expected mortality rate), lung cancer (1.16 times higher than expected), and heart disease (1.10 times higher than expected). However, working in the mining industry was not believed to be the predominant cause of the lung cancer or heart disease.

What factors, particularly dust from taconite operations, are associated with mesothelioma and other respiratory diseases?

Researchers found that the length of time people worked in the mining industry was specifically linked to higher levels of mesothelioma. For each year in the industry, researchers noted a 3 percent increase in a worker's risk of developing mesothelioma.

Specifically, exposure to a fiber-like mineral – referred to as elongate mineral particle (EMP) – was linked to mesothelioma. The investigators determined EMP exposure could be from either dust generated in mining and processing or from its most widely known source, commercial asbestos exposure.

Are workers and their spouses at risk for common dust-related lung diseases?

A health screening of current and former taconite workers and their spouses in 2010–11 showed X-ray evidence of dust-related scarring of the lung and lung lining (pleura) in workers but not in their spouses. MB

Read the full report at z.umn.edu/taconitestudy.

PHOTO: BERGERSON PHOTOGRAPHY

Aerial view of a taconite mine near Eveleth, Minnesota

Department of Medicine welcomes new leader

The University of Minnesota Medical School's largest department has a new leader. Peter Igarashi, M.D., began his tenure as head of the Department of Medicine and holder of the Nesbitt Chair on December 31. He succeeds Wesley Miller, M.D., who had held the positions since 2008.

Peter Igarashi, M.D.

"Dr. Igarashi's emphasis on team science, building global partnerships, and delivering clinical excellence is precisely right for the role," says Medical School Dean Brooks Jackson, M.D., M.B.A.

Igarashi comes to Minnesota from the University of Texas Southwestern Medical Center, where he was a professor of internal medicine and pediatrics, chief of the Division of Nephrology at UT Southwestern Medical Center, and director of the UT Southwestern O'Brien Kidney Research Core Center. Before that, he held a faculty position at Yale University School of Medicine.

Igarashi earned his M.D. in 1981 from UCLA's School of Medicine. He completed his internship and residency training in internal medicine at the University of California, Davis Medical Center before completing a nephrology fellowship at Yale University School of Medicine.

At the University of Minnesota, Igarashi plans to continue his National Institutes of Health–funded projects, which focus on kidney development, transcriptional regulation, and polycystic kidney disease.

"Internal medicine is divided into clinical subspecialties, but research concepts cross disciplines," says Igarashi. "I look forward to facilitating clinical trials and building on existing strengths in health services research and medical informatics to develop multidisciplinary and interdisciplinary programs with global impact." MB

UMN Health opens Phase I clinical trials unit

University of Minnesota Health now has a state-of-the-art facility for Phase I clinical trials. The Early Phase Clinical Research Unit opened on August 31 and currently accepts patients who are participating in research studies at the U.

The unit is located on the University of Minnesota Medical Center's 5th floor in the Blood and Marrow Transplant (BMT) Unit. Renovated last year, the BMT unit has single-patient rooms that are used exclusively for clinical trials.

The Early Phase Clinical Research Unit is staffed by a skilled care team that specializes in working with research patients. The unit's nursing staff will work closely with the research nurse and pharmacist to prepare participants for the study treatment. The patient could be on the unit for six to 18 hours, depending on the study protocol.

Opening the Early Phase Clinical Research Unit will help U of M experts translate breakthrough lab research into new therapies for patients. MB

$2.6 million NIH grant boosts U's heart attack research

A University of Minnesota research team was awarded $2.6 million by the National Institutes of Health (NIH) to investigate new treatments for heart attacks. The research will focus on myocardial ischemia and reperfusion injury, which account for more than 300,000 deaths each year in the United States.

The research team will work on developing new strategies to prevent the second wave of heart damage that can occur when blocked arteries are re-opened to restore blood flow. Investigating the advanced generation of synthetic "molecular Band-Aids," the medical researchers plan to develop treatments to protect cardiac tissue during reperfusion.

Experts on the U research team cover a variety of disciplines, including chemical engineering and material sciences, clinical cardiology, and biology and physiology.

"This grant offers a wonderful example of tapping into the richness of scholarship and expertise at the University of Minnesota as directed toward a significant biomedical research problem," says the grant's principal investigator, Joseph Metzger, Ph.D., who leads the Medical School's Department of Integrative Biology and Physiology and holds the Maurice B. Visscher Chair in Physiology. MB

LOCATION: Kampala, Uganda MISSION: Ensuring that kids with malaria get the nutrition they need

Iron kids

Less than two months before this photo was taken last fall in Uganda, little Husina NamwaiyJe was terribly ill from malaria and iron deficiency, says Sarah Cusick, Ph.D., an assistant professor in the Department of Pediatrics' Division of Global Pediatrics. But she bounced back after being treated at Kampala's Mulago Hospital, with which the department has a robust research partnership.

"I'm so amazed at how sick they can be, and then you see them a few weeks later and they're back to their healthy kid selves," says Cusick, who spends about two months per year in Uganda studying how deficiencies of certain vitamins and minerals interact with infectious diseases.

In September, a healthy Husina was back at Mulago for her last follow-up visit after participating in a study on iron absorption in children with malaria. While the nutrient is critical to a child's growth and development, Cusick says iron supplementation can make a child more susceptible to malaria—or sicker if the child already has malaria. And that's a problem in many parts of the world, like Uganda, where both malaria and childhood iron deficiency are prevalent.

Cusick's study aims to determine the best time to give children supplementary iron—during treatment for malaria, which is the standard of care now, or four weeks after treatment ends, when their bodies might be better able to absorb it because of reduced inflammation.

The U's Division of Global Pediatrics aims to improve the health of children living in or coming from low-resource areas of the world through research, advocacy, and clinical work. MB

Sarah Cusick, Ph.D.

SUBMIT YOUR WORK

The *Medical Bulletin* is seeking compelling photos and stories featuring U of M Medical School student, alumni, or faculty experiences abroad. Selected submissions will be published in future issues of the *Medical Bulletin*. For more information or to submit your photo or story, email managing editor Nicole Endres at nendres@umn.edu.

PHOTOS: CHERYL-SAMANTHA OWEN

Disarming a global threat

The recent Ebola outbreak underscores the need for a well-trained, well-coordinated workforce to respond to the growing risk of pandemic diseases – and the U is on top of it

BY RICHARD BRODERICK

His name was Emile.

He was 2 years old and lived in Guéckédou, a city of about 250,000 in southern Guinea, not far from the borders of Sierra Leone and Liberia.

Although we do not know Emile's last name, he touched off a medical crisis when the illness that killed him in December 2013 was finally identified as Ebola in March 2014.

By then, Ebola had killed several other members of his immediate family and had spread throughout the region, eventually taking the lives of thousands, including a small number of people who'd traveled to Europe and the United States after being exposed to the virus but before showing symptoms.

Emile's death and what followed demonstrate the growing danger posed by emerging pandemic threats triggered by zoonotic diseases—infectious agents passed from animals to humans. And they underscore the urgent need for more effective measures for responding to and preventing the spread of these pandemics in areas where the threat is most potent.

Backed by USAID funding of up to $50 million over five years, the University of Minnesota and Tufts University have assumed a major role in developing those measures under the "One Health Workforce" initiative. Part of the USAID Emerging Pandemic Threats (EPT) program, the initiative is aimed at developing crossdisciplinary teams of human and animal health professionals in central and eastern Africa and Southeast Asia to handle emerging pandemic threats.

The "One Health" approach emphasizes an interdisciplinary response to the spread of infectious diseases where humans, animals, and the environment intersect, explains David Chapman, Ph.D., the U of M's One Health Workforce director and a professor in the College of Education and Human Development. Its purpose, he says, is to create "a national and international network of people who know how to respond to a pandemic outbreak."

The Ebola paradigm

The Ebola virus was identified in 1976—the same year it claimed its first known victims. Between then and December 2013, while the disease was confined to West Africa, there were about 1,716 confirmed Ebola cases. As of January 2015, the new outbreak announced by Emile's death had sickened some 22,000 people.

The large number of victims this time around is directly attributable to the rapid growth of cities like Guéckédou (which now has about a quarter million inhabitants compared with about 80,000 in 1996), coupled with poverty, ignorance of the disease, and the lack of an effective public health infrastructure, especially in Liberia, where the disease hit hardest. Previous outbreaks had occurred in remote and less populated locations.

"The latest appearance of Ebola has galvanized world attention on preparedness for outbreaks of this kind of epidemic," says Chapman. "This attention is good because such things as pollution, climate change, and the threat of bioterrorism may raise the risk of pandemic diseases."

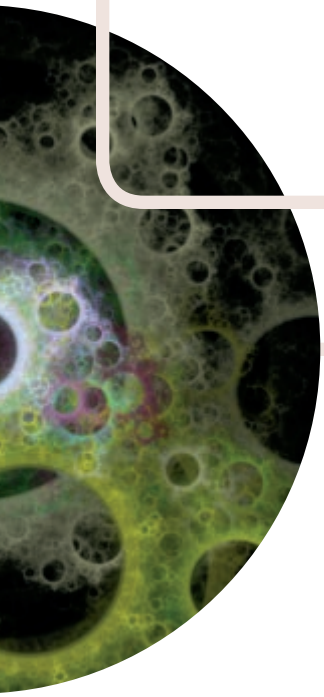
ONE HEALTH WORKFORCE PRIMARY LEADS

William Bazeyo, MBChB, Makerere University, Uganda

David Chapman, Ph.D., University of Minnesota, Minnesota

Noor Hassim, M.S., M.D., Universiti Kebangsaan, Malaysia

Saul Tzipori, D.V.M., Ph.D., Tufts University, Massachusetts



RESPONDing to threats

USAID started the EPT program in response to the emergence of avian flu as a source of pandemic threats in the early 2000s. In 2003, the SARS (severe acute respiratory syndrome) virus appeared on the scene and quickly spread around the world.

One of EPT's initial projects, RESPOND, called on the University of Minnesota and Tufts to provide the technical and medical know-how to help achieve several goals. The most important was to work with 28 schools of public health, veterinary medicine, nursing, and medicine in 10 African and Southeast Asian nations to develop university networks that would lay the foundation for a One Health Workforce.

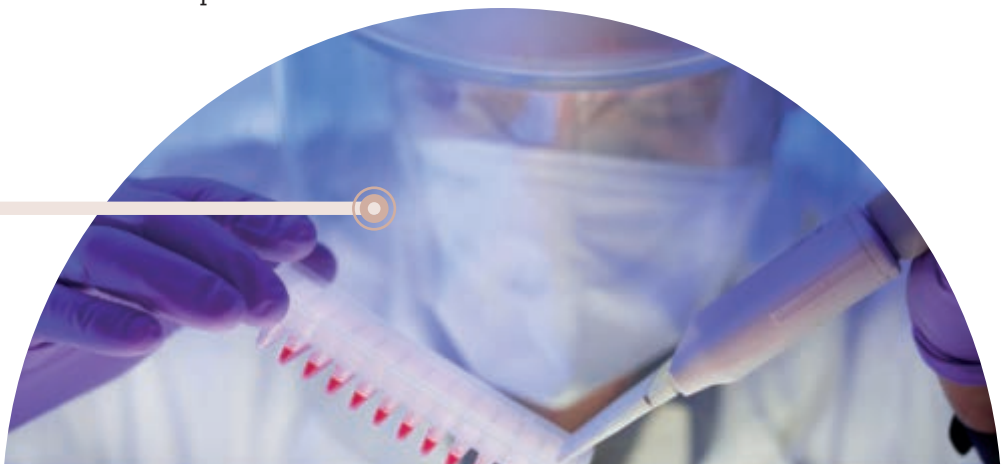
These networks developed curricula and other training tools, including student field experiences and faculty exchanges, focused on enhancing worldwide responses to zoonotic diseases believed to have the potential to turn into new pandemic threats.

The first five years of the initiative started with a broad focus on capacity-building, says Katey Pelican, D.V.M., Ph.D., an associate professor of veterinary population medicine and a member of the core management team that will help direct the U's efforts with Chapman and John Deen, D.V.M., Ph.D.

Now, One Health Workforce is expanding that work. Led by the University of Minnesota in partnership with Tufts, the current project will work with the networks to create a new kind of workforce that's capable of an efficient and effective response to infectious disease threats like Ebola, says Pelican.

"The core to this training is hands-on experience so students have better competence in all areas," she says. "The beauty of working with universities in these networks is that they graduate a large percentage of medical doctors, nurses, veterinarians, and public health professionals who work in that country, so if you change things there, you can change the entire health care workforce," she says.

"Creating an effective One Health Workforce is not a departure for our University, which is a recognized leader in research that cuts across boundaries," says Brooks Jackson, M.D., M.B.A., dean of the U's Medical School and vice president of health sciences. "It draws upon our existing resources and extends in a new direction the work we're already doing."



One world threats

Contact with infected body fluids is the primary way the Ebola virus is transmitted, but prominent Ebola researchers, including Michael Osterholm, Ph.D., M.P.H., director of the U's Center for Infectious Disease Research and Policy, suggest that limited respiratory transmission already occurs, and additional airborne transmission in future cases cannot be ruled out. SARS is an example of a zoonotic disease that evolved and now can be passed from person to person without physical contact. So is the Spanish flu that emerged in 1918 and in the following two years killed some 50 million victims around the world before burning out.

Zoonotic illnesses are nothing new. Indeed, many of the most common and dangerous diseases affecting humans—measles, smallpox, influenza, and tuberculosis among them—originated in animals. Most of these illnesses are the result of human domestication of animals, a process that began on a large scale with the development of agriculture at the end of the Ice Age.

Some of the newer, most worrisome of these zoonotic pathogens, however, can be traced to more recent times in which human populations, driven by poverty, hunger, or dispossession of land, have pushed farther into habitats where human presence had been rare if not almost entirely unknown. HIV and Ebola both seem to be the products of this more recent dynamic.

"Over the last 50 years, 75 percent of the new diseases that have emerged in human populations have had their origins in wildlife," observes Saul Tzipori, D.V.M., Ph.D., chair of the Department of Infectious Disease and Global Health at Tufts University and head of Tufts' One Health Workforce team. "This includes HIV, MERS [Middle East respiratory syndrome, first identified in Saudi Arabia in 2012], Ebola, and SARS." As a result, the global health community has become increasingly concerned about pandemics, he says.

These diseases are emerging in certain hotspots around the world—all of them in the tropics or subtropics and mostly in developing countries lacking well-organized infrastructures. The most critical of these regions are located in sub-Saharan Africa and Southeast Asia, sites of the One Health university networks.

ONE HEALTH UNIVERSITY NETWORKS

The Central and Eastern Africa Network involves 14 public health and veterinary institutions from the Democratic Republic of Congo, Ethiopia, Kenya, Rwanda, Tanzania, and Uganda.

The South East Asia Network involves 14 faculty members from 10 universities in Indonesia, Malaysia, Thailand, and Vietnam.

The new normal

With the population of the developing world set to explode (Africa is projected to be the most heavily populated continent by the end of the 21st century), public health experts believe the world has entered a "new normal." Under this paradigm, zoonotic diseases can quickly reach a pandemic scale.

"We know that the circumference of the world hasn't changed," says Osterholm. "On the other hand, the world is much larger and smaller at the same time. It's larger in terms of population— the most rapid growth in population is in urban areas of the developing world. It's smaller in that modern transportation has made oceans, mountain ranges, and international borders irrelevant to the spread of infectious agents.

"If you wanted to create the perfect mixing bowl for enhancing infectious diseases, it would be these megacities," he continues. "Not only are people living in close, squalid quarters, we also have to feed these new urban populations."

In the Shanghai metro, or "peri-urban," area alone, Osterholm says, 750 million chickens are hatched every month just to feed the city's inhabitants. "Each chick represents an incubator for viruses, including avian flu viruses."

Meanwhile, as the world's population grows, the globe, in other ways, keeps getting smaller. Today pathogens can jump from continent to continent, turning into new pandemics in a matter of weeks or months, instead of years or even decades as in the past.

"We have removed all boundaries to the movement of infectious agents," Osterholm says. "We are moving everything from plants to mosquitoes to fish to microscopic agents. The same is true with infectious diseases." At any time, he says, some 40,000 large oceangoing vessels transport cargo from country to country. Humans are circling the globe as well; in the past year alone, approximately 1.7 billion people crossed an international border.

"We have immense challenges before us," says Osterholm. "I liken it to the difference of a swimmer in a calm lake who can cover 12 miles in six hours. Put that same swimmer in a river heading upstream against a 4 mph current... After three hours that same swimmer ends up six miles downstream of where he started."

In today's "new normal," he says, "We are not swimming in a calm lake." MB

Richard Broderick is a freelance writer who lives and works in St. Paul.

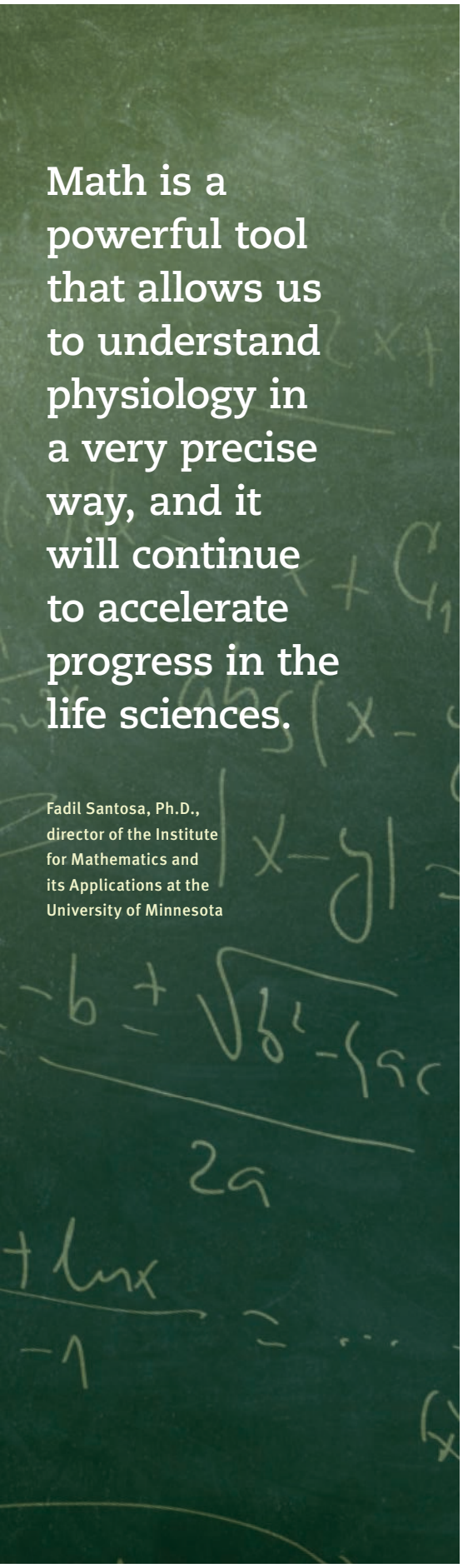
Cr4ckin9 m3dica1 mysteries with m4th

From calculus and probability theory to statistics and algebraic geometry, mathematics has become one of medicine's most powerful tools

BY BARBARA KNOX

"The great book of nature," Galileo once reportedly said, "can be read only by those who know the language in which it was written. And this language is mathematics."

So true, agree scientists and mathematicians of all stripes at the University of Minnesota. Indeed, in the early 21st century, mathematicians have emerged as some of medicine's greatest unsung heroes, powering through thorny problems in cancer and genetics, shedding light on complex biological processes, and analyzing mountains of data, all with the goal of helping doctors improve outcomes for patients.



Math is a powerful tool that allows us to understand physiology in a very precise way, and it will continue to accelerate progress in the life sciences.

Fadil Santosa, Ph.D., director of the Institute for Mathematics and its Applications at the University of Minnesota

"Math is a powerful tool that allows us to understand physiology in a very precise way," says Fadil Santosa, Ph.D., professor of mathematics and director of the U's Institute for Mathematics and its Applications (IMA), "and it will continue to accelerate progress in the life sciences—the applications are limitless."

Santosa has watched it happen in his more than 15 years at the IMA, where the mission emphasizes collaboration between mathematicians and research scientists to solve real-world problems. In the works right now, for instance, is a project—in partnership with Medtronic—to develop an artificial pancreas that will actually learn from the host patient via a math model designed by the IMA, then deliver medication based on carefully constructed algorithms.

How will we use our ever-increasing terabytes of raw data to understand disease and dysfunction in the human body? Using mathematics, is it possible to make predictions about how illness progresses, then alter the course of treatment to attack, with precision, when the body is most receptive? Somewhere in those mountains of data, are there cures to diseases waiting to be unearthed?

Behold the power of mathematics in medicine.

Hacking the microbiome

Dan Knights, Ph.D., gets more attention for his celebrity status as a champion Rubik's Cube "speed-cuber"—his best time solving the 3-D puzzle is 11.93 seconds—than he does for his work studying microbial communities of the human gut, but, really, who can blame folks for wanting to hear more about the time he solved a cube while free-falling from 12,000 feet than how he extracts DNA from fecal samples?

It might not sound sexy, but, in truth, Knights' work is fascinating. His University lab—he's an assistant professor in the Department of Computer Science and Engineering—focuses on what he calls "hacking the microbiome."

"We look for patterns in the microbial communities in the gut that link to various diseases," he explains, "and we use those patterns to help develop better therapeutics and diagnostics."

Knights relishes the hard problems—to wit, speed-cubing in free fall—so working to identify every one of the hundreds of species of microorganisms teeming inside the human gut is a welcome challenge.

Consider: Each of us carries about 100 trillion microorganisms in our own guts, so the job of identifying an individual species—then figuring out its specialized role—is enormous. Knights' approach is to take fecal samples, grind up all of the DNA together, then sort out individual bugs. The result? Massive amounts of data, including huge DNA sequences, that need to be categorized, modeled, and compared with others.

"This is a fairly new field that's growing quickly," says Knights, "and new discoveries here rely heavily on math and computational modeling.

So it's a fun way to apply my problem-solving skills in a way that will potentially have a real impact."

We already have some understanding of just how impactful increased knowledge of the microbiome could be. A case in point: Several years ago, University gastroenterologist Alexander Khoruts, M.D., completely cured—within hours—a woman suffering from the crippling gut infection *Clostridium difficile* by transplanting a sample of her husband's healthy microbiome into her colon; many similar transplants since have been equally successful.

Knights ticks off more examples of disabling conditions that might be avoided or cured as scientists learn to identify and correct problems in the microbiome: blood infections in chemotherapy patients, asthma and allergy problems in children treated with antibiotics in infancy, bowel diseases … his list even includes new tools to help medical examiners pinpoint time of death based on gut bugs' activity.

Ultimately, knowledge of the gut microbiome could result, Knights says, in something like a probiotic cocktail that could rebalance a system out of whack. To get there, Knights and other scientists like him will keep turning to mathematics.

Fighting cancer with probability theory

For decades, research scientists have focused with laser-like intent on developing new anticancer drugs to treat the 14 million or so people around the world who are diagnosed with cancer annually. But in quiet offices far removed from research labs, mathematicians have been asking a critical question: "While we wait for discovery of the next big drug, can we do better with what we already have?"

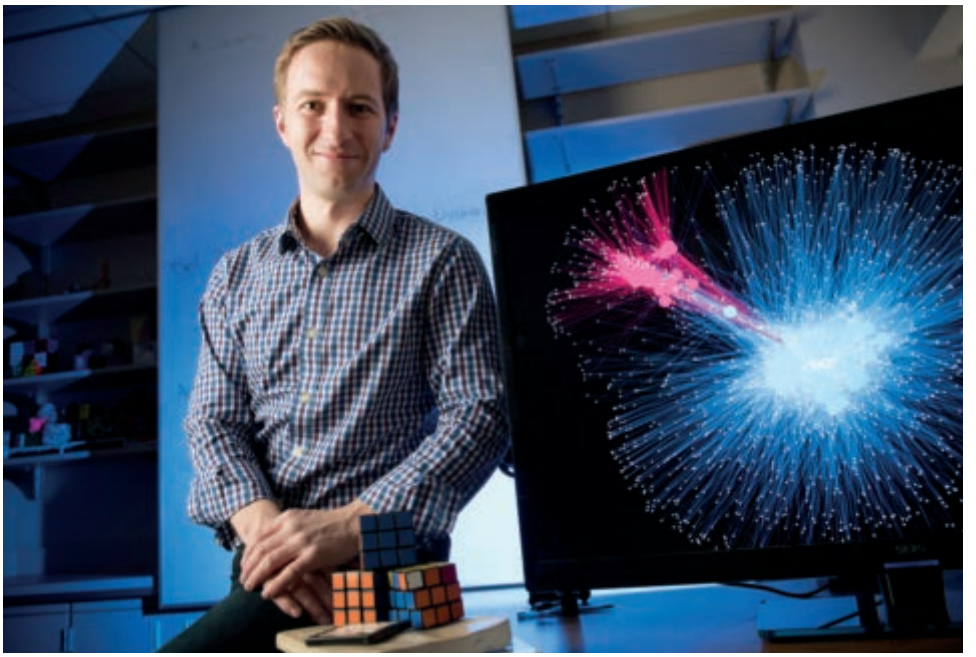


PHOTO: SCOTT STREBLE

Dan Knights, Ph.D., studies microbial communities of the gut. His computer monitor shows a map of microbiomes found in the guts of mice. Normal microbiomes appear blue; microbiomes that have been exposed to antibiotics appear pink.

It seems almost too simple: modify a drug's dosage, alter the timing of its delivery, and improve the patient's outcome. Clinical studies currently under way across the country are finding that it works.

"When we understand better how tumors evolve, and how resistance to drug therapy evolves," says Jasmine Foo, Ph.D., a 2013–2015 McKnight Land Grant Assistant Professor in the U's School of Mathematics, "then, ideally, we can design more effective combinations of therapies."

Foo is a quantitative modeler who relies heavily on probability theory, or the study of randomness, to do just that. Working with a cell biologist, she gathers extensive amounts of data about a particular cancer. How big is the tumor? What does the tumor micro-environment look like? How

PHOTO: SCOTT STREBLE

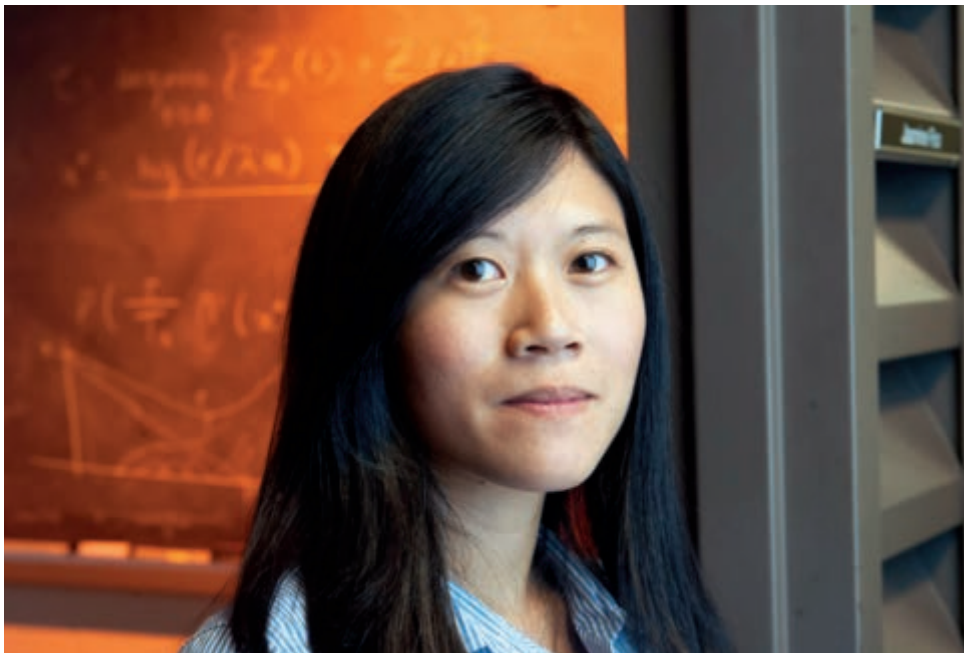
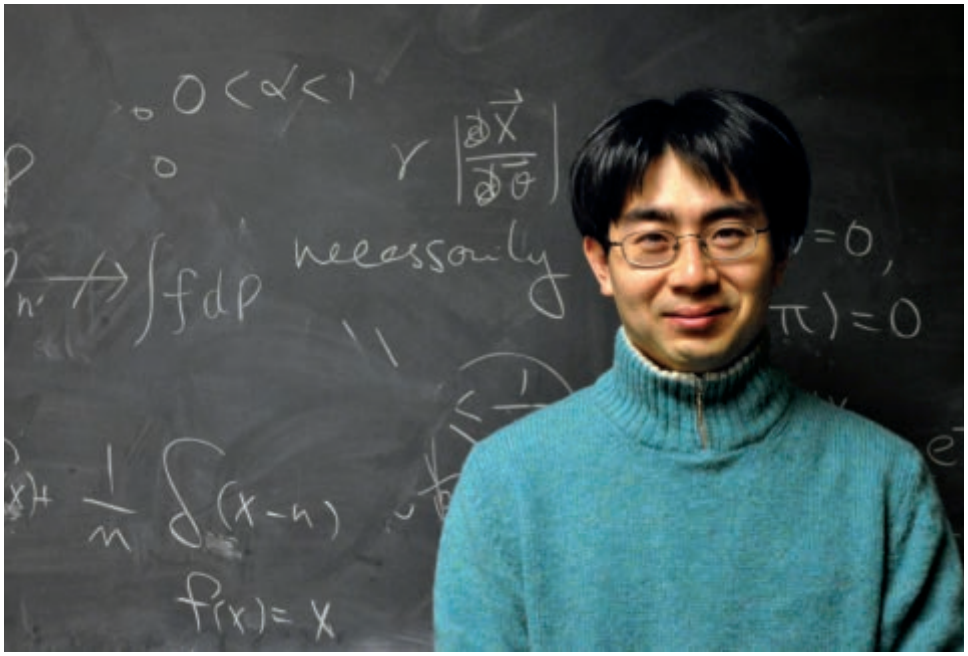


PHOTO: COURTESY OF THE OFFICE OF THE VICE PRESIDENT FOR RESEARCH, UNIVERSITY OF MINNESOTA



TOP
Using big-data models, Jasmine Foo, Ph.D., is finding ways to make anticancer drugs more effective.

BOTTOM
Yoichiro Mori, Ph.D., studies electrical activity in the brain to understand migraines and how to stop them.

many days after treatment does resistance begin? What does that resistance look like?

Sometimes she works in the lab to get a better understanding of the data, but mostly her tools are simple: chalkboard and chalk, paper and pencil, computer. As she builds her math model, answers start to emerge. And those answers, says Foo, can help foil cancer cells' wily ability to dodge anticancer drugs.

In a clinical trial at Memorial Sloan Kettering Cancer Center in New York, doctors are finding that a new treatment regimen for non-small cell lung cancer based on Foo's math model works more effectively than the previously accepted protocol.

Her models can also help guide surgeons who are removing tumors, by providing information about the size and geometry of the premalignant tissue field around the tumors, which can vary greatly from cancer to cancer.

"Ultimately, our hope is to develop interdisciplinary platforms that can be fine-tuned to different types of cancer," says Foo, who is a member of the Masonic Cancer Center, University of Minnesota. "That's another great thing about using math modeling to design new treatments using existing drugs: an experimentalist would have to retool the entire lab, but I can just change the parameters of the model to look at different cancers."

Mathematically mapping migraines

Associate professor of mathematics Yoichiro Mori, M.D., Ph.D., makes an important point when he says that this new era of math biology is not just a one-way street, with mathematicians giving and medicine taking.

"Thinking about physiological problems—medical problems—can lead to new mathematics and really vitalize applied mathematics," says Mori, who has a passion for math that ultimately lured him away from practicing medicine after he finished his M.D. training in Japan.

Armed with his newfound knowledge of physiology, Mori migrated into

mathematical biology, digging deep into electrophysiology, the study of electrical activity in the body.

It's a major area of research, because electricity orchestrates many of the body's critical functions: the beating of the heart, communication in the brain, vision and hearing, muscle movement.

"Electrophysiology is one of the older fields of study in mathematical biology," explains Mori, who builds math models to determine exactly how electrical signals are propagated throughout the heart, and what it looks like when things go wrong.

"You start by writing down equations to make sense of it mathematically," he says, "then begin building computer models that help us understand things like arrhythmias and show us how we can intervene medically to prevent fatal attacks."

Lately, Mori's focus has shifted to the brain, a world filled with unanswered questions for researchers. He's studying migraines, a debilitating condition that's estimated to affect more than 10 percent of the world's population, making it a problem more widespread than diabetes and asthma combined.

Mori believes that understanding a brain phenomenon called cortical spreading depression (CSD) is key to cracking the mystery of the migraine. Essentially, CSD is a wave of repressed electrical activity that moves very slowly through a portion of the brain, rendering all of the electrically excitable neurons completely inactive. While CSD doesn't appear to do permanent damage—cells bounce back as the CSD recedes—the incident is known to cause the "visual auras" that precede migraine headache in many patients.

The work is painstaking. As Mori points out, CSD was first described more than 70 years ago, and scientists still don't fully understand why it happens or, more importantly, how to make it stop. But tackling it with mathematics is the best way to clarify the basic physiology, which lays the groundwork for intervention.

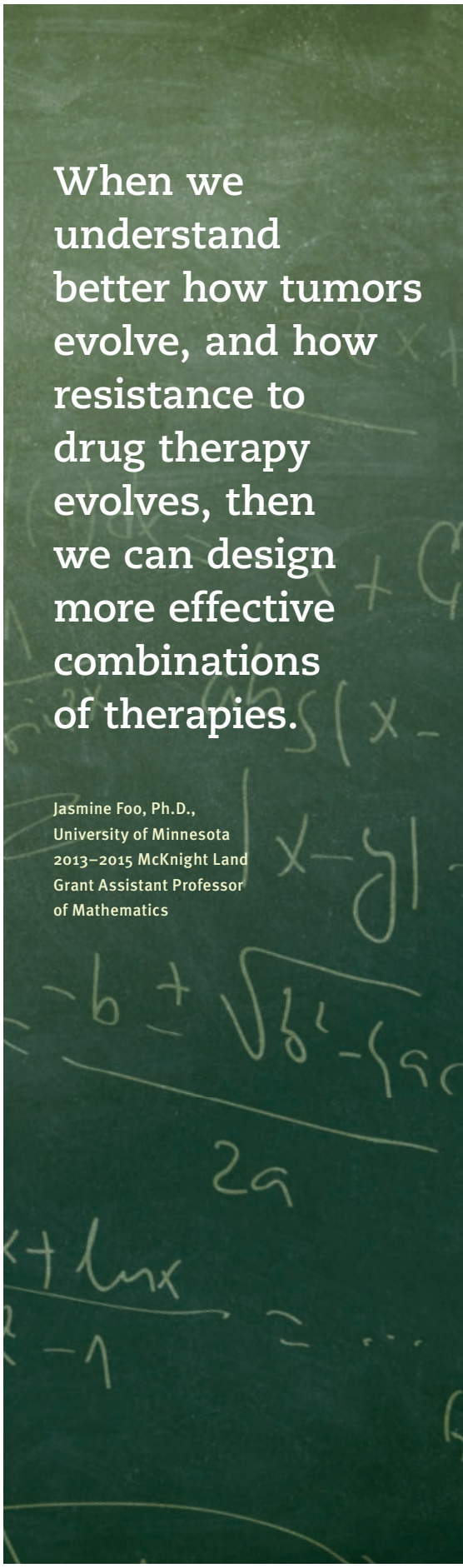
Coming together

Mori, Knights, and Foo are just three among the U's veritable army of mathematicians, computational biologists, biostatisticians, and other specialists working to solve tough medical problems with math.

"There's such a strong environment here at the U for this kind of work," says Santosa, "and the IMA is committed to enabling strong collaborations, to keep driving the innovations, to inventing new math to make the models we need to illuminate human physiology."

It seems that Galileo had it right when he also said, "If I were again beginning my studies, I would follow the advice of Plato and start with mathematics." MB

Barbara Knox is a freelance writer and editor and a frequent contributor to the *Medical Bulletin*.



When we understand better how tumors evolve, and how resistance to drug therapy evolves, then we can design more effective combinations of therapies.

Jasmine Foo, Ph.D.,
University of Minnesota
2013–2015 McKnight Land Grant Assistant Professor of Mathematics

BY CHUCK BENDA

The pursuit of Parkinson's

U scientists are gaining ground on Parkinson's disease on multiple fronts

"Parkinson's patients are a bit like snowflakes," says Jerrold Vitek, M.D., Ph.D., head of the Department of Neurology and director of the University's Neuromodulation Research Center. "No two are alike. The symptoms can vary greatly from one patient to another—as can the effectiveness of the treatments available to them."

So it only makes sense that researchers are pursuing Parkinson's on many fronts. At the University of Minnesota, experts in neuroscience, magnetic resonance imaging, sleep science, and drug development are among the cadre of scientists striving to enhance the overall understanding of Parkinson's, develop more effective treatments, and contribute to the development of a cure.

PHOTO: SCOTT STREBLE

Jerrold Vitek, M.D., Ph.D., uses deep brain stimulation to treat the symptoms of patients who have Parkinson's disease.

Plumbing the depths

Although Parkinson's disease is not directly life-threatening and its early stages aren't severely life-altering, as time wears on, the symptoms—which can include slow movements, tremors, rigidity, and gait disorders—worsen, and the impact can be devastating for patients and their families.

Perhaps that's why Vitek finds it so gratifying when he is able to help patients by using a form of treatment that has become his specialty: deep brain stimulation. DBS uses a surgically implanted electrode (a lead with four metal contacts is connected to a pacemaker-like device that supplies the current that is passed through the contacts) to deliver electrical charges to a very precise area of the brain.

The stimulation mitigates and, in some cases, eliminates, the motor symptoms of Parkinson's disease. It is typically used in later stages of the disease, when medications are less effective in controlling those symptoms.

Before implanting the DBS electrode, doctors map the patient's brain using a procedure known as microelectrode recording or MER. MER has the capacity to detect and record the activity in individual brain cells to help pinpoint the right location to place the DBS lead deep within the brain.

Currently, Vitek and Noam Harel, Ph.D., associate professor of radiology at the U's Center for Magnetic Resonance Research (CMRR), are using MER mapping to develop patient-specific 3-D models of the brain that will facilitate even more precise electrode placement.

Implanting the electrode is a tag-team effort between Vitek and a neurosurgeon, who implants the electrode in the target area. After the lead is placed in the brain, Vitek uses a handheld device to deliver current to the contacts on the electrode, assessing its effect on the patient's motor symptoms and watching for any side effects.

PARKINSON'S IMPACT

Worldwide, 4 to 6 million people are affected by Parkinson's disease. In the United States, the numbers stack up like this:

- 1 million people affected
- 50,000–60,000 new cases diagnosed annually
- 14th leading cause of death
- $10.8 billion spent on direct medical expenses and indirect costs*

* *American Journal of Managed Care,* March 17, 2010

POSSIBLE SIGNS AND SYMPTOMS

- Tremor
- Slowed movement (bradykinesia)
- Rigid muscles
- Gait difficulty
- Impaired posture and balance
- Loss of automatic movements
- Speech changes
- Writing changes

"The patient is fully conscious, and we can see if the stimulation has the desired effect," says Vitek. "If not, we reposition it slightly and reassess.

"When it works, it can be almost like turning a lightbulb on and off," Vitek continues. "I've participated in more than 1,500 DBS cases, and each one still brings the same thrill; the tremors go away—or the movements improve. In some cases, we've had patients who were able to return to activities like snow-skiing and cycling."

Vitek is the principal investigator on several DBS research projects funded by the National Institutes of Health and by the U's MnDRIVE (Minnesota Discovery, Research, and InnoVation Economy) initiative, as well as by private foundations and industry.

One of those projects, INTREPID, is a national, 20-site clinical study led by the U of M and the University of California, San Francisco to evaluate a new type of stimulation device developed by Boston Scientific. The device is designed to enable physicians to deliver the brain stimulation with greater control and accuracy.

Vitek and colleagues also are studying the use of DBS to treat neuropsychiatric disorders, such as treatment-resistant depression, and working with Medtronic and St. Jude Medical, as well as Boston Scientific, to find better ways to deliver DBS therapy.

Exactly how and why DBS works is still not completely understood, but significant progress has been made in understanding its effects on brain circuitry, says Vitek. "We're getting better at DBS all the time."

The stuff of dreams?

Recent medical research has shown that the lack of a good night's sleep can contribute to a broad spectrum of health problems, from heart disease and high blood pressure to strokes and diabetes. Particularly intriguing to sleep expert Michael Howell, M.D., is the link between a rare sleep disorder known as REM behavior disorder (RBD) and Parkinson's disease.

"RBD is a prodromal syndrome, or precursor, of Parkinson's disease," says Howell, assistant professor of neurology at the University and medical director of the Fairview Sleep Clinics in Minneapolis and Edina. "Roughly 40 percent of all people who eventually develop Parkinson's have RBD first—and somewhere between 80 and 90 percent of people who have RBD go on to develop Parkinson's."

Howell notes that RBD affects approximately .5 percent of the population—about 25,000 people in Minnesota alone. The disorder disrupts the function of the brain stem that normally "paralyzes" people during the rapid-eye-movement, or REM, phase of sleep. As a result, people with RBD physically act out their dreams—often violently.

RBD was first documented in 1986 by University of Minnesota psychiatry professor Carlos Schenck, M.D., and neurology professor Mark Mahowald, M.D. In 1996, Schenck reported that RBD was often a precursor of Parkinson's. Howell studied with both Schenck and Mahowald as a postdoc at the Hennepin County Medical Center Sleep Disorders Center in Minneapolis.

"The work they did is some of the most important research in sleep medicine," says Howell, who practices medicine and teaches in addition to conducting research.

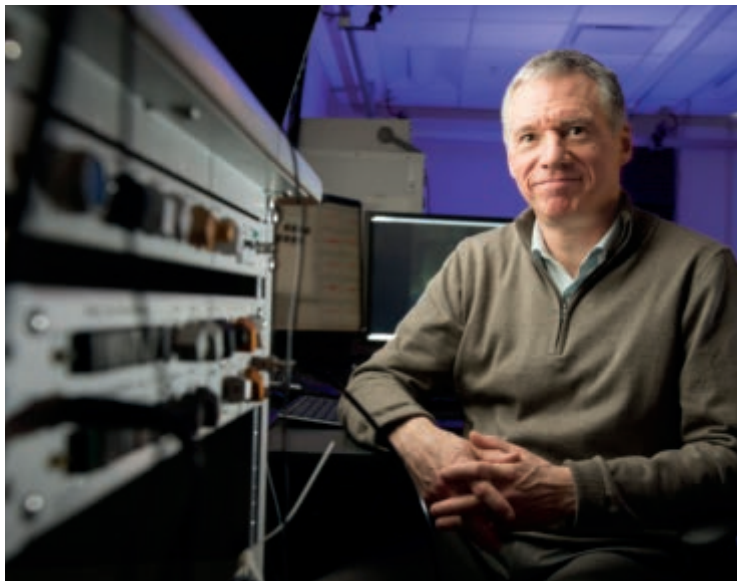
He describes the connection between RBD and Parkinson's as a "gift" to researchers. "Because we know there is a connection, we can study people who are at risk, watch for any brain changes that might develop and, hopefully, learn from them," he says.

Identifying those changes could one day unlock some of the mysteries behind Parkinson's, believes Howell, who has completed several research projects on the RBD-Parkinson's connection.

Another project Howell is planning (pending funding) involves working with neuroimaging specialist Shalom Michaeli, Ph.D., from the CMRR to identify Parkinson's-related changes in the brain.

"We're very fortunate to have such a strong group of researchers here—and resources like the CMRR," says Howell. "I really get excited about the future of neuroprotective therapy. Within the next five to 10 years, I think it's very likely that we will be starting clinical trials with RBD patients on agents to prevent the onset of Parkinson's."

PHOTOS: SCOTT STREBLE



ABOVE
Colum MacKinnon, Ph.D., studies "freezing of gait," a complication of Parkinson's that temporarily and inexplicably leaves a person unable to move.

BELOW LEFT
Michael Howell, M.D., investigates the links between a rare sleep disorder and Parkinson's disease.

Frozen

Colum MacKinnon, Ph.D., assistant professor of neurology and director of the University's Movement Disorders Laboratory, is trying to shed light on one of the more puzzling symptoms of Parkinson's disease: freezing of gait.

The complication affects about 70 percent of people in the advanced stages of Parkinson's. Inexplicably—and unpredictably—their bodies "lock up," or freeze in place—often in the middle of an activity like walking. These episodes, which can occur multiple times daily, pose a significant safety risk.

"Imagine trying to walk across the street on a green light and getting 'frozen' in the middle of the intersection without the ability to move forward. It's very frustrating and potentially dangerous," says MacKinnon, who is a leading authority on freezing of gait. "For people with frequent and severe freezing episodes, it can also become the most debilitating aspect of the disease."

Although the freezing phenomenon is not well understood, it is clear that a variety of cues—ranging from a flashing light to a tap on the shoulder or a buzzing sound—can help people "unfreeze" their gait and get moving again.

Somewhere deep in the brains of people with Parkinson's disease, there are near-normal patterns that can be accessed and released.

– Colum MacKinnon, Ph.D., director of the University's Movement Disorders Laboratory

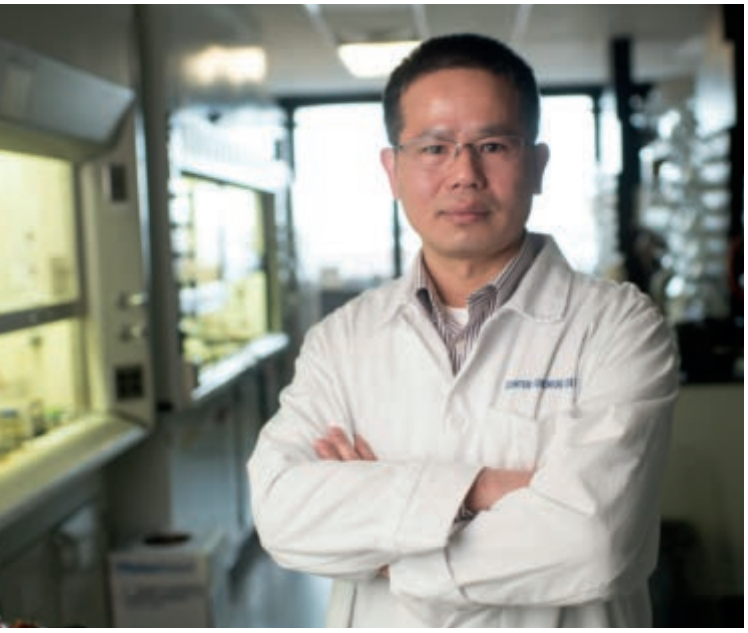
"Somewhere deep in the brains of people with Parkinson's disease, there are near-normal patterns that can be accessed and released," says MacKinnon.

To find out how, he and his team conduct research in a movement laboratory, where they use high-speed cameras and sensors to record physical movement as well as muscle and brain activity. By comparing data collected from people with and without Parkinson's, they hope to identify key differences and deepen their overall understanding of the mechanisms behind the disease.

"Ask anyone with Parkinson's what's their number one problem impacting the quality of their lives, and they'll tell you it's issues with their mobility," says MacKinnon. "It's a big deal for them."

In search of good pharma

Like MacKinnon, assistant professor Liqiang Chen, Ph.D., and his team of research scientists in the University's Center for Drug Design (CDD) want to understand how Parkinson's works so they can intervene. For the past few years, they have been developing compounds that might lead to suitable drugs for treating the disease.



The research of Liqiang Chen, Ph.D., and his team may lead to a drug that could delay or prevent the onset of Parkinson's.

"In simple terms, we take small fragments that might have a certain desired effect and then test them," says Chen. "If they do what we want them to, we use computer modeling, combined with what we know about these kinds of fragments, to identify new fragments. We then combine these new fragments with previous ones to give us compounds, which can be tested again."

Three years ago, Chen's team synthesized a compound that shows great promise in treating one of the underlying causes of Parkinson's.

The deterioration and death of dopamine-producing brain cells is known to be an intermediate cause of Parkinson's disease. These brain cells are killed by a toxin produced in the brain. Exactly how or why this toxin is produced isn't known, but scientists do know that it is connected to the accumulation of aggregate masses of protein scattered throughout the brain.

Chen and his team developed a compound that blocks the protein SIRT2, inhibiting the detrimental effects of the toxin. Their discovery could lead to the development of a drug to delay, or perhaps even prevent, the onset of Parkinson's.

After describing the compound in a paper published in the September 13, 2014, *Journal of Medicinal Chemistry*, the team has since developed multiple iterations of the compound and enhanced its desirable attributes.

"We have improved characteristics of the initial compound by adding new fragments," says Chen. "It's now more potent, more selective—and it has better drug-like properties such as stability, solubility, and permeability."

Next, Chen's team plans to begin testing the compound's performance in mice.

"We plan to collaborate with Swati More, Ph.D., an assistant professor at the CDD who is very experienced in this kind of work," says Chen, adding that if the compound tests favorably, it may lead to the development of a new drug to treat Parkinson's.

FINDing the disease

Identifying biomarkers for Parkinson's disease could result in better methods of diagnosing and treating the condition, says U of M neurology professor Paul Tuite, M.D.

Tuite is the U's principal investigator for BioFIND, a two-year study funded by the Michael J. Fox Foundation for Parkinson's Research that wrapped up this spring.

Reliable and consistent biomarkers allow scientists to not only diagnose and track a disease but also determine which medications might work against it. Currently available drugs help manage Parkinson's symptoms, Tuite says, but they don't halt the disease or reverse its damage to the central nervous system.

The U's BioFIND team collected and analyzed spinal fluid, which, because it surrounds the brain and other parts of the central nervous system, could provide a host of useful information.

Tuite reports that he and his U colleagues have been able to reliably measure antioxidants in the blood and spinal fluid of people with Parkinson's, which may prove useful in the quest for new treatments.

"Developing biomarkers is an important goal and something we are focusing on along with developing treatments that we may be able to monitor using a blood test or a brain scan," he says.

More than 20 participants enrolled in the study at the U, which was one of eight universities to take part in BioFIND. Results from the study, which collected blood, spinal fluid, urine, and saliva samples from 240 participants across the country, are currently being analyzed.

Gaining ground

Progress across these many disciplines reinforces Vitek's belief that science is gaining ground on Parkinson's disease. "This is a very exciting time for Parkinson's research, and the University is a very exciting place to be doing it," he concludes. "With all of the wonderful people we have—building our understanding, exploring new drugs, and developing new, noninvasive ways to do therapy—I expect good things to happen." MB

Chuck Benda specializes in writing about business, science, and technology.

PHOTOS: SCOTT STREBLE

Paul Tuite, M.D., is searching for biomarkers that would help scientists diagnose and track Parkinson's disease.

TWIN TRACK

Identical twins Nicole and Stephanie Noyes are united in their quests to become doctors

BY SUZY FRISCH

To find out how you can provide scholarship support for medical students, please contact Holly Gulden at mcdo0021@umn.edu or 612-625-8758.

FOR THE FIRST TIME IN THEIR 23 YEARS, identical twins Stephanie and Nicole Noyes are going it alone as they pursue their dreams to become doctors. These extremely close sisters both go to the University of Minnesota Medical School, but Nicki enrolled at the Duluth campus, while Steph attends in the Twin Cities. Though they are living apart, they are still sharing their experiences, as they always have.

The twins grew up in Marshall, Minnesota, the youngest of five sisters in a tight-knit family. They both followed a premed track at the College of St. Benedict and graduated with degrees in biology in 2014. Just as when they applied to college, Steph and Nicki didn't necessarily intend to go to medical school together—they let fate take over.

Staying in touch

They did apply to many of the same schools in the Upper Midwest. Both were admitted to the Duluth and Twin Cities campuses, leaving the final decision up to them. Attracted by Duluth's smaller class sizes and focus on rural communities, Nicki went north; while Steph opted for the Twin Cities.

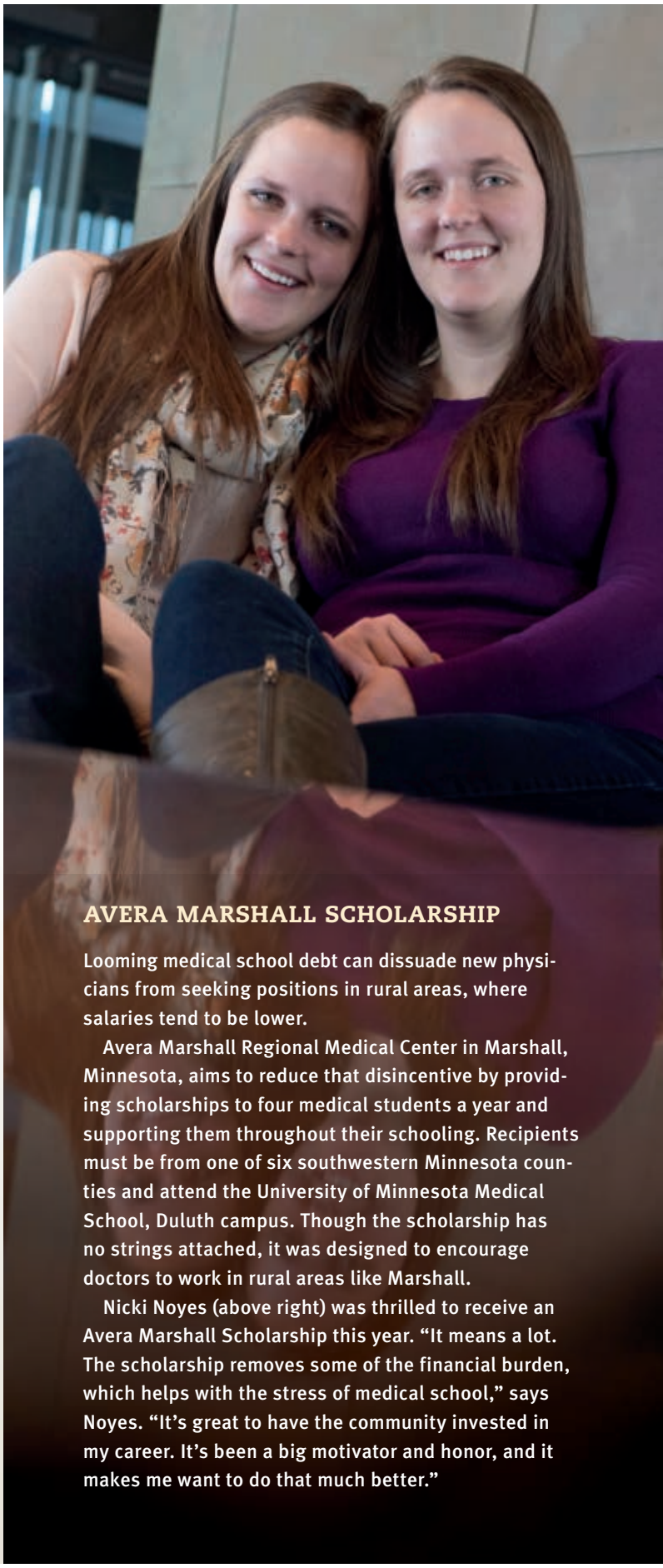
It hasn't been easy to be apart, but they share the experience as much as they can. The sisters visit each other frequently—and often study together—and they talk on the phone regularly, going over what each is learning. When they can, they help each other with their course work.

Then there are the intangible benefits. Says Steph, "She's my best friend, and I have someone to call when I'm frustrated and going through all the things med students go through. She understands because she's going through it, too. Having that connection with another medical student who I'm comfortable with and comparing her experience with mine has been really helpful."

For the love of science

The first in their family to pursue medical careers, the twins came to medical school with a shared love of science but with different motivations. Watching family members contend with illness, such as a grandfather with diabetes and a niece who has glycogen storage disease, inspired Nicki. "Seeing how much physicians did to help my niece made me want to do what they did for her," she says. "And seeing how wonderfully my grandpa took care of his diabetes and himself made me want to help people have a healthy life even if they have chronic [health] issues."

Steph and
Nicki Noyes



Steph was motivated by her family, which emphasizes giving back to the community. She gravitated toward a career in health care and then landed on medical school after doing volunteer work and job shadowing at medical centers in Willmar, Marshall, and St. Cloud, as well as with the Optimist Club, an organization that aims to bring out the best in kids.

Alike yet different

The sisters' first-year experiences reflect their respective campuses' different approaches to medical education. Nicki enjoys Duluth's clinical opportunities and patient interaction. Steph appreciates the Twin Cities' focus on several core topics for the entire first semester, compared with the five-week block structure offered on the Medical School's Duluth campus. She's also continued to volunteer in the city, most recently answering questions and teaching visitors in the Human Body Gallery at the Science Museum of Minnesota.

Eventually, the twins will be reunited when third-year Duluth medical students come to the Twin Cities campus for their last two years of medical school. Both will graduate in 2018.

The sisters haven't chosen specialties yet, but they both are interested in primary care. Nicki intends to practice in a small town, aiming to emulate the Marshall physicians who play a major role in community life. Steph is unsure whether she will stay in a larger metro area or return to a rural setting.

Might the sisters eventually move to the same city and open a practice together? That's certainly their father's dream.

"We've joked about it, and our family likes to joke about it—that we'll move back to Marshall and start our own practice, and then we'll have houses next to each other," says Nicki.

That could happen, the sisters agree. But they aren't signing on the dotted line just yet. MB

Suzy Frisch is a freelance writer in the Twin Cities who frequently covers medicine and health care.

PHOTO: SCOTT STREBLE

AVERA MARSHALL SCHOLARSHIP

Looming medical school debt can dissuade new physicians from seeking positions in rural areas, where salaries tend to be lower.

Avera Marshall Regional Medical Center in Marshall, Minnesota, aims to reduce that disincentive by providing scholarships to four medical students a year and supporting them throughout their schooling. Recipients must be from one of six southwestern Minnesota counties and attend the University of Minnesota Medical School, Duluth campus. Though the scholarship has no strings attached, it was designed to encourage doctors to work in rural areas like Marshall.

Nicki Noyes (above right) was thrilled to receive an Avera Marshall Scholarship this year. "It means a lot. The scholarship removes some of the financial burden, which helps with the stress of medical school," says Noyes. "It's great to have the community invested in my career. It's been a big motivator and honor, and it makes me want to do that much better."

Alumni Spotlight | Penny Wheeler, M.D.

Allina Health's new CEO aims to make patient care better as a means to making it more affordable

IF NOT FOR THE wisdom of a 10th-grade English teacher, Penny Wheeler, M.D., might never have gone into medicine.

Wheeler, now 56, grew up in the St. Paul suburb of Mendota Heights, and by high school she had developed a keen interest in photography. But her English instructor intervened: "She said, 'That will make a nice hobby for you someday. I think you're destined for other things,'" Wheeler recalls.

The teacher's prediction proved true. Last fall, after a decades-long career as a practicing obstetrician and gynecologist, followed by terms as chief clinical officer and president, Wheeler was appointed CEO of Allina Health, one of Minnesota's largest health care organizations. As the nonprofit's top leader, she oversees more than 26,000 employees and has responsibility for 14 hospitals and 90 clinics across the state.

What's more, she's taking the reins of the organization at a critical time in health care. Industry watchers will keep a close eye on Wheeler's actions and initiatives as health care reform plays out over the next few years.

Wheeler relishes the challenges: "If you want to have an impact in health care, there's really no better time to be in a leadership role than right now," she says.

First, the liberal arts

Prompted to rethink a career in photography, Wheeler eventually decided to study medicine and enrolled at the U of M. Medicine seemed to fuse her dual interests in learning about science and working with people. And she liked the U because it allowed her to explore other interests, even as she focused on medical studies.

"What I liked about the U was that I was able to pursue in a pretty profound way my interests in different spheres," says Wheeler, who obtained a B.A. in physiology and minored in American literature. "I got a true liberal arts education."

Wheeler proudly calls herself a "triple Gopher," noting that she obtained her undergraduate diploma (1980) and her M.D. (1984) and completed her medical residency (1988) at the University. She remains close with many former classmates, as well as the upperclassman who served as her mentor: Valerie Ulstad, M.D., M.P.H. The longtime cardiologist, who now works as an educator and industry consultant, says Wheeler stood out among medical students because she was both tenacious and gracious.

"Penny has deep integrity. She goes beyond what's expected to meet with a family member or find solutions," Ulstad says. "And she's a great listener. When you talk with her, you feel like you're the only person in the world. Even if she says no, you feel like you had her attention."

> If you want to have an impact in health care, there's really no better time to be in a leadership role than right now.
>
> – Penny Wheeler, M.D.

A wider reach

Wheeler specialized in obstetrics and gynecology and quickly built a reputation as a smart and sensitive practitioner.

"I chose ob-gyn in part because we have one of the longest relationships with patients of any specialty," she says. "We see patients from delivering their first child through dealing with menopause and beyond."

But Wheeler began to wonder what she could do for patients on a broader scale. Ultimately, she took an interest in health care administration, accepting a job as Allina Health's chief clinical officer in 2006 and becoming president in 2013. When her boss, former CEO Kenneth Paulus, announced his retirement last year, Wheeler took the helm — becoming Allina Health's first woman and first physician in the role.

The appointment of a physician as leader mirrors an industry trend. While only 5 percent of all health organizations are doctor-led, some of the most prominent hospital and health systems — including the Cleveland Clinic and the Mayo Clinic — have tapped physicians as leaders in recent years. Doctors also were recently named to head Minnesota's North Memorial Medical Center and CentraCare.

"It was initially a huge jump," Wheeler says of her ascension. Her résumé had some gaps when it came to management: "My first week, I realized I could

PHOTO: SCOTT STREBLE

Allina Health's new CEO, Penny Wheeler, M.D., calls herself a "triple Gopher," with three degrees from the U. ("Quadruple" wouldn't be an overstatement; she completed the Carlson School of Management's Minnesota Executive Program, as well as her B.A., M.D., and medical residency at the U.)

do a complex hysterectomy, but I couldn't open my email," she jokes.

The right outcomes

Wheeler also believes there's a reason why health care organizations are turning to doctors to solve their problems. "I'm of the opinion that you can make care more affordable by making it better," she says. "And who knows how best to make it better? The people who understand clinical care processes."

Making care better means doing away with wasteful processes and focusing on benefits to patients, Wheeler says. But she acknowledges that there's a conundrum in modern health care: What benefits patients may not always boost the bottom line—and vice versa. A recent Allina Health initiative to serve cancer patients by pairing them with cancer care coordinators, for example, resulted in 95 fewer hospital admissions over six months and an estimated $1.2 million in saved costs.

But the expense of running the coordination service wasn't covered by insurance. "We lost $600,000," Wheeler says. "The market doesn't always reward for the right outcomes."

Health care reform has helped spotlight that problem. Additionally, it has sparked conversation among health care organizations about what's good for the community—rather than individual hospitals, systems, and insurers. Wheeler points to collaborations with HealthPartners in the north metro and the merger of the Courage Center and Allina Health's Sister Kenny Institute as signs that her organization is weighing what's best for the community, as well as its own interests, in decision-making.

"It's not about self-optimization. It's about collaborating as much as possible," she says.

Busy as she is, Wheeler occasionally stops to marvel over her career path. "Sometimes I think, 'CEO? Are you kidding me?'" she says with a chuckle. "Sometimes you don't have a plan, but a plan has you." MB

By JOEL HOEKSTRA, a Twin Cities freelance writer and editor

Alumni Connections

Alumni Celebration, September 16–19

All Medical School alumni, including the reunion classes of 1955, 1960, 1965, 1970, 1975, 1985, 1990, 1995, 2005, and 2010, are invited back to campus to reunite with friends, engage with students, and see what's new at the Medical School. Join us for this annual celebration of the Medical School and its alumni.

Don't miss the chance to:

- ☐ Attend lectures, tours, and presentations to find out what's new in medical education and research
- ☐ Meet current medical students and faculty
- ☐ Celebrate scholarship donors and student recipients at the Scholarship Reception
- ☐ Pay tribute to our distinguished alumni at the Alumni Awards Banquet
- ☐ Connect with old friends at the reunion class receptions and dinners
- ☐ Cheer on the Gophers as they take on Kent State at TCF Bank Stadium

Invitations and registration materials will be mailed in July. Until then, please visit rsvp.umn.edu/medalum2015 to find a complete schedule of events and more. MB

How you can get involved

Alumni are needed to contact classmates, join the reunion planning committee, or serve as reunion giving volunteers. Interested? Please contact Katrina Roth at roth0103@umn.edu or 612-625-0336.

LEGISLATIVE UPDATE

On the docket: Better health for Minnesotans

The University of Minnesota plays a vital role in the well-being of our state's residents. It educates the next generation of health professionals, provides care across Minnesota, and conducts critical research to advance new treatments and cures.

To succeed in that role, the University has requested $25.5 million from the state Legislature for the next biennium to fund Healthy Minnesota, a partnership with the state to strengthen Minnesota's health care delivery and workforce.

It has also requested $30 million for Medical School Investment, an initiative to improve the Medical School's ranking in National Institutes of Health funding from 30th to 20th in the next five to eight years.

Together, the initiatives will:

- Address projected workforce shortages by incorporating new models of care, expanding workforce pipeline programs, and increasing scholarships for students who choose to practice in underserved communities.
- Develop new community-based models of health promotion and care (including a statewide network of interdisciplinary primary care teaching clinics) to better serve Greater Minnesota and underserved areas.
- Create "medical discovery teams" to conduct research related to the state's most pressing health concerns.
- Accelerate research to treat, cure, and manage chronic diseases and conditions. MB

Learn more and find updates at http://govrelations.umn.edu/biennial-budget.html.

Scholarship Winner | Faduma Sharif

Following her heart into women's health

FADUMA SHARIF'S PATH to medical school wasn't quite linear: Her first application, during her junior year as an undergrad at the U majoring in biology, science, and environment, was rejected.

But Sharif—who arrived in Minnesota from Somalia by way of Kenya, Missouri, and San Diego—has always been comfortable with the less direct route, knowing that each stop along the way offers valuable learning experiences.

"After I didn't get in, I took two years to try to improve myself. I decided to go to Yemen," says Sharif, now a fourth-year U of M medical student. "My parents have family in rural Yemen; they have limited medical care. I went there to see family, and then got involved in one of the pediatric clinics, shadowing physicians and talking to patients and their families."

That six-month stay was the first of two momentous trips to the country for Sharif, who received a Victor and Robert Vaughn Endowed Scholarship this year. "It [confirmed] for me that studying medicine was what I wanted to do," she says.

Her interest may have been sparked by her father's diabetes diagnosis when Sharif was a middle-school student in San Diego. "I was the most fluent English-speaker in the family, so I was doing all the interpreting, looking up medical literature online. … He was on insulin at the time, so I was helping him navigate that. I liked doing that," she recalls.

A breadth of experience

Sharif's attraction to medicine grew during her senior year at the U, when Sharif was accepted into the Minnesota's Future Doctors program, which helps students underrepresented in medicine prepare for medical school.

Throughout high school and college, Sharif volunteered regularly at a local emergency aid nonprofit and worked for the Volunteer Lawyers Network. That service ethic was instilled early on, Sharif says: Her mother and father, who run a wholesale bakery in Minneapolis, have always done "everything they can" for their children—and for others, too, including strangers.

During her first year of medical school, Sharif received a graduate assistantship that allowed her to gain research experience while earning a stipend to offset tuition costs. She worked with Kola Okuyemi, M.D., M.P.H., director of the U's Program in Health Disparities Research, on a smoking-cessation project involving people experiencing homelessness.

"We [tried to discover] how to keep track of such a mobile population, and what could help them be successful in quitting smoking," explains Sharif. Among the study's key findings was the importance of involving participant recruiters who were themselves homeless. "Hiring people from within that community really made a difference," she says.

Last year, Sharif and a friend founded the Interfaith Medical Student Interest Group to explore the intersection of belief and medicine. "Patients make big decisions based on their beliefs. Having respect for those beliefs is important to maintaining trust and understanding with your patients," says Sharif, who also cochairs the Medical School's Gold Humanism Honor Society.

PHOTO: SCOTT STREBLE

Faduma Sharif spends a lot of time with her family at the Minneapolis bakery she co-owns with her parents. They hire many recently immigrated Somali women to give them a chance to earn money while they get settled in this country.

Drawn to helping women

Sharif says she's grateful to be able to follow her heart into primary care, thanks in part to the Vaughn Scholarship. "To think there is somebody here who's willing to invest money in my education—somebody saying, 'I believe in these students and I'm going to back them up'—it helps you think, 'OK, this is going to be worth it, and I'm going to be successful. I can choose the work I really want to do, not base it on my anticipated future salary.'"

Her latest trip to Yemen, just over a year ago, turned her focus toward ob-gyn. Although she'd traveled there to work in a pediatric clinic, mothers of the young patients opened up to her instinctively, sharing their concerns and doubts.

"I was working with a pediatrician. The mothers were very young and also had complaints of their own. Every time I introduced myself as a medical student from America, they made the jump straight to, 'She's a doctor from America!'" Sharif recalls.

"I hadn't really worked with women before, and I was struck by their ability to raise families, to save money for their families," says Sharif. "Even when they weren't allowed to work outside the home, they'd find ways to earn anyway. They were working so hard.

"I thought it was fun talking to an expectant patient about her diet, about medications she should avoid. There's a lot of teaching [in ob-gyn care], which really appeals to me. You have a real opportunity to teach women about their bodies."

Looking ahead, Sharif hopes to support, and perhaps be a role model for, women—particularly in immigrant communities—through medicine. "I have four younger sisters; I'm very proud of them. I always think about how much I want for them to be educated and self-sufficient. I don't ever want their options to be limited," Sharif says.

"Women are the foundation of society. Whether we like to admit it or not, women spend a significant amount of time raising children," she continues. "Even in a two-working-parent household, the women are doing lots of the teaching. So by educating and empowering women, that's how we change society. You give them the right tools, and they are going to create big change." MB

By SUSAN MAAS, a freelance writer who lives in Minneapolis

It is fun talking to an expectant patient about her diet, about medications she should avoid. There's a lot of teaching [in ob-gyn care], which really appeals to me. You have a real opportunity to teach women about their bodies.

– Faduma Sharif

Healing partnerships

U physician reaches out to build healthy communities

WHEN MICHELE ALLEN, M.D., Class of '99, talks with people—patients in the exam room, struggling refugee and immigrant parents, social service providers—she sees opportunities, not problems.

"As doctors, we're trained to pathologize, to look for problems and fix them," she explains. "But that's a one-way approach, and we're learning that we need to reframe who we think of as the expert in the room to have a two-way transfer of information and expertise."

Allen, a University of Minnesota physician and assistant professor in the Medical School's Department of Family Medicine and Community Health, takes a community-based approach to health care and research, which she credits, in part, to her sociology studies.

"My graduate program in sociology was the foundation of what I do, but the international work I've done, as well as my residency and my work in community clinics, has also helped me develop an appreciation for people, their communities, and the organizations that serve them," she says.

"People don't appreciate researchers coming in and telling them things like, 'You have too much diabetes in your community.' We need to listen to how a community frames its own issues, which could be to tell us, 'We don't have access to enough fresh fruits and vegetables.' Then we can work with them to come up with solutions."

Last year, Allen received the 2014 University of Minnesota President's Community-Engaged Scholar Award in recognition of her commitment to public engagement scholarship, addressing, among other things, health equity for immigrants and refugees. Recently, she also was one of six researchers to be tapped by the University's Urban Research and Outreach-Engagement Center (UROC) to be Generation Next/UROC Faculty Fellows.

PHOTO: JOHN BEUMER

Michele Allen, M.D., engages with local communities to address adolescent health issues, particularly among minority and immigrant groups.

Under the direction of UROC and in partnership with Minneapolis-based Generation Next, the researchers will examine the whys behind the persistent achievement gap between white students and students of color in Minneapolis and St. Paul schools, as well as the community-based strategies being used to close it.

In her own work, Allen explores adolescent health issues and is an investigator in the Medical School's Program in Health Disparities Research. Currently, she's working with U of M Extension and community organizations to develop a program to help Latino families prevent youth substance use.

"It's a family program that's focused on supporting parents trying to help their children navigate what it means to be a teen in the U.S.," Allen explains.

She is also working with the Somali, Latino, and Hmong (SoLaHmo) Partnership for Health and Wellness to promote resiliency by helping teachers develop strong relationships with students.

"Kids need people to understand who they are as individuals with different cultural backgrounds," Allen says. "That kind of appreciative approach will help teachers better understand the academic and other challenges the kids they teach are facing." MB

By MELEAH MAYNARD, a Minneapolis-based writer and editor

Anatomy of a violin

Combining two loves leads an alum to renown as an expert in a different type of body

THE FIRST TIME, it occurred by happenstance. Steven Sirr, M.D., was the attending radiologist on duty at Hennepin County Medical Center one Saturday afternoon in 1987. He was in charge of three radiology residents who didn't need much supervision, he recalls, so in his free time, he played his violin.

"There was a gunshot victim who needed a CT [computed tomography] scan before he was going to be taken to surgery," says Sirr, Medical School Class of 1979. "I was playing my violin at the time, and I ran down the hall with my violin, not even really knowing I was holding it. And I put it on a table next to the CT scanner."

Once the patient had his scan and left for surgery, Sirr found himself wondering what his violin would look like under CT. The machine captured the images—and his interest. He took the images to violin maker John Waddle, who had sold him his first violin, and they were both intrigued by the intricacies of the anatomy they observed.

Since then, Sirr has scanned many hundreds of bowed stringed instruments, including 44 crafted in Cremona, Italy, before 1781, that are worth more than $1 million. Sirr is the only radiologist member of the elite Federation of Violin Makers, and he's sought out by people around the world to scan their beloved and often historically relevant instruments.

Sellers and potential buyers of old and valuable stringed instruments often find CT evaluation helpful in their pre-sale decision-making, Sirr says. Internal grain patterns become the instrument's "fingerprints," he says, and previous repairs such as glue and internal patches are easily detected this way.

Through his three-plus decades of work in this realm, Sirr has drawn several parallels between violins and human medicine—particularly in his own specialty. A radiology resident, he explains, spends two to three years learning what the normal range of human anatomy looks like. "One of the worst mistakes you can make as a radiologist is calling a normal variation a disease," he says.

That's why Sirr honed his expertise in violins by scanning as many as he could to help him understand what's normal for a violin and what could be considered a "disease" from trauma or worm infestation.

And much like humans change as they age, so do violins. "Just like we get fatter with age," he says, "turns out they do, too. The volume inside increases by about 3 percent."

Then there's a less tangible parallel, but it's one that has helped Sirr maintain his appreciation for the beauty of the instruments themselves: "Violins bring beautiful music and love into the world, which, you know, people should do, too." MB

By NICOLE ENDRES, managing editor of the *Medical Bulletin*

For more information about Sirr's work, visit www.trioviolinproject.com.

PHOTO: DAN MARSHALL

Steven Sirr, M.D., holds a replica of the famous Betts violin crafted by Antonio Stradivari in 1704. The replica was made using Sirr's CT scans of the instrument.

Honor an outstanding alumnus

The Medical Alumni Society is seeking nominations for the 2015 alumni awards. Honor a fellow alumnus with the Harold S. Diehl, Distinguished Alumni, Early Distinguished Career Alumni, or Alumni Philanthropy and Service Award. Winners will be recognized at the Medical School Alumni Awards Banquet on Thursday, September 17. For award criteria, nomination requirements, and a list of past recipients, visit z.umn.edu/medschoolalumni. Nominations are due by May 15. MB

All grown up

U's Department of Pediatrics celebrates 100 years

In the century since the University admitted its first pediatric patient in 1911, the Department of Pediatrics has become one of the best in the nation, making discoveries that have changed the face of medicine worldwide. Among its many groundbreaking achievements, the University performed the world's first successful pediatric bone marrow transplant and open-heart surgery using cross-circulation between a child and parent.

The University of Minnesota created the Department of Pediatrics in 1915, when the specialty outgrew its status as a division in the Department of Internal Medicine. Julius P. Sedgwick, M.D., was tapped to lead the new department, which at the time was made up of two other professors and a half-dozen instructors and assistants.

Now the Medical School's century-old Department of Pediatrics has about 180 faculty members in 18 divisions and ranks eighth in funding from the National Institutes of Health – underscoring its role as a national leader in children's health. About 70 percent of all pediatricians practicing in Minnesota – and the vast majority of pediatrics specialists in our region – trained at the University.

"We've advanced a lot in 100 years," says Joseph P. Neglia, M.D., M.P.H., who leads the department and holds the Ruben-Bentson Chair and Minnesota American Legion and Auxiliary Chair in Children's Health. "In 1915, much of pediatrics was focused on nutrition. Alexander Fleming did not discover penicillin until 1928. Vaccines were still in their infancy.

"Over these 100 years, we've moved from offering supportive care to dealing primarily with acute infection, chronic illnesses, and healthy development in children," continues Neglia, who is also physician-in-chief of University of Minnesota Masonic Children's Hospital.

Today the University's Department of Pediatrics is acclaimed for its work in such areas as childhood cancer, stem cell therapies, global health, transplantation, type 1 diabetes, kidney disease, newborn care, and childhood health conditions that lead to chronic diseases in adults. MB

MILESTONES

1911

The 108-bed Elliot Memorial Hospital opens, providing health care for adults and, eventually, children.

1968

Pediatric immunologist Robert Good, M.D., Ph.D., performs the world's first successful bone marrow transplant. The patient was a child.

1982

University experts pioneer neonatal and pediatric hemodialysis and become first in the country to perform hemodialysis in an infant.

1998

U researchers develop a vaccine for Lyme disease.

2010

U scientists prove for the first time that a genetic disorder can be corrected in human cells using TALEN gene-editing technology.

A Look Back

Here are some of the many medical milestones achieved along the way

1915
The Department of Pediatrics is founded, and Julius P. Sedgwick, M.D., is named its first chair.

1929
The Eustis wing of the University Hospital opens, providing 50 beds for children and an expanded outpatient pediatric clinic.

1952
The world's first successful open-heart surgery using hypothermia is performed at the University by F. John Lewis, M.D., and a team of U physicians.

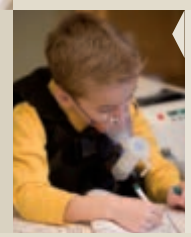
1954
The first pediatric open-heart surgery using cross-circulation is performed at the University, led by C. Walton Lillehei, M.D., Ph.D., and Richard Varco, M.D., Ph.D.

1975
A team of U physicians successfully performs related-donor kidney transplants in children as young as 1 year old.

1975
The U's John Kersey, M.D., leads the first successful pediatric bone marrow transplant for treating lymphoma.

1986
The department establishes the first international adoption clinic and is first to publish a protocol for developmental testing in international adoptees.

1988
U physicians perform the first successful pancreatic islet cell transplant to treat type 1 diabetes in a child.

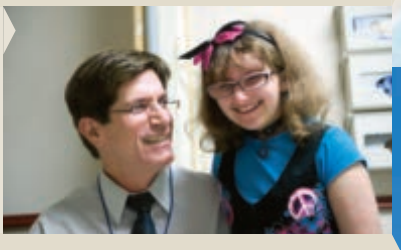


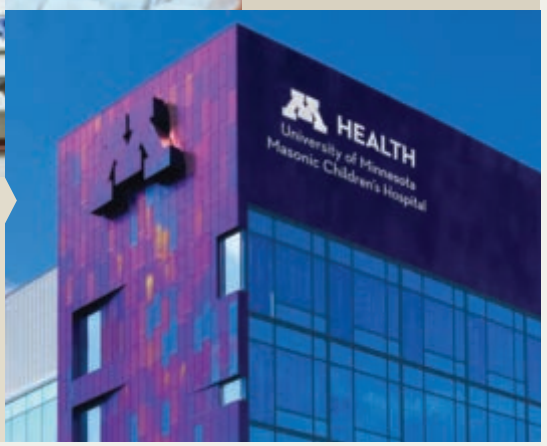
1988
A vibrating, chest-clearing vest invented by the U's Warren Warwick, M.D., is licensed and transforms care for children who have cystic fibrosis.

2007
Jakub Tolar, M.D., Ph.D., and his research team discover that transplanted bone marrow cells can correct a protein deficiency in a completely different organ, the skin.

2008
The U performs the first bone marrow transplant to treat the devastating skin disease recessive dystrophic epidermolysis bullosa.

2000
John E. Wagner, M.D., performs the world's first blood and marrow transplant using genetic testing on an embryo to find a suitable cord blood donor.





2011
A state-of-the-art, eco-friendly children's hospital opens on the U's Riverside campus in Minneapolis.

2014
The hospital is named University of Minnesota Masonic Children's Hospital in honor of Minnesota Masonic Charities' long-standing support of the U. A new $25 million gift to enhance the patient experience and advance pediatrics research brings the Masons' total support to more than $125 million.

In Memoriam

JOSEPH J. ASTA, M.D., Class of 1948, Minneapolis, died Sept. 21, 2014, at age 91. Dr. Asta had a 30-year career as a radiologist in Duluth. He is survived by his wife, Naomi; 7 children; and 12 grandchildren.

GORDON L. BACKER, M.D., Class of 1955, Wausau, Wis., died Oct. 2, 2014, at age 85. Dr. Backer was an ophthalmologist and cofounder of the Backer Eye Clinic, now the Eye Clinic of Wisconsin. He is survived by his wife, Arlene, and 4 sons.

LESLIE G. BONNEY, M.D., Class of 1966, Niagara Falls, N.Y., died Oct. 15, 2014, at age 95. He was preceded in death by his wife, Kathleen. He is survived by 2 daughters.

DAVID J. BURAN, M.D., a 1966 resident alumnus, Minneapolis, died Oct. 10, 2014, at age 82. An otolaryngologist, Dr. Buran served as head of the Park Nicollet Clinic ENT department for many years. He was preceded in death by 1 daughter. He is survived by his wife, Ann; 1 daughter; and 4 grandsons.

RICHARD L. COLE, M.D., Class of 1944, Bozeman, Mont., died Nov. 3, 2014, at age 98. Dr. Cole practiced internal medicine in private practice and at the VA hospitals in Grand Junction, Colo., and Fort Harrison, Mont. He was preceded in death by his first wife, Audrey. He is survived by his wife, Hettie; 7 children; 8 grandchildren; and 2 great-grandchildren.

WINDON H. DAVIS, M.D., Class of 1948, Kremmling, Colo., died Dec. 14, 2014, at age 91. Dr. Davis was a practicing dermatologist and also taught at University of Colorado School of Medicine. He was preceded in death by his wife, Betsy, and 1 son. He is survived by 2 children; 4 grandchildren; and 3 great-grandchildren.

CHARLES W. DECKER, M.D., Class of 1963, Hibbing, Minn., died Sept. 25, 2014, at age 76. Dr. Decker was a family practitioner at the Adams Clinic in Hibbing, where he also served as president for many years. He is survived by 4 children and 2 grandchildren.

JAMES H. DeGEEST, M.D., Class of 1952, Miller, S.D., died Dec. 1, 2014, at age 90. Dr. DeGeest was a general surgeon and family practice physician in Miller, where, for many years, he was the only doctor serving the town and surrounding area. He was preceded in death by his wife, Shirley. He is survived by 5 children; 13 grandchildren; and 16 great-grandchildren.

LUTHER L. DEHNEL, M.D., Class of 1953, St. Cloud, Minn., died Nov. 10, 2014, at age 88. Dr. Dehnel was a psychiatrist. He is survived by his wife, Julie; 5 children; and 6 grandchildren.

DAVID F. DREIS, M.D., Class of 1978, Seattle, Wash., died Jan. 26 at age 64. Dr. Dreis specialized in pulmonology and respiratory care. He is survived by his wife, Ann, and 2 children.

SHEILA M. FROEMMING, M.D., Class of 2003, Duluth, Minn., died Nov. 2, 2014, at age 39. Dr. Froemming was a family physician. She is survived by her husband, John; 3 daughters; and many close relatives.

LEONARD W. GOLDMAN, M.D., Class of 1950, Minnetonka, Minn., died Oct. 28, 2014, at age 93. Dr. Goldman was a psychiatrist. He was preceded in death by his first wife, Helma. He is survived by his wife, Pearle; 2 children; 2 step-children; 5 grandchildren; and 10 great-grandchildren.

NEILL F. GOLTZ, M.D., Class of 1944, Bozeman, Mont., died Sept. 26, 2014, at age 94. Dr. Goltz was chair of the otolaryngology department at St. Luke's Hospital from 1955 to 1984. He is survived by his wife, Deborah; 8 children; 12 grandchildren; and 1 great-grandchild.

HAROLD W. HERMANN, M.D., Class of 1946, Raleigh, N.C., died Aug. 4, 2014, at age 91. Dr. Hermann was a pediatrician who later became a pharmaceutical and nutritional researcher. He was preceded in death by his first wife, Marie; and his second wife, Charlotte Rose. He is survived by 5 children; 2 step-children; 10 grandchildren; 2 step-grandchildren; and 11 great-grandchildren.

CHARLES S. HOYT, M.D., Class of 1953, Edina, Minn., died Jan. 7 at age 86. Dr. Hoyt was a pediatrician and a founding partner of Southdale Pediatrics. He is survived by his wife, Helen; 3 children; 5 grandchildren; and 2 great-grandchildren.

ROBERT T. JENSEN, M.D., M.P.H., Class of 1948, Umatilla, Fla., died Dec. 5, 2014, at age 88. Dr. Jensen served nationally and internationally, providing medical care for indigent populations, conducting research, and providing education in preventive medicine. He is survived by his wife, Rosemary; 3 children; 9 grandchildren; and 10 great-grandchildren.

FRANKLIN L. JOHNSON, M.D., Class of 1959, Duluth, Minn., died Sept. 22, 2014, at age 79. Dr. Johnson helped to develop the department of occupational medicine at St. Luke's Hospital and later joined the Duluth Family Practice Center, where he served as assistant director and physician. He is survived by 3 children and 5 grandchildren.

RAOUL T. KUNERT, M.D., Class of 1963, Fort Worth, Texas, died Oct. 24, 2014, at age 77. Dr. Kunert was a general practitioner in St. Cloud when he was drafted to serve as a medical officer in Vietnam. He later completed his residency in pathology and joined Pathology Associates of Texas. He is survived by his wife, Sandra; 2 children; and 3 grandchildren.

DONALD M. LARSON, M.D., Class of 1950, Duluth, Minn., died Dec. 28, 2014, at age 88. Dr. Larson practiced pathology at St. Mary's and St. Luke's hospitals and taught at the University of Minnesota Medical School, Duluth campus. He is survived by his wife, Leona; 4 children; and 9 grandchildren.

RALPH H. MALLINGER, M.D., Class of 1952, San Bernardino, Calif., died Oct. 30, 2014, at age 90. He was preceded in death by his wife, Myde. He is survived by 2 children.

AARON L. NATHENSON, M.D., Class of 1965, St. Louis Park, Minn., died Aug. 11, 2014, at age 74. Dr. Nathenson served as chief of ophthalmology at Hennepin County Medical Center and as an associate professor at the University of Minnesota. He is survived by his wife, Judi; 3 children; and 9 grandchildren.

MARK E. ODLAND, M.D., Class of 1950, Detroit Lakes, Minn., died Aug. 26, 2014, at age 91. Dr. Odland practiced family medicine at the Detroit Lakes Clinic. He was preceded in death by his wife, Ruth. He is survived by 4 children; 6 grandchildren; and 4 great-grandchildren.

TERRILL C. OLSEN, M.D., Class of 1966, Bremerton, Wash., died Sept. 16, 2014, at age 75. Dr. Olsen was an ophthalmologist. He is survived by his wife, Sharon; 3 sons; and 1 grandson.

RAYMOND C. READ, M.D., Ph.D., Class of 1946, Rockville, Md., died Nov. 27, 2014, at age 90. Dr. Read was a general and thoracic surgeon and a pioneer in hernia research. He is survived by 3 children and 3 grandchildren.

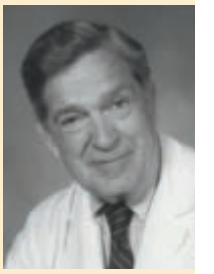
DAN REIKES, M.D., Class of 1948, Lantana, Fla., died Nov. 14, 2014, at age 93. Dr. Reikes established his own radiology practice in Hattiesburg, Miss., which grew to become Hattiesburg Radiology Group. He is survived by his wife, Anita; 3 children; and 5 grandchildren.

MITCHELL J. ROSENHOLTZ, M.D., Class of 1956, Columbia, Mo., died Nov. 15, 2014, at age 83. Besides practicing pathology, Dr. Rosenholtz served as a faculty member and assistant dean at the University of Missouri School of Medicine. He was preceded in death by his wife, Sandy, and 1 daughter. He is survived by 1 daughter.

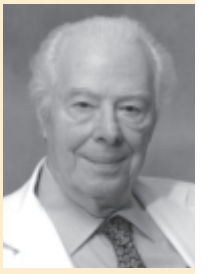
JAMES E. RUNQUIST, M.D., Class of 1961, Davis, Calif., died Sept. 11, 2014, at age 80. Dr. Runquist practiced internal medicine in Orinda, Calif. He is survived by his wife, Kay; 2 children; and 2 grandchildren.

MORRIS F. COLLEN, M.D., Class of 1938, Walnut Creek, Calif., died Sept. 27, 2014, at age 100. Dr. Collen worked with Kaiser Permanente for more than 70 years, and his research led to one of the first computer databases for tracking patients' health. He also championed the early use of penicillin to treat pneumonia, developed multiphasic preventive exams to screen patients, and studied the effects of multiple prescription drugs on the elderly. Dr. Collen was preceded in death by his wife, Frances Bobbie. He is survived by 3 children; 9 grandchildren; and 5 great-grandchildren.

KONALD A. PREM, M.D., Class of 1950, Plymouth, Minn., died Jan. 25 at age 94. A former chair of what's now called the Department of Obstetrics, Gynecology, and Women's Health at the University of Minnesota, Dr. Prem was a pioneer in gynecological oncology and a leader in developing techniques for radical pelvic cancer surgery. After 40 years of commissioned military service, he retired in 1980 as a brigadier general. He was preceded in death by his wife, Phyllis, and 1 daughter. He is survived by 2 children; 7 grandchildren; and 2 great-grandchildren.



LEE W. WATTENBERG, M.D., Class of 1949, Minneapolis, died Dec. 9, 2014, at age 92. A pioneer in cancer prevention research, Dr. Wattenberg is widely credited with establishing the discipline of chemoprevention, introducing entirely new ways of thinking about the effect of diet on cancer. He was a distinguished professor of medicine at the University of Minnesota for more than 60 years and received a lifetime achievement award from the American Association for Cancer Research in 2010. He is survived by his wife, Esther; 4 children; 8 grandchildren; and 1 great-granddaughter.



STANLEY W. SHAPIRO, M.D., Class of 1957, Minnetonka, Minn., died Aug. 3, 2014, at age 81. Dr. Shapiro maintained a private psychiatric practice. He is survived by his wife, Berta; 4 children; and 5 grandchildren.

ROBERT I. SHRAGG, M.D., Class of 1946, Westwood, Calif., died Oct. 12, 2014, at age 91. Dr. Shragg was an endocrinologist and a hospital medical director. He was preceded in death by his wife, Betty. He is survived by 3 children; 6 grandchildren; and 2 great-grandchildren.

ROBERT J. SIELING, M.D., Class of 1961, San Carlos, Calif., died Aug. 24, 2014, at age 79. Dr. Sieling was a neurosurgeon. He is survived by his wife, Allene; 7 children; and 9 grandchildren.

RICHARD C. SMITH, M.D., Class of 1946, Fort Myers, Fla., died Dec. 7, 2014, at age 91. After three years of rural general practice in Minnesota, Dr. Smith served as chief of radiology at the military hospital in Ft. Lee, Va., and later began a solo radiology practice in San Diego, Calif. Dr. Smith is survived by his wife, Joan; 3 children; 6 grandchildren; and 8 great-grandchildren.

continued on page 36

IN MEMORIAM *continued*

LOUIS H. STAHN, M.D., Class of 1949, Sauk Rapids, Minn., died Nov. 8, 2014, at age 93. Dr. Stahn specialized in internal, critical care, emergency, and cardiovascular medicine, and was chief of medicine and geriatrics at the St. Cloud VA hospital. He was preceded in death by 1 son. He is survived by his wife, Cora; 2 daughters; and 3 grandchildren.

JOSEPH A. STENZEL, M.D., Class of 1963, Minneapolis, died Jan. 2 at age 85. Dr. Stenzel was a family practitioner. He is survived by his wife, Mary Ann; 7 children; 13 grandchildren; and 4 great-grandchildren.

ROBERT G. TRAHMS, M.D., Class of 1961, Tiburon, Calif., died Sept. 30, 2014, at age 80. Dr. Trahms practiced psychiatry in the Bay Area. He is survived by his wife, Nancy; 2 children; and 3 grandchildren.

ROBERT W. WILKEN, M.D., Class of 1957, Eugene, Ore., died Aug. 8, 2014, at age 83. Dr. Wilken was a practicing radiologist. He was preceded in death by his first wife, Marilyn. He is survived by his wife, Illona; 7 children; and 17 grandchildren.

WILLIAM S. WRIGHT, M.D., Class of 1945, Minneapolis, died March 29, 2014, at age 92. Dr. Wright was a pediatrician. He was preceded in death by his first wife, Bonnie; 1 son; and 1 grandson. He is survived by his wife, Ruth; 6 children; 20 grandchildren; and 21 great-grandchildren.

JOE VRUNO, SPICY-MEATBALL PHOTOGRAPHY

TOP LEFT Matt Leither gives Emily Wartman a kiss after learning that he had matched to a family medicine residency at Providence Alaska Medical Center in Anchorage. BOTTOM LEFT Jordan and Jenny Blessing celebrate Jordan's pediatrics match at the University of Vermont in Burlington. RIGHT Joel Stanek gets a hug from his mom, Ann, for his match in otolaryngology at the University of Minnesota.

Game, set, match!

GRADUATING MEDICAL STUDENTS gathered with family and friends at the U's McNamara Alumni Center on March 20 for Match Day. Of the 241 students who were matched to a residency, 88 are staying in Minnesota, with 50 of them joining University of Minnesota programs. Half (120) of the students matched to primary care residencies in internal medicine, family medicine, pediatrics, and medicine-pediatrics. MB

Call for alumni volunteers

The Medical Alumni Society needs your help with three new initiatives involving incoming and current medical students. First, in an effort to recruit even more students who are outstanding achievers, we are seeking alumni to contact newly accepted students and encourage them to attend the U of M Medical School. Second, to help meet an urgent and growing need for additional clinical training sites for our students, we are looking for primary care and family medicine practitioners to serve as preceptors at their practice sites. Finally, we want to create opportunities for current students to shadow alumni physicians of all specialties. MB

To participate or learn more, please contact Katrina Roth at roth0103@umn.edu or 612-625-0336.

Medical Bulletin

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