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HEALTH SCIENCES

COLLEGE OF HEALTH SCIENCES MAGAZINE

2021

The College of
Health Sciences
celebrates 25
years of service
and success



Reinforcing Resilience

Neuroscience research could hold a key to healing generational trauma

Expanding Excellence

The Physician Assistant Studies program grows in space and size

Connecting Form to Function

Teaching assistants in the gross anatomy lab are grateful for lessons learned from 'silent teachers'



Welcome to the 2021 edition of *Health Sciences* magazine! It is a pleasure to welcome you to these pages as we celebrate 25 years of service and success. While the COVID-19 pandemic has presented numerous challenges in providing a truly distinctive preparation for our students as future health care practitioners, the creativity and resilience of our faculty, staff and students has allowed us to continue to deliver a truly transformational educational experience.

This issue features a profile of our new doctoral program in occupational therapy, an update on our neuroscience research on stress and mental illness, a deeper look into our new state-of-the-art facility for training future physician assistants, research from a physical therapy faculty scientist with important implications for stroke rehabilitation, and much more.

Let me repeat the words of a former PA student, who at the groundbreaking ceremony for our new PA facility described our ongoing commitment to academic excellence: "Have no doubts." No doubts about our dedication for educational rigor and excellence, no doubts about our deep commitment to service to others, no doubts about our perseverance throughout a worldwide pandemic that threatened to fundamentally change our ability to sustain nationally ranked and recognized programs of study, and no doubts about our passion and promise to train young men and women for others who will one day assume their respective roles in health care, having been trained in an environment steeped in the Jesuit tradition of care and concern, especially for the disadvantaged. That is our calling. And we are blessed to be accompanied by so many alumni and friends who have partnered with us in promoting what we have termed "The Science That Heals."

With warm regards,

William E. Cullinan, Ph.D.
Professor and Dean, College of Health Sciences



IGNATIUS MOMENT

Friends of the College of Health Sciences contribute in many ways to advancing our mission and the values of St. Ignatius through their selfless acts of generosity. Through philanthropic support from Billie and Michael, Med '63, Kubly; Michael and Jeanne Schmitz; Jim, Eng '68, and Kelly, Arts '68, McShane; Barbara, Bus Ad '72, and Dennis, Bus Ad '73, Klein; and many others, we're able to advance our research into debilitating mental health conditions such as depression, addiction and other neuropsychiatric diseases, embodying the Ignatian ideals of effective love and care for the entire person.

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2021



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PROGRAMS IN THE COLLEGE OF HEALTH SCIENCES PROVIDED IN-PERSON INSTRUCTION THROUGH SOCIAL DISTANCING AND MASK-WEARING, LIKE THIS CLASS IN THE NEW OCCUPATIONAL THERAPY CLINICAL DOCTORAL DEGREE PROGRAM.

AWARDS & GRANTS

BIOMEDICAL SCIENCES PROFESSOR AND COLLEAGUES RECEIVE \$2.2 MILLION GRANT FOR NEUROSCIENCE RESEARCH ON SUBSTANCE ABUSE

Dr. David Baker, chair and professor of biomedical sciences, received a \$2.2 million grant from the National Institute on Drug Abuse for his study on neuroscientific bases of substance abuse. Baker is the lead investigator of a team of scientists from Marquette University and the Medical College of Wisconsin. His colleagues from Marquette are Dr. Robert Peoples, professor of biomedical sciences, and Dr. Alex Savtchouk, assistant professor of biomedical sciences.

The grant, titled “PACAP-Dependent Coordination of Glutamate Signaling Between Neurons and Astrocytes,” seeks to further explore how signaling activity in the brain occurs and what effect it has on drug-seeking behavior and addiction.

Brain function is based on the coordinated activity of two types of brain cells: neurons and astrocytes. Glutamate is a molecule in the brain required for cellular communication between these two cells. But how the brain coordinates that cellular signaling could hold answers into the neural basis of addiction and related disorders.

Baker and his team believe that a neuropeptide – a small, protein-like molecule in the brain – called PACAP may be

“The impact of diseases of addiction on our society reflects the lack of effective and safe medications. We hope this study will lead to discoveries that can help address that.” Dr. David Baker

the key to how glutamate signaling is coordinated. The grant will allow an in-depth study of PACAP and its role in neural signaling.

“Brain disorders that lead to issues like addiction result in a larger disease burden in the United States than cancer, heart disease and diabetes,” Baker says. “The impact of diseases of addiction on our society reflects the lack of effective and safe medications. We hope this study will lead to discoveries that can help address that.”

“This is an important scientific project, not only for Dr. Baker and colleagues, but for the field of the neurobiology of addiction,” says Dr. William E. Cullinan, dean of the College of Health Sciences at Marquette University. “Investigating mechanisms of neuron-astrocyte interactions in the brain may ultimately lead to novel therapeutic treatments for addictive disorders.”

FACULTY RESEARCHERS RECEIVE \$3 MILLION GRANT FOR RESEARCH ON EXERCISE IN OLDER ADULTS

Dr. Sandra Hunter, professor of exercise science, along with colleagues Dr. Chris Sundberg, Grad '18, assistant professor of exercise science, and Dr. Robert Fitts, professor emeritus of biological sciences, received a \$3 million R01 grant from the National Institutes of Health for their study on fatigue and the protective effects of exercise in older adults.

Additional Marquette co-investigators include Dr. Kathleen Lukaszewicz, Arts '02, PT '04, clinical associate professor of physical therapy; Dr. Carolyn Smith, clinical associate professor of exercise science; and Dr. Mehdi Maadooliat, Grad '06, associate professor of mathematical and statistical sciences.

The grant, titled “Fatigability of Limb Muscle in Older Adults: Protective Effects of Exercise,” will include clinical trials to test the effectiveness of coupling high-velocity resistance exercise with blood flow restriction to improve muscular function, power and stamina in older men and women.

“As we advance in age, our muscles, especially those in our arms and legs, become weaker and fatigue more easily,” Hunter said. “This can make it difficult for men and women beyond age



65 to generate the limb power necessary to perform daily activities such as climbing stairs.”

The team’s study will address the issue of muscle power and stamina and will identify potential sex differences by determining whether these issues are due to impairments in the musculoskeletal system, the vascular system or both.

“This research program is a prime example of a powerful cross-disciplinary collaboration,” said Dr. William E. Cullinan, dean of the College of Health Sciences. “The work among these researchers, both within the College of Health Sciences and across the university, will generate robust and comprehensive data on how exercise can be deployed as a preventative health tool in aging populations.”

AWARDS & GRANTS

PHYSICAL THERAPY PROGRAM CHAIR RECEIVES \$2.3 MILLION GRANT FOR STROKE RESEARCH



Dr. Allison Hyngstrom, professor and chair of the Physical Therapy Department, received a \$2.3 million R01 grant from the National Institutes of Health for stroke research.

The five-year study, titled "Ischemic Conditioning and Improved Motor Function Post Stroke," will focus on ischemic conditioning and exercise training as it relates to stroke rehabilitation.

Ischemic conditioning stimulates the neural and cardiovascular response to exercise through transient restriction of blood flow to muscles affected by a stroke.

"We are continually looking for interventions that will help improve patient function after stroke," Hyngstrom says. "Current therapies only result in modest improvements in walking speed and function. This intervention has the

potential to further increase functional gains more rapidly." Hyngstrom will work with people recovering from stroke to measure a number of variables over time, including walking speed, leg muscle strength and respiratory fitness, in order to measure the effectiveness of their intervention. She will also partner with the Neuro Recovery Clinic at Marquette as a place to hold these trials.

"This R01 grant will continue to raise the profile of the Physical Therapy program at Marquette, already the university's highest ranked full-time academic program," says Dr. William E. Cullinan, dean of the College of Health Sciences. "More importantly, Dr. Hyngstrom's partnership with local colleagues and the resources provided by the new Neuro Recovery Clinic will have important implications for the development of a new treatment for stroke patients."



Dr. Judith Maloney



Dr. Jenya Iuzzini-Seigel

Dr. Jenya Iuzzini-Seigel, assistant professor of speech pathology and audiology, received a Way Klingler Young Scholar Award. The award supports promising young scholars in critical stages of their careers.

HEALTH SCIENCES FACULTY RECEIVE TEACHING AND RESEARCH AWARDS

Dr. Judith Maloney, clinical associate professor of biomedical sciences, received a Faculty Award for Teaching Excellence.

The award recognizes faculty who inspire students to seek the ideals of the university and cause them to grow in knowledge and scholarship for the glory of God and the good of others.

PHYSICAL THERAPY ASSISTANT PROFESSOR RECEIVES \$747,000 GRANT FOR SPINAL CORD INJURY RESEARCH



Dr. Kristi Streeter, assistant professor of physical therapy, received a \$747,000 R00 grant from the National Institutes of Health for her study on neuromuscular plasticity following spinal cord injury.

Spinal cord injury often leads to paralysis of the diaphragm, a muscle crucial in the act of breathing. Streeter's goal is to understand how neurological sensory information from the diaphragm contributes to the recovery of breathing and cardiovascular control after spinal cord injury and to determine whether electrical stimulation of those sensory neurons has value in rehabilitation.

Ultimately, she hopes to discover new methods to improve breathing in people with spinal cord injuries.

"The neurons that control breathing are essential for life," Streeter says.

"Respiratory neurons utilize sensory feedback to function properly, and these feedback signals may be impaired following spinal cord injury. We believe that electrical stimulation of the neurons may be used to restore sensory input to the spinal cord and may improve the ability to breathe after injury."

"The NIH awards R00 grants to facilitate the transition to R01-funded research," says Dr. Allison Hyngstrom, chair of the Physical Therapy Department. "This is the first time this highly competitive award has been given to a faculty member in our department, and we're proud of the work Dr. Streeter has done to receive this grant."

"This is the first time this highly competitive award has been given to a faculty member in our department."

Dr. Allison Hyngstrom



HELP OUR STUDENTS RISE.

By opening doors through scholarship, you have the power to change lives for Marquette students. Your generosity allows talented young people to be driven more by what they can become than by what they owe.

Support scholarship at marquette.edu/giveonline or contact Kathleen Ludington at 414.288.1410.



ALUMNI AWARDS

YOUNG ALUMNA OF THE YEAR AWARD – DR. JASMINE Y. ZAPATA, H SCI '09



Jasmine Zapata wears a lot of hats — physician, researcher, author, youth empowerment specialist, motivational speaker and singer — and she loves them all.

Officially, Zapata is board certified in pediatrics and preventive medicine and public health at University of Wisconsin School of Medicine. She earned her B.S. in biomedical sciences in 2009 and graduated from the UW School of Medicine and Public Health in 2013. Outside of the hospital, she is the founder of the Beyond Beautiful International Girls Empowerment Movement and the Madam Dreamers Online Pre-med Academy. She also co-founded the Madison Inspirational Youth Choir and authored four books. It all keeps her busy, but she wouldn't change any of it.

"Honestly, there are so many things I love about the work I do. I love working with children and families and being present for life coming into the world. I love teaching medical students and residents about public health. I love being able to do community-based research," she says. Like her talents, the list is long and varied.

Through it all, Zapata is driven by her faith. "It helps me take risks and do innovative things. I feel comfortable taking risks because I know I'm walking in my purpose and have a calling in my life. Without that, none of this would be possible," she says.

For Zapata, this award validates her path and recognizes the meaning behind the work she is doing. "It gives me determination to keep pushing and aiming for even greater things, and I thank Marquette for that," she says.

SERVICE AWARD – MARY POWER NACHREINER, PT '79



Twenty years ago, a family tragedy changed Mary Power Nachreiner's career path and opened her eyes to the importance of organ donation. Today, as community outreach coordinator at University of Wisconsin Organ and Tissue Donation, she is dedicating her life to educating the public about the importance of registering as a donor and offering hope to those awaiting a transplant.

Nachreiner became passionate about organ donation when her 16-year-old daughter, Kelly, chose to be a donor when getting her driver's license. Four weeks later, Kelly was tragically killed in a car accident. "Thanks to her decision to donate, Kelly saved the lives of three strangers," she says. Soon after, Nachreiner left her successful PT practice and

joined UW Organ and Tissue Donation. "I wanted to help encourage all Wisconsinites to give to those who are desperately waiting for an organ. Plus, it allows me to share Kelly and still be her mom," she says.

For Nachreiner, the love of family, friends and her faith gave her the strength to survive the loss of her child. "They allowed me to focus on the many blessings bestowed upon us. Success is being able to engage in a passion that impacts others in a positive manner. This is how I've found contentment, which I hope for all," she says.

Humbled and grateful to receive the Service Award, Nachreiner says it is really for her daughter. "Kelly is the reason I started on this journey. To find a passion and purpose through tragedy is her gift to me," she says.

FRIEND OF THE COLLEGE AWARD – BILLIE ANN KUBLY



Billie Kubly's mantra always has been "make a difference, even if only for one person." That lesson was brought to her doorstep in 2003 when she lost her youngest son. Soon after, she and her husband launched the Charles E. Kubly Foundation to make a difference for those affected by depression and suicide.

Along with being a mother to her seven children, Kubly has volunteered throughout her life. "After Charlie's death, mental health became my passion and mission to make a difference, and I will continue with that mission as long as I am able," she says.

Kubly's association with Marquette began when her late husband, Michael, was admitted to what was then Marquette Medical College one year after they were married. "I did my part by being active in the Medical Wives Association, serving on the board and singing in productions put on by the medical students."

Today, her association with Marquette continues. Through a

generous \$5 million donation, Billie and Michael helped launch the Charles E. Kubly Mental Health Research Center, which provides seed funding to the biomedical scientists researching mental health, including depression. Billie also serves on the college's Leadership Council.

That philanthropy was just the beginning of the Kubly legacy throughout the community. They also established the Charles E. Kubly Psychiatric Chair at the Medical College of Wisconsin. At Rogers Memorial Hospital, they created the Charles E. Kubly Education Center and the Charles E. Kubly Focus Center, a residential treatment facility for young adults with depression and mood disorders. The Charles E. Kubly Access Project provides mental health support to pediatricians across Wisconsin.

"Billie's passion and tireless commitment make her a true friend to the entire Milwaukee mental health community, and we are deeply grateful for her support and friendship," says Dr. William E. Cullinan, dean of the College of Health Sciences.

PROFESSIONAL ACHIEVEMENT AWARD – WILLIAM J. WENNINGER, PT '80



If he could choose anyone in history as his dinner guest, William Wenninger would select Abraham Lincoln. "His insight on leadership through very difficult times would be fascinating to discuss," he says. Leading in difficult physical therapy situations is something Bill does every day as rehabilitation planning specialist for the Department of Veterans Affairs (DVA).

Wenninger, who defines success as consistency and progress toward a goal, continues to work toward his own goals at the DVA. "In the short term, I would like to continue to strengthen the programs I run. In the long term, I want to assure a smooth transition to new leadership and help make sure physical

therapy continues to have a significant presence here."

In his work, Wenninger lives the Marquette values of excellence, faith, leadership and service through contemplation followed by setting a course of action that is fair and consistent. "I learned to listen to ensure that issues are fully understood, and I am willing to consult with others. My Marquette experience prepared me to properly assess situations and search for answers that are appropriate, whether that be in patient care or in health care administrative processes," he says.

Wenninger is happy his work has been acknowledged at the university, while also feeling "humbled to be chosen to receive this award, as there are so many deserving graduates of this institution."

Global Brigades in Ghana

Faculty and students traveled to Ghana with Global Brigades to provide public health support, exchange cultural ideas and learn leadership skills.

By Jesse Lee | Photos By Ellie Rogge, Arts '20

Dr. Joseph Byonanebye, clinical assistant professor of biomedical sciences, supervised a group of students from Marquette on the university's first trip to Ghana with Global Brigades, the world's largest student-led humanitarian organization, started in the College of Health Sciences more than 15 years ago.

On New Year's Day 2019, Byonanebye and 22 students from various programs across campus boarded a plane for a nearly 20-hour flight to Africa. They made their way to Ghana, located in West Africa and bordered on the south by the Atlantic Ocean, where they would spend the next seven days on a Public Health Brigade.

"Our plan was to construct latrines and to educate the community in rural Ghana; 91 percent lack access to basic sanitation facilities and have no public sewerage system," Byonanebye says. "In seven days we constructed five biogas latrines."

Byonanebye explains that biogas latrines have a biodigester that breaks down fecal matter through an anaerobic process to release biogas. Because the biogas is primarily methane and carbon dioxide, it can be combusted with oxygen, and can then be used as an alternative source of energy for heating and cooking. The latrines have a useful life of about 50 years.

In addition to the work, Byonanebye says the students were impacted by the cultural exchange with the Ghanaian people.

"Students enjoyed interacting with children especially," he says. "The children always came to them and wanted to be their company. We also visited Cape Coast, a castle museum that was formerly a place for holding slaves during the transatlantic slave trade."

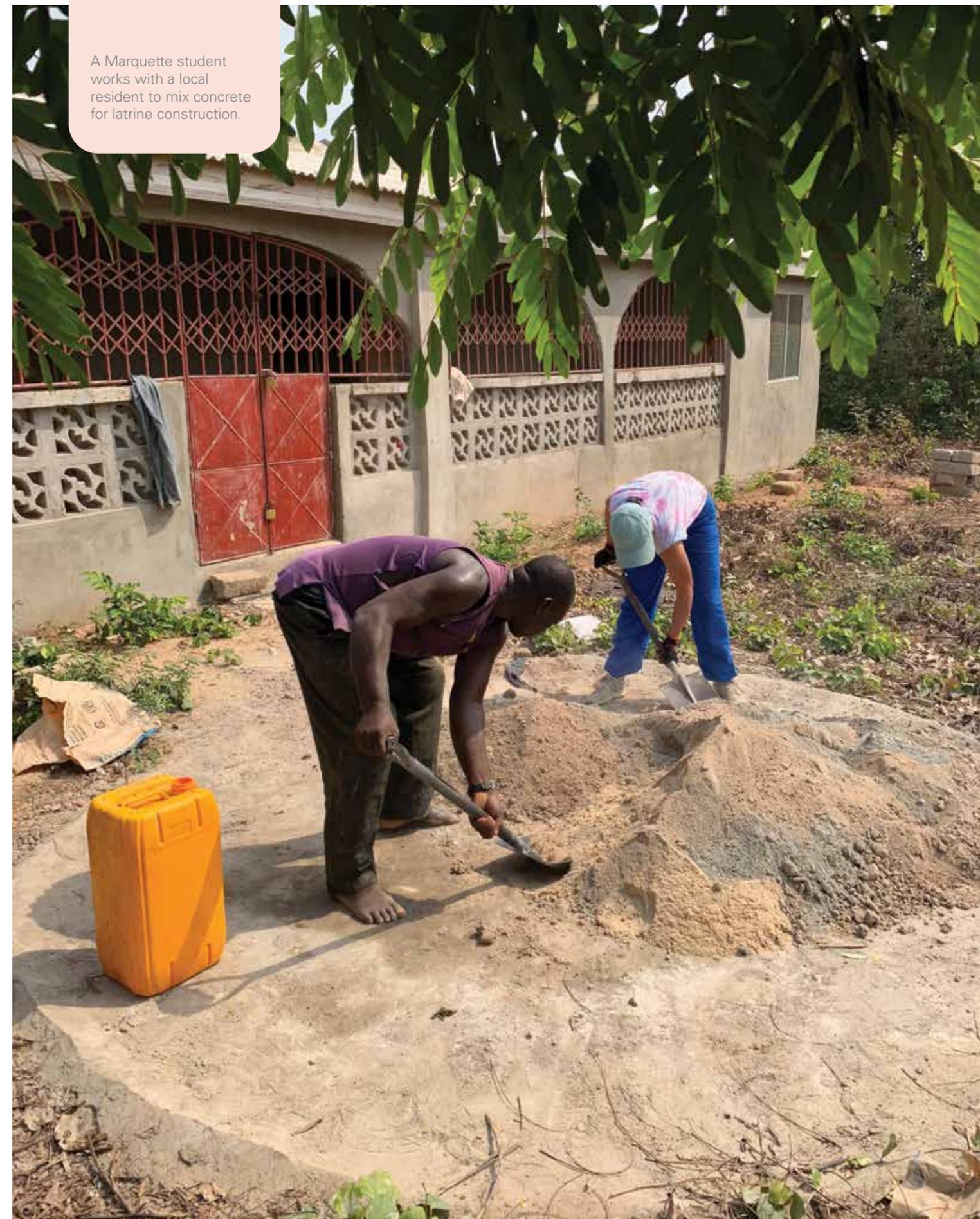
"This trip may have helped and impacted the Ghanaian community of Ekumpono, but I knew when I left that the positive impact the Ghanaians I worked with had a much greater impact on my heart and my appreciation for diversity around the world," says Ellie Rogge, Arts '20, from West Bend, Wisconsin. "I am grateful I was able to participate in a Global Brigades trip to Ghana and bring the knowledge and experience back to Marquette with me."

At the same time that Byonanebye and his students were in Ghana, Skyler Demis, a senior from West Chester, Pennsylvania, was in Panama on a Medical Brigade. The trip had an immediate impact on her, and when she returned, she started to research how she could learn more about the impact and reach of Global Brigades.

"I really wanted to see a holistic picture of Global Brigades, because for my first Panama trip, it was only medical and some dental," she says. "Even though I was in-country and participating, I knew I wanted to take the chance to see how it all works."

Through her online research, Demis learned of the Global Brigades Leadership Institute.

A Marquette student works with a local resident to mix concrete for latrine construction.



“I think these trips help shape the way we treat people and the way we interact, both when we’re in-country but also when we return and we’re in our local communities.” *Skyler Demis*

The Global Brigades Leadership Institutes take place in each of the countries in which Global Brigades currently has programs – Ghana, Greece, Guatemala, Honduras, Nicaragua and Panama.

The Institutes are “designed for student leaders ready to ignite or grow the Global Brigades movement on campus” and are the “only opportunity for leaders to spend one-on-one time with our program managers and learn the behind-the-scenes intricacies of our health and development model,” according to the Global Brigades organization.

Excited by the possibility of learning more and taking a stronger leadership role, and seeing the success of Byonanebye’s trip, Demis signed up to go to Ghana.

“I wanted to see something completely different, and it was an amazing opportunity,” she says.

Demis says that the Leadership Institute allowed her to learn from brigade leaders who have been on brigades that Demis herself might never get the chance to attend.

“We got to meet all of the in-country staff in Ghana – public health, dental, business, engineering, medical and water,” she says.

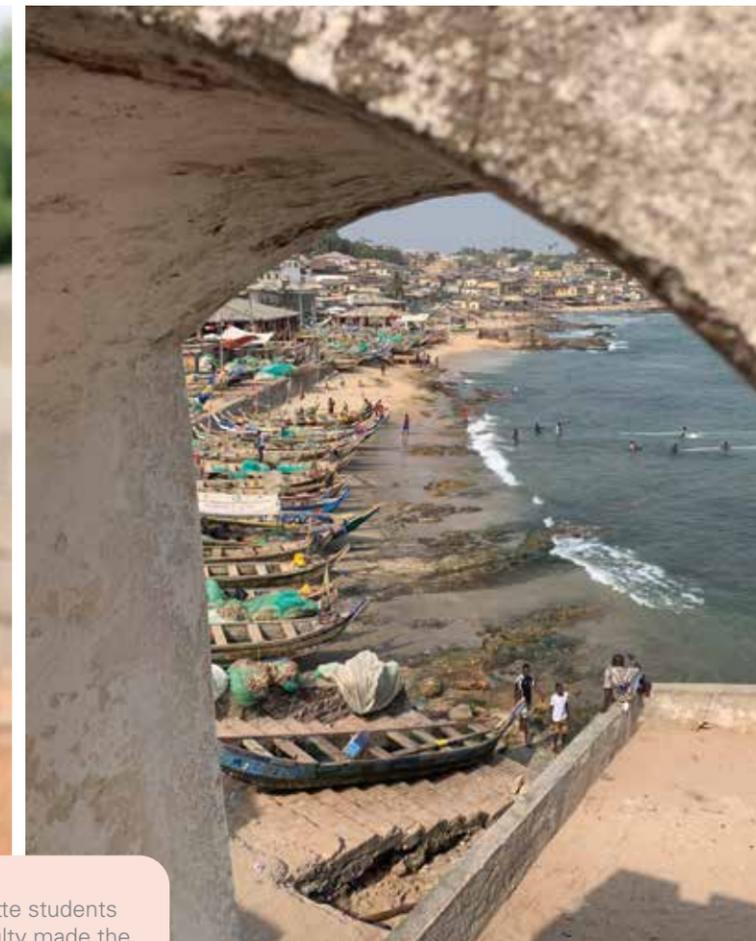
The Institute attendees also got to hear from the teams who assess communities and look at how working with Global Brigades might be able to help best.

Spending the five days learning the specifics of the different Brigade opportunities gave Demis the insight she hoped for into the organization, and it opened up a desire to become more involved.

“It gave me that holistic sense I wanted to learn about,” she says. “And because of that, I can pass that on to our brigaders – ‘this is why a community bank has to come before public health or water brigades, because you need to be able to finance the infrastructure. You see the sustainable development – the people in the communities are investing their own money and resources, and Global Brigades isn’t there to give a handout, just a hand up.”

Upon her return, Demis decided to make Global Brigades even more of a priority. She believes that, in addition to making her a better leader, her Global Brigades experiences will help make her a better health care provider as well – she plans to attend medical school after completing her undergraduate degree in biomedical sciences.

“I think these trips help shape the way we treat people and the way we interact, both when we’re in-country but also when we return and we’re in our local communities,” she says. “We’re all humans; we all deserve respect. And I think as a doctor, we can remember that and connect with patients as people and find out what might be impacting them holistically, not just what their health complaint might be.”



Marquette students and faculty made the university's first-ever trip to Ghana in 2019.



Completing the Triad of Rehabilitation Science

The College of Health Sciences adds Wisconsin's first clinical doctorate of occupational therapy to its top-ranked rehabilitation sciences programs.

By Jesse Lee

The College of Health Sciences at Marquette houses one of the leading physical therapy programs in the nation, as well as one of the oldest and most well-regarded speech pathology and audiology programs in the country, founded in 1910 as the Department of Speech Correction. The two programs are ranked 13th and 55th by *U.S. News & World Report*, respectively.

The college completed the triad of rehabilitation sciences with its addition of a new Clinical Doctorate of Occupational Therapy program, the first of its kind in Wisconsin.

To build such a program, the college needed someone who not only understood the inner workings of an occupational therapy degree program, but also someone with the practical experience of creating one from scratch.

Dr. Lani Stockwell, chair and clinical associate professor of occupational therapy, previously founded an OT master's program at another university and came to Marquette eager for the challenge of creating the new doctoral program.

"Founding an occupational therapy program from the ground up takes a lot of effort — it's not for the faint of heart," Stockwell says. "But this really speaks to the mission of the College of

Health Sciences and of Marquette. To have such established health professional programs at the reputation levels that we do, occupational therapy was the next most logical choice for expansion."

There are important milestones and steps toward the creation of any new degree program. First, the university has to declare its intent. The next step is candidacy. But the space between declaration and candidacy is filled with countless hours — months — of work and preparation.

"To get to candidacy, it requires the scaffolding of the program," Stockwell says. "So you're creating the curriculum, you're hiring faculty, you're creating an optimal learning space, and I think most importantly, you're looking at the strengths of the university and the programming already in place to use as an asset, but also to see how occupational therapy can complement that."

Thanks to the hard work of Stockwell and her faculty partners — Dr. Ann Millard and Erin Campbell, clinical assistant professors of occupational therapy — as well as numerous others in the College of Health Sciences and around the university, the new Occupational Therapy program welcomed its first cohort of students in fall 2020.



A student provides occupational therapy services to a patient in the Neuro Recovery Clinic at Marquette.

"It's so exciting for Marquette," Stockwell says. "Occupational therapy is such an integral part of an interprofessional rehabilitation science team, and interprofessional education is such a big focus here."

At its core, occupational therapy enables people who have been injured to function in a way that best helps them in their daily lives. Occupational therapists focus on building patients' capacity to be able to do what they need to do each day, from walking up stairs to relearning feeding mechanics.

"The word occupation in 'occupational therapy' is all about what occupies you in a day's time; what would you like to be able to do," Stockwell says. "A lot of the time, it's teaching someone how to modify the

way they do something or adapting the environment to make it easier and more supportive for that person to accomplish what they set out to do."

Thanks to on-site opportunities such as the new Neuro Recovery Clinic, OT and PT students will be able to work alongside one another in real-world situations, learning each other's professions and how each complements the other to provide patients with a full rehabilitative experience.

"On-campus clinics like our NRC are not common," Stockwell says. "The potential for our faculty to work together — both in clinical practice, but also on tenure-track research agendas — is such a powerful opportunity."

Left to right: Dr. Joseph Byonanebye; Dr. Nilanjan Lodh; Joshua Knox, PA-C



Prioritizing Public Health

Marquette's new interdisciplinary public health equity minor helps address issues of health, locally and globally.

By Jesse Lee | Photo By Aliza Baran

Public health and health equity share characteristics that also form the core of the mission at Marquette University. The science of public health aims to prevent disease, prolong life and promote human health, while the practice of health equity ensures that all people have full, equal access to opportunities that enable healthy living. At their cores, public health and health equity are about caring for individuals and groups of people and providing them the means to live their best lives.

Until recently, however, Marquette had no program through which students could pursue public health or health equity education. A team of faculty members from the College of Health Sciences, composed of Dr. John Mantsch, former chair of biomedical sciences; Dr. Joseph Byonanebye, clinical assistant professor of biomedical sciences; Dr. Nilanjan Lodh, assistant professor of clinical laboratory science; and Joshua Knox, Grad '11, clinical associate professor of physician

assistant studies, saw a need and an opportunity to address this issue.

Working with faculty across campus through a multidisciplinary community of practice, they created a new minor in public health equity.

The new interdisciplinary minor includes two tracks: one focused on global health and the other focused on community health issues in greater Milwaukee.

For the team to tackle the issue of public health, it needed someone with expertise in this area

– someone who could bridge the gap between the scientific research and clinical, community practice. The team found that bridge in Byonanebye, who holds a Ph.D. in public and community health from the Medical College of Wisconsin, and who saw firsthand the importance of public health growing up in his home country of Uganda.

“When I came here, I felt that public health was a gap in some way,” Byonanebye says. “Students come here wanting to be M.D.s, PAs and therapists who want to be on the preventative side, to work to ensure diseases don’t happen. This minor will be helpful for all students in disease prevention.”

Byonanebye points out that it’s not just College of Health Sciences students who will benefit from the new minor. While it originated with a team from the college, the minor is specifically designed to be interdisciplinary.

Lodh, whose work includes parasitic disease detection and prevention, agrees. As the leader of the community of practice, he acts as a liaison

with members at Marquette who are tasked with working on public health.

“This is much bigger than just health science,” he says. “It includes social and cultural aspects, economic aspects. We have a strength on campus, where people are involved with these activities that are way beyond our own capacity at the college level.”

Public health equity has long been of interest to Knox as well. As a physician assistant he’s traveled to Honduras and Nicaragua with Global

Brigades, providing medical care as well as public health through sanitation and water initiatives. He also helps the local community, training future PAs at Repairers of the Breach clinic in Milwaukee.

Knox and the others on the team believe that education like the new minor can help turn the tide of public health and that it starts at the local level. The capstone requirement of the minor – a two-course sequence that will find students partnered with agencies including the Milwaukee Health Department, the Medical College of Wisconsin, the Autism

Society of Southeastern Wisconsin and more – was designed with this goal in mind.

“There’s a lot of work to be done in our community,” Knox says. “With an interdisciplinary program, we’re going to have a bigger labor force to draw from, and we’ll be doing work in ways that we may not have conventionally thought of as public health. If we can start here, where we’re culturally knowledgeable and culturally relevant, then eventually we can focus on nationally and globally.”



Students gain firsthand understanding of the importance of public health, both abroad and at home.



THE COLLEGE of
HEALTH SCIENCES CELEBRATES

SERVICE AND SUCCESS

By Jesse Lee | Illustration by David Milan

In the 2016 edition of this magazine, we celebrated the 20th anniversary of the College of Health Sciences, highlighting its history and the work done to shape the college into a collection of highly ranked destination programs.

Now in 2021, as we celebrate the college's 25th anniversary, we highlight the amazing progress from the past five years alone.





“It’s so exciting for Marquette,” says Dr. Lani Stockwell, chair of the Occupational Therapy Department and clinical associate professor. “This really speaks to the mission of the College of Health Sciences and of Marquette. To have such established health professional programs at the reputation levels that we do, occupational therapy was the next most logical choice for expansion.”

Another first for the college, the university and the state came in the form of the Neuro Recovery Clinic (NRC).

Founded in December 2018 by a \$1 million gift from an anonymous donor, the mission of the clinic is grounded in Marquette’s Jesuit values of care for the whole person. Patients of the clinic – people with neurologic disorders such as strokes, spinal cord injuries and diseases like multiple sclerosis – receive intensive personalized therapeutic treatment from a team of caring professionals including physical therapists, occupational therapists and speech pathologists. The NRC is only the 13th clinic of its kind

nationally. Prior to it, Wisconsin residents had to travel to Chicago or Minneapolis to receive these specialized services.

Like the other clinics housed in the College of Health Sciences – the Marquette Physical Therapy Clinic and the Speech and Hearing Clinic – the Neuro Recovery Clinic also provides opportunities for students to receive hands-on training and education.

Since its inception, the Neuro Recovery Clinic has been further bolstered by a \$750,000 gift from alumni couple Sarah, Arts ’83, and Jeff, Bus Ad ’83, Joerres. The gift provides grants for qualified patients who may not otherwise be able to afford treatment.

In 2019, Marquette dedicated the newly built Physician Assistant Studies building at North 17th and West Clybourn streets. The 44,000-square-foot building houses a state-of-the-art medical suite and simulation center,

PHYSICIAN ASSISTANT STUDIES BUILDING

A NEW PROGRAM, A NEW CLINIC AND A NEW BUILDING

In 2020, the College of Health Sciences created its first new degree program in nearly two decades. The Clinical Doctorate of Occupational Therapy, also the first program of its kind in the state of Wisconsin, completed the triad of rehabilitation sciences at Marquette – a three-pronged, interdisciplinary approach to rehabilitation that includes physical therapy and speech-language pathology (see story on page 14).



bringing much-needed upgrades to the Physician Assistant Studies program – ranked 26th in the country by *U.S. News & World Report*.

Along with the expanded space came the ability to expand from an annual graduating class of 55 to a total of 75.

FOCUS ON RESEARCH

In 2015, Dr. Michael and Billie Kubly donated \$5 million to establish the Charles E. Kubly Mental Health Research Center in the College of Health Sciences, named for their son, Charlie, who died of suicide in 2003.

Since then, other families have joined the Kublys in supporting the mission of neurobiological mental health research in the college. Michael and Jeanne Schmitz donated \$1 million in 2017 to create the Michael and Jeanne Schmitz Mental Health Research Fund, in honor of their son, Joey. When asked about their gift, they said, “Our study has led us to conclude that the research for cures for depression is woefully



Top: Neuroscience graduate students in the Biomedical Sciences Department at work in the new Klein Bio Imaging Facility. Bottom: Local high school students participate in a Brain Brigade activity organized by students under the mentorship of Dr. SuJean Choi, neuroscientist and professor of biomedical sciences. Left: Dr. Carolyn Smith explains an ultrasound technique to a student.

underfunded as compared to other serious illnesses. Further, there is a widespread view that depression is primarily caused by psychological or social factors, but less recognition of the role that the biology of the brain and its chemistry plays as causative agents.”

Jim and Kelly McShane gifted \$1 million in 2018 to establish the first Dean’s Endowed Research Fund, with special consideration

to mental health research. And Barbara and Dennis Klein provided \$1 million in 2016 to establish the Barbara and Dennis Klein Neuroscience Research Innovation Fund.

These transformational gifts provide important seed funding and the ability to buy cutting-edge technology for neuroscience researchers in the College of Health Sciences, allowing them to compete for multimillion-dollar grants from agencies such as the National Institutes of Health. Researchers have received more than \$10 million in new grants in the past five years.

Research has remained robust across other areas of the college, such as in physical therapy.

In 2019, Dr. Allison Hyingstrom, chair of the Department of Physical Therapy, received \$2.3 million from the National Institutes of Health for stroke research. Dr. Sandra Hunter, professor of exercise science, along with co-investigators Dr. Kathleen Lukaszewicz, Dr. Carolyn Smith and Dr. Chris Sundberg, received a \$3 million NIH grant to study the effects of exercise in older adults. Dr. Kristi Streeter, assistant professor of physical therapy, received \$747,000 from the NIH for spinal cord injury research. And Dr. Sheila Schindler-Ivens, associate professor of physical therapy, was awarded the first-ever patent in the Physical Therapy Department (see story on page 32).

RESPONDING TO A PANDEMIC

In March 2020, the world changed. As the COVID-19 pandemic began its spread across the country, faculty, staff and students were forced to change the way they taught, worked and learned.

Like the rest of the university, the college pivoted to a model of online learning. However, faculty also saw new educational opportunities. A Community of Research Scholars (CoRS) at Marquette, including faculty from the College of Health Sciences, created a new Public Health and Equity COVID-19 Fellowship program. It replaced the planned public health equity summer research program that was canceled in summer 2020 because of the pandemic. The goals of the one-year fellowship are to generate interest in public health-related disciplines, inspire students to address pressing contemporary societal problems through research, and provide



A cardboard cutout of Dean William Cullinan reminds visitors to wear their masks.

students with an immersive and meaningful experience focused on the development of research skills.

In addition to new educational opportunities, faculty and staff found new ways to celebrate and support students, especially in May 2020 when Commencement would have normally been held. Faculty and staff members used social media to connect with students and held virtual celebrations on Microsoft Teams with graduates.

Dr. William E. Cullinan, dean of the College of Health Sciences, is often invited to student graduation parties. Unable to attend in 2020, he found a new way to be a part of their celebrations – he had a life-size cardboard cutout made of himself and lent it to students who requested it. Later, the cutout





Physician assistant studies students prepare for a vaccine clinic.

became a fixture in the college's office, wearing a mask and affixed with a speech bubble reminding all visitors to do the same.

Students also played a key role during the pandemic, with many clinical and professional students working on the front lines, administering tests and caring for patients with COVID-19. Service to others is a core principle of a Catholic, Jesuit education, and it is core to the mission of the College of Health Sciences.

In January 2021, students in the Physician Assistant Studies program coordinated a vaccine clinic as part of the "Get Vaccinated!" campaign. They helped provide COVID-19 vaccines to clinical students and faculty throughout the college who were working on the front lines of the pandemic.

LOOKING TOWARD THE FUTURE

As greater numbers of people receive vaccinations, we can start to look toward a post-pandemic world and what the future holds for the College of Health Sciences at Marquette.

Students in Global Brigades, the world's largest student-led humanitarian organization, which was founded in the



College of Health Sciences, will be able to pivot back to in-person experiences. The pandemic saw a shift to TeleBrigades, virtual Medical Brigades that allowed students to consult with and learn from medical professionals around the world.

According to the Global Brigades organization, "when our volunteers participate in TeleBrigades, they learn from and collaborate with full-time, local in-country teams and community members to carry out social impact projects like medical clinics, water systems, and community banks. In this way, volunteers achieve the same learning outcomes as volunteering abroad with GB teams in Ghana, Honduras, Guatemala, Nicaragua, Greece and Panama. Using virtual meeting software and secure telemedical platforms, TeleBrigades volunteers have the opportunity to participate in select live consultations, interviews with physicians and economic development professionals, and real case studies in the fields of business, engineering, medicine, and public health."

While this was an amazing opportunity for students, they look forward to returning to the transformational, in-person experience of working with medical professionals around the world to serve those most in need.

Each year the college also welcomes nearly 4,000 local high school students to tour the gross anatomy lab and learn directly from student teaching assistants. The gross anatomy experience in the College of Health Sciences is one of only a few in the country where undergraduates can perform a complete human cadaver dissection, and it truly sets the college apart in terms of preparing students for further education, including physician assistant, medical and dental degrees (see story on page 38).

Research will continue to be a key focus of the college. The Summer Research Program, which was suspended in 2020 due to the pandemic, will be reinstated as soon as it is safe to do so. The program, made possible by funds from the college's Sterilizer Monitoring Service and by a generous annual gift from an anonymous donor, gives undergraduates the opportunity to spend the summer working in a research lab, supervised by faculty researchers.

Many undergraduates are able to co-author scientific publications that are published in key journals, and much of their work helps faculty researchers on existing grants or helps lay the groundwork for new grant proposals.

The college also continues to have some of the highest ranked professional programs in the country, according to *U.S. News & World Report*. In 2021, the Physical Therapy program ranked 13th, the Physician Assistant Studies program ranked 26th and the Speech Pathology and Audiology program ranked 55th.

The past five years have brought exciting growth to the college and new opportunities for students, despite the recent challenges brought on

by COVID-19. But the pandemic also helped to shine a spotlight on students, faculty and staff who live the mission of the college and the university every day, helping those in need locally and globally.

For 25 years, the college has continued to grow, to innovate and to provide students – some of the best and brightest at Marquette – with an unparalleled educational experience. The College of Health Sciences is poised for a bright future, and is excited to continue serving students and celebrating the accomplishments of alumni for another 25 years and beyond.

Students enjoy a break on a Global Brigades trip in Nicaragua.



REINFORCING RESILIENCE

*Neuroscience
research could
hold a key to healing
generational trauma
and bolstering resilience
in people affected by
chronic stress.*

*By Jesse Lee
Illustrations by
Linden Eller*



L

ike many large American cities, Milwaukee has a checkered history. From its early roots as an industrial center to its worldwide fame as a beer capital, many have

a romanticized vision of the city as an example of the American dream come to life, seen through Cream City-colored glasses.

But the harsh reality of Milwaukee is much more bleak. According to a 2016 report from the U.S. Census Bureau, Milwaukee has the third-highest poverty rate among the 50 largest U.S. cities and remains one of the most segregated cities in America, statistics that have trended in the wrong direction since as far back as the 1930s.

Rocked by the reality of the Great Depression, the once-thriving industries in the city began to dry up while unemployment soared. Now, decades later and in the midst of a global pandemic, Milwaukee and its residents still feel the long-term effects of generational trauma fueled by joblessness, homelessness, mental illness and addiction.

Former *Milwaukee Journal Sentinel* reporter John Schmid received a Carolyn C. Mattingly Award for Mental Health Reporting for his 2017 series, "A Time to Heal." The series shined a spotlight on the issues plaguing the city and put out a call for help and healing for its residents.

Schmid's series focused not only on the economic issues of generational trauma, but also on the health effects of chronic stress, calling it a "public health crisis."

A team of researchers in the College of Health Sciences at Marquette has studied the neurobiological effects of stress and trauma – how chronic stress can literally change brain chemistry, predisposing people to diseases like mental illness and addiction – and they believe their research may play a major role in beginning the healing that the city so desperately needs.



College of Health Sciences
neuroscientist and Dean
Dr. William E. Cullinan

"As scientists, the interest in this initially came from how stress affects the brain as a biomedical disorder," says Dr. William E. Cullinan, dean of the College of Health Sciences. "But what it's really sparked an interest in is addressing this trauma epidemic in different ways."

Cullinan says that includes forming community partnerships, educating students, and engaging in collaboration with social scientists and clinicians to address trauma by identifying predictors of resilience in communities, which can then lead to better health outcomes.

Faculty neuroscientists at Marquette, each addressing the problem from the unique perspectives of their individual research, offer a beacon of hope. While their research highlights the negative effects of stress and trauma, it also shows that, through changes in the environment and reductions in the levels of chronic stressors, brain chemistry can change for the good.

"Growing up or being born into a household like that has long-term consequences, and we're starting to understand that those consequences have an important genetic component." Dr. Paul Gasser

STRESS AND CORTISOL LEVELS

A main research focus in the College of Health Sciences is on the neurobiology of stress and motivation, specifically how chronic stress can cause physiological changes in the brain that lead to addiction and drug-seeking behavior.

"We know that being in a traumatic environment, whether it be an impoverished environment or one riddled with violence or neglect, there are biological correlates that you can see in terms of how your brain is functioning," Cullinan says. "And those biological correlates, based on what should be the typical function of brain regions like the prefrontal cortex and the amygdala, produce functional deficits in terms of how people process information and learn."

Dr. Paul Gasser, associate professor of biomedical sciences, says the steroid hormone cortisol is a major factor in these neurobiological changes.

"Cortisol is critical for adapting to stress and maintaining normal brain function, but it's also extremely powerful, and therefore, long-term exposure is damaging," he says. "Through long-term studies spanning many years, we know that individuals who have chronic stress and chronic exposure to cortisol have degradation in the prefrontal cortex."

The prefrontal cortex is the executive control region of the brain. When functioning normally, it acts as a gatekeeper for impulsive behavior, controlling emotions and decision making. The prefrontal cortex also interacts with the amygdala, the brain's fear center, to regulate responses to fear and stress.

In populations affected by generational chronic stress and trauma, such as food scarcity, poverty

and households with violence, research has shown that the prefrontal cortex literally shrinks, limiting its ability to regulate impulsive behaviors and leading to potentially dangerous decision-making abilities and emotional responses.

"If you look at the brain of someone who has hypercortisolism – an overabundance of cortisol – the prefrontal cortex and other areas of the brain are smaller in those individuals," Gasser says. "And we know that chronically elevated cortisol levels are present in people with depression and chronic stress or trauma."

EFFECTS OF CHRONIC STRESS LIKELY INHERITED

Gasser also points to research that shows a generational or epigenetic correlation to stress – basically that the effects of chronic stress, potentially including elevated cortisol levels, is likely inherited.

"What we know from a large number of animal studies is that animals born to mothers that have undergone high levels of stress have epigenetic changes that are persistent as they become adults," he says. "Those epigenetic changes affect their stress responses, and those changes can, in some cases, be passed on, even past that generation. And there's evidence that the same thing happens in humans."

Gasser illustrates it like this: When you think about stress in animals, you think about lack of food or the need to evade predators for survival. But chronic stressors in human populations living in poverty manifest in much the same way – people who face conditions of poverty often don't have food and don't have safety.



From left to right: Dr. Marieke Gilmartin, Dr. Robert Wheeler and Dr. Paul Gasser

stress at hand, which seems like a really good and adaptive response," she says. "But the consequence is that, long term, you get a reduced ability of higher-order networks to rein in that response, which has a negative effect."

Under Gilmartin's conditioning model, a subject hears a tone and then receives a negative stimulus, creating a brain response. Eventually the subject learns to associate the tone itself with the negative stimulus, so the

"Growing up or being born into a household like that has long-term consequences, and we're starting to understand that those consequences have an important genetic component," he says.

STUDYING FEAR RESPONSE CONDITIONING

In conditions of high stress, our brains go into modes of fear and preparation, a state commonly referred to as "fight or flight." We think of the fight-or-flight response as an instinct, but it's actually a learned behavior, according to Dr. Marieke Gilmartin, assistant professor of biomedical sciences.

Gilmartin's lab uses fear response conditioning to understand the role of brain structures like the aforementioned prefrontal cortex and amygdala in detecting and responding to stress and trauma. But her research has also shown that the hippocampus, the area of the brain that processes emotion and memory, plays a role in the fear or stress response.

"On one hand, early life stress leads to accelerated amygdala development to deal with the constant

tone triggers the fear response in anticipation of a negative outcome before actually receiving it. But Gilmartin has found that the response persists regardless of the time gap between the tone and the stimulus, suggesting that memory also plays a role.

In environments where the stressors, or negative stimuli, are near constant, like those inhabited by people living in poverty and conditions of trauma, the brain is continuously flooded with cortisol, leading to the hypercortisolism effects described by Gasser.

PREDISPOSED TO ILLNESS

Dr. Robert Wheeler, associate professor of biomedical sciences, says it's important to note that it's not just the developing brain that is vulnerable to trauma, but that trauma has severe and persistent effects in adults as well. He concurs with Schmid's characterization of trauma as a public health crisis, calling it a major cause of diseases such as mental illness and addiction.

"I think that the emerging understanding of how

traumatic events change the brain in a persistent manner that predisposes people to illness is the most important neuroscience discovery of my lifetime," Wheeler says.

Wheeler's research focuses on the way stress hormones actually reshape the brain through a process called "regressive neural plasticity." Neural plasticity is the ability of neurons – transmitter cells within the nervous system or brain – to change or adapt their function and form based on environmental changes. In the case of negative environmental changes, like chronic stress or trauma, the brain undergoes regressive plasticity, literally losing pathways that a healthy brain uses to signal positive hormonal releases in response to stressors. This regressive plasticity thereby has a negative effect in the regulation of emotional processing and motivational influence, leading to issues like addiction and loss of impulse control. And this plasticity is constant, even into adulthood.

COMMUNITY INTERVENTION INCLUDES SWIM

The idea that chronic stress and trauma can be passed on through generations and does lead to actual changes in the structure and function of the brain can sound like an insurmountable obstacle, impossible to overcome.

"I say this is the most important emerging neuroscience discovery because I believe that highlighting these biological mechanisms has the potential to take a problem that seems intractable and inspire a will for policymakers and service providers to address it in new ways," Wheeler says. "This is an opportunity for scientific discovery to do the greatest good for our society."

"Community change for the good also has biological impact," Cullinan says. "We can offset some of the negative effects through social and cultural interventions at the community level. We can attack part of this through our science and understand how it's all happening, but community partnership is absolutely critical."

One major partnership comes in the form of the Scaling Wellness in Milwaukee, or SWIM, initiative, led by Marquette President Michael R.

Lovell and Amy Lovell. SWIM is "a collaboration within the human services, health care, educational and criminal justice sectors that is bringing Wisconsin to the forefront of the trauma informed care movement."

The first SWIM conference, "Healing Trauma, Healthy Communities," held in September 2018, brought together more than 1,300 city and community leaders to explore mechanisms for healing and building resilience. Marquette partnered with the Social Development Commission, a provider of human service programs for low-income individuals and families in Milwaukee County.

At the conference, President Lovell said: "As a Catholic, Jesuit university, Marquette is called to serve the community around us, and one of the ways we are doing that is by recognizing and responding to trauma in our city. Bringing SWIM and the SDC together for a joint event about self-reflection and hope will spark important conversations and promote healing, which are goals for both organizations."

There is a lot of work to be done. Generations of stress and trauma, and the neurobiological effects suffered by people throughout those generations, will not be solved overnight, and the lasting effects of COVID-19 will take years to understand. But taking a multifaceted approach – biologically, economically and socially – to tackling this problem will ensure that change will be made. And the Marquette community will continue to live up to its mission in order to affect that change.

"This interest has inspired the involvement of many faculty members and students to become involved in broader initiatives, partnering with service providers and researchers from the other major research institutions in Milwaukee to meet with members of our community to talk about how to best address the effects of trauma," Wheeler says. "In addition to working in our individual research programs, we're meeting regularly with other researchers at Marquette, UW-Milwaukee and the Medical College of Wisconsin, as well as community members and service providers, with the goal of finding a way to better understand the effects of trauma and to implement the interventions that emerge."

Dr. Sheila Schindler-Ivens works in her lab, making adjustments to her patented technology.



Inventing a Treatment for Stroke

Dr. Sheila Schindler-Ivens' patented technology could provide unprecedented levels of treatment for people dealing with mobility issues after a stroke.

By Jesse Lee

Dr. Sheila Schindler-Ivens, PT '89, is an innovator. As a student at Marquette in 1989, she helped create The Marquette Challenge, a fundraising effort to support physical therapy research through the Foundation for Physical Therapy. The Challenge has grown to nearly 180 participating programs across the country and has raised more than \$4 million for physical therapy research. That seed funding has been leveraged into more than \$100 million of federal research support.

Now an associate professor of physical therapy in the College of Health Sciences at Marquette, Schindler-Ivens has a new innovation — the invention of a motor-assisted, uncoupled pedaling system for stroke rehabilitation, for which she's received the first-ever patent in the Department of Physical Therapy at Marquette.

According to Schindler-Ivens, the invention came about from an experiment involving mobility issues for people who have had a stroke.

"We did an experiment and found that people with stroke have at least two problems moving," she says. "Number one is that they tend to not use their paretic limb — that's the weaker leg, or the one most affected by stroke. The other is that, even when they do use their paretic limb, they tend not to use it well in coordination with the other extremity."

Traditional thinking is that the leg affected by stroke doesn't produce a lot of force, which, combined with the coordination difficulty, makes it very hard for people with stroke to walk.

However, in Schindler-Ivens' experiment, she found that when pedaling a bicycle-style pedal setup

using a "split-crank" mechanism, people with stroke actually can produce the requisite force to turn the pedals with their paretic limb. From there she theorized that the mobility issues may have more to do with coordination between the legs rather than solely an issue of leg strength.

The split-crank mechanism is key to the therapeutic intervention Schindler-Ivens discovered to help people with stroke regain mobility, and in turn, is key to the invention that helps provide this intervention.

In a traditional pedal system, the pedals are mechanically coupled — when you turn one, the other follows. In Schindler-Ivens' machine, the pedals can be uncoupled to move independently. Because moving one pedal doesn't move the other, the person pedaling is forced to maintain coordination between their legs to move the pedals in rhythm. Additionally, the device is motor aided, so it can be set to offer assistance to the leg that can't get around, or to provide resistance to the stronger leg to encourage motor coordination between the two limbs.

"The goal is to make the exercise challenging yet tractable," Schindler-Ivens says. "So we can use the motor to mimic or equalize leg strength, help the person keep their leg movements coordinated and help them adapt their movements."

Schindler-Ivens and a team of two co-inventors received a patent on the device and are working to license the technology to a company or manufacturer. She hopes that someday soon her technology will be used in devices found in rehabilitation clinics around the country.

Expanding Excellence

The Physician Assistant Studies program grows in space and size, with a new building and an expanded class.

By Paula Wheeler

With approximately 1,400 applicants vying annually for just 55 spots, Marquette University's Physician Assistant Studies program had long been ripe for growth. But housed until recently in a too-small building, the program had no clear avenue to expansion and lacked the latest educational tools and technology to best train the country's future PAs.

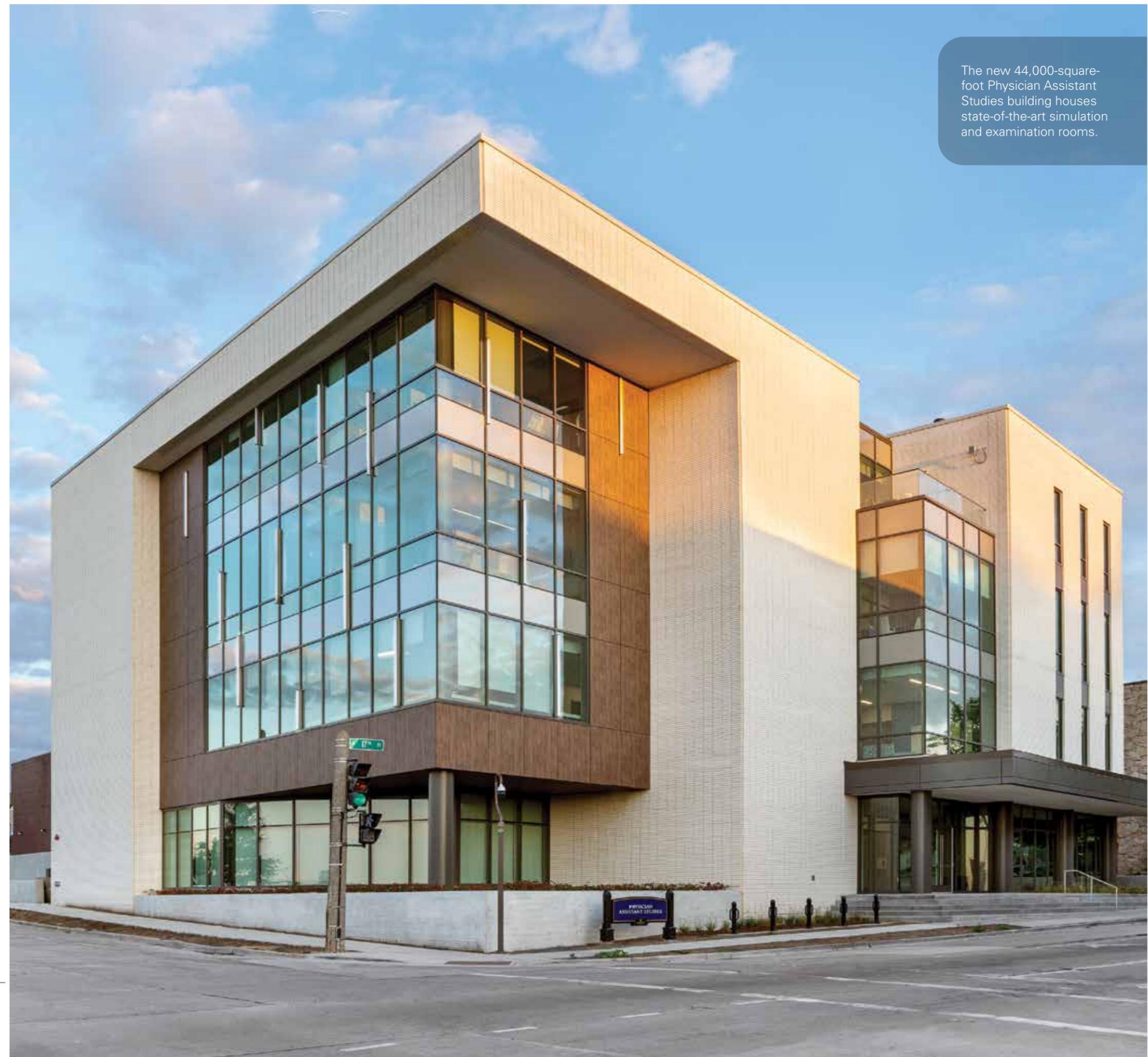
The need to do so is of national urgency, as the population ages and the demand for primary care continues to grow. With fewer medical school graduates matching to primary care residencies than ever before, the Association of American Medical Colleges has predicted a substantial shortage of primary care physicians by 2032.

"The PA profession has been identified as one to fill this gap," says Mary Jo Wiemiller, clinical associate professor and chair of the Department of Physician Assistant Studies. "That was one of the driving forces for us to take a look at our program, to see if we had the capacity to expand it and help meet the health care need in this country."

Confident in the program's quality and knowing its sought-after status would make it a good candidate for strategic expansion, Wiemiller appealed to university leadership to consider funding a brand-new space.

Just 17 months after its groundbreaking in spring 2018, the new Physician Assistant Studies building was completed at the northwest corner of West Clybourn and North 17th streets — a modern, gleaming, 44,000-square-foot facility, complete with

The new 44,000-square-foot Physician Assistant Studies building houses state-of-the-art simulation and examination rooms.





“Almost one-third of our students will seek employment in medically underserved areas or health provider shortage areas.” *Mary Jo Wiemiller*

The program’s expansion adds 20 students per cohort, 65 new clinical training sites and a facility both beautiful and practical, intentionally designed to prepare students to excel in today’s health care settings.

Features that excite Wiemiller include large and smaller “active-learning” classrooms that enable collaborative learning. The full simulation center — complete with an emergency room, operating room, intensive care area and inpatient hospitalist room — “is equipped with high-fidelity technology and mannequins to simulate real patients and scenarios that the students will see in real life,” she says. “We also have a full medical suite with 19 clinical exam rooms, and this is where we have standard patients — actors and actresses — come in and play different patient scenarios.”

Contrast that with just eight exam rooms, and neither a simulation center nor active-learning classroom in the program’s former building.

All of the simulation and exam rooms offer one-way viewing windows so students can be observed by peers or instructors without distraction. Wiemiller notes that state-of-the-art equipment acquired through a partnership with Milwaukee-based GE Healthcare is enabling bedside ultrasound training, a unique aspect that few PA programs offer.

PROVIDING MORE JESUIT-TRAINED PAs

Along with the enhanced training made possible in the new facility, accepting larger cohorts means the program can turn out even more Jesuit-trained PAs, says Wiemiller. The program’s focus on serving disadvantaged populations — students serve patients in Milwaukee’s free

community clinics as a way to gain experience and knowledge about the city’s health care system — often attracts students who are inclined toward community service and giving back. “Almost one-third of our students will seek employment in medically underserved areas or health provider shortage areas,” she explains. “This is part of our mission, reaching underserved and disadvantaged populations. This is an ever-present theme we teach in both didactic and clinical years. As they train, our students learn the value of service.”

Second-year PA student Emma Holbrook had already decided that Marquette offered the right program for her when she learned about the new building. “I was really excited that there would be a building dedicated solely to our program,” says the native of Marshfield, Wisconsin, a rural community with a significant need for health care practitioners.

Holbrook, who joined the program’s first larger cohort after two years of experience working in a medical lab, says she believes a career as a physician assistant will be a perfect fit. “It’s focused on teamwork, and I believe that two minds are better than one when treating a patient,” she says. “There’s a lot of lateral mobility, so if I wanted to change specialties, I can at any point.” She particularly appreciates Marquette’s focus on serving those in need, noting, “I would like to spend some part of my career giving back to the community I was raised in.”

Top: Physician assistant studies students work and learn in the new building’s state-of-the-art simulation labs.

Left: PA3 student Ali Logan examines fellow student Paige Reynebeau, H Sci ’20.

A TOP PROGRAM GETS EVEN STRONGER

Even before its expansion, Marquette’s 24-year-old PA program enjoyed national renown. The program stands apart for its dedicated, experienced faculty, early clinical exposure, emphasis on service and work with populations in need, and wide variety of partner sites for students to complete clinical rotations. It has boasted a 100 percent pass rate on national board exams for the past 10 years in a row, as well as a 100 percent job placement rate for graduates within six months of program completion. In 2019, it shot up from No. 40 to No. 26 in the *U.S. News & World Report* rankings.



state-of-the-art technology and a full simulation center that facilitates team-based learning. It opened its doors in fall 2019 to welcome the program’s first expanded cohort of 75 students.

“Finding out that we would be the first class in this brand-new building was amazing,” says PA2 student Colton Rod, who moved to Milwaukee from Minnesota to attend the program. “It’s really nice having this building as a home base. I always have somewhere to study at the end of the day.” Rod looks forward to delving into the latest technology and practicing in the sim labs: “I feel pretty spoiled to be here.”

Connecting Form to Function

Teaching assistants in the gross anatomy lab are grateful for the lessons learned from their 'silent teachers.'

By Jesse Lee

The biomedical sciences gross anatomy lab experience in the College of Health Sciences at Marquette is highly distinctive – it's one of the only courses in the nation where an undergraduate student can dissect a complete human cadaver. While it may sound daunting, for the pre-health-professional students who complete the class, it's one of the most rewarding experiences they'll have during their college careers. The course, which has run annually for over two decades, enrolls 90-100 students within the biomedical sciences major.

For many students in the class, their next goal will be selection to serve as a teaching assistant (TA) in the lab — a coveted, paid position reserved for a select group who excel in the lab.

Brian Conway, a senior from La Crosse, Wisconsin, and a gross anatomy lab TA, remembers his first time in the lab: "It was a little nerve-wracking at first. You're thinking, 'This is a person, a human body,' but it was really an incredible experience," he says. "I was lucky enough to make the first incision – I quickly volunteered and it set the tone for my experience."

Neethara Abraham, a senior TA from Aurora, Illinois, recalls taking a little longer to get acclimated. "I'll admit I was a bit timid my first two weeks there," she says. "I definitely did not volunteer to make a first cut. But after a while, my lab mates and a TA helped me get more comfortable. Now I'm able to do that for other students during their first time."

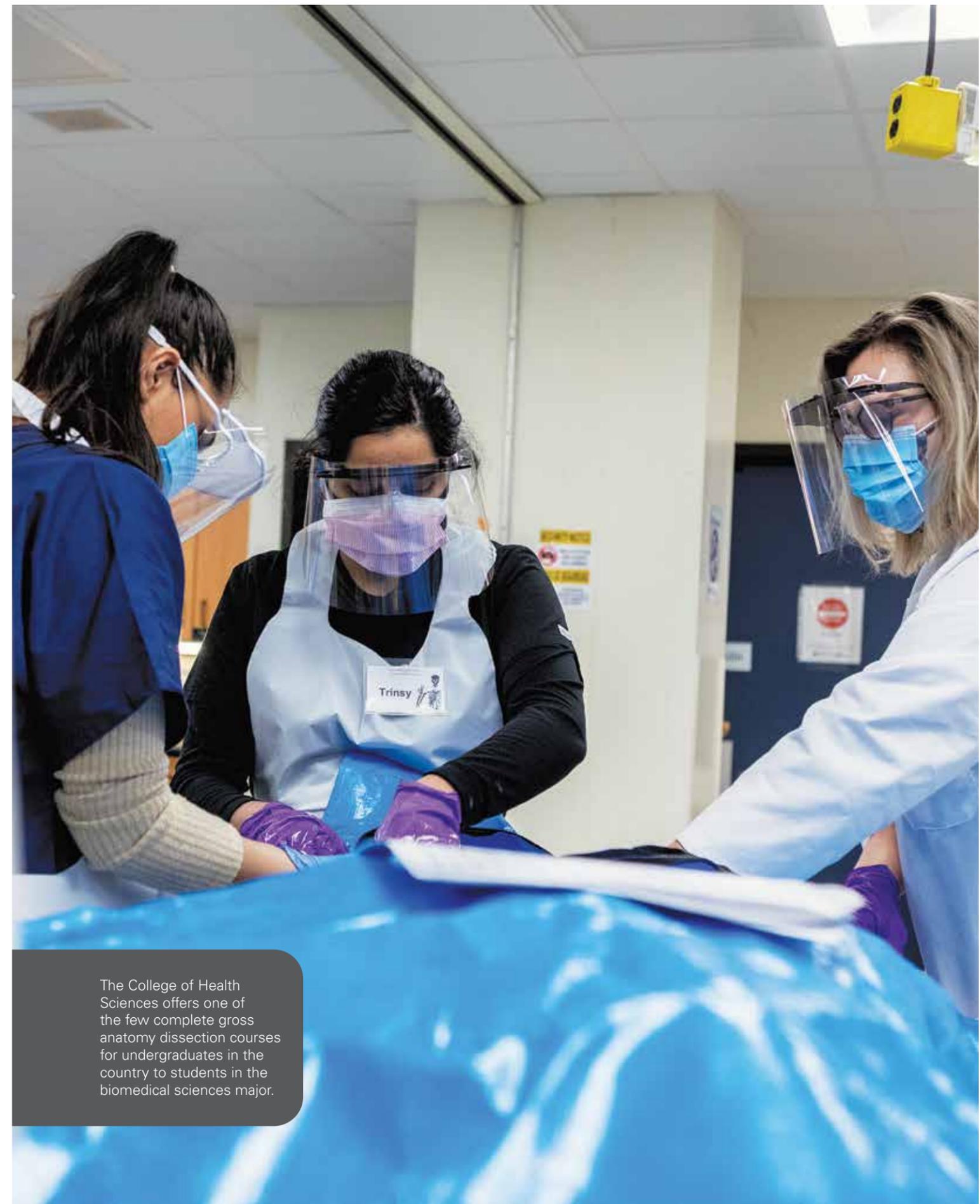
Megan Cote, a senior TA from Grayslake, Illinois,

says that working as a TA with reluctant students can be one of the most rewarding experiences. "I also think that dissection is kind of an art form. The first time holding a scalpel is like the first time holding a paintbrush – you're very fragile and not too skillful," she says. "But as you develop techniques and learn more, you find yourself developing a mastery of it. You think, 'OK, I need to take a superficial approach here to maintain the integrity of deeper structures that we want to see next.' You learn to proceed in a manner that preserves things in order to view as much as possible overall."

For those students seeking to take their skills to the next level, the Biomedical Sciences Department offers a 10-week advanced dissection experience in the summer known as the Anatomy Fellows Program. Students who complete this program are generally deployed as TAs for the college's professional programs in physical and occupational therapy or in the Physician Assistant Studies program.

As students in the anatomy courses become more relaxed and confident, they are able to recognize the experiences not only as an invaluable learning tool, but also as a profound reminder of the generosity of body donors, or "silent teachers" as they're often called in the program.

"I think the TAs do a great job of setting the tone of respect for the donors to other students," Abraham



The College of Health Sciences offers one of the few complete gross anatomy dissection courses for undergraduates in the country to students in the biomedical sciences major.



Gross anatomy students are able to complete a full human cadaver dissection, including instruction on brain dissection.



“I’ll have a massive advantage in medical school, no doubt about that.” **Brian Conway**

says. “And, of course, the memorial plaque outside the main entry to the lab is a great reminder of how fortunate we are to have this experience.” The inscription on the plaque was written by current dean William Cullinan after joining the biomedical sciences faculty in the 1990s and assuming responsibility for the anatomy program and lab. It reads: “These rooms, and the scientific pursuits undertaken herein, are dedicated with utmost honor to our donors. Their gracious gifts are received here with profound respect and gratitude.”

At the conclusion of each semester students organize and hold a memorial service for the donors, including personal reflections and music, before the remains are prepared for cremation and ashes returned to donor families. “I had the opportunity to speak at the service last year,” Cote says. “It was

a humbling moment, though it’s really important that we all get involved. The whole class came. A gracious gift was given to us – and we had an opportunity to show our gratitude and respect.”

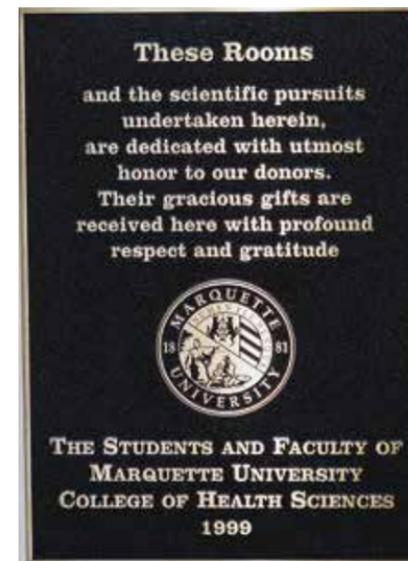
“I’m really proud of the professional manner that Marquette students have taken to the anatomy program and lab over the years,” says Cullinan. “Our courses begin in contemplation about what we are about to undertake, so that students understand that it is

a magnanimous gift on the part of the donor, and a true privilege to pursue as a student. Anatomical dissection is also a very powerful way to understand human function based on anatomical structure and form that precedes other medical science disciplines, and then brings them into sharper focus.”

It is also a gift that these undergraduates take with them – a head start in their future professional curricula in medicine, dentistry and a wide range of health careers. “I’ll have a massive advantage in medical school, no doubt about that,” Conway says. “The gross anatomy experiences at the medical schools I’ve toured so far were so varied. I saw everything from full dissections to prosections that professors rapidly walk you through. So the fact that I have already done a full dissection while some medical students will never do that – it sets the bar a little higher.”

“It is definitely the case that the Marquette biomedical sciences majors who come to the Medical College of Wisconsin (MCW) having had this dissection experience are highly advanced,” says Dr. Todd Hoagland, who ran the MCW gross anatomy course for over a decade.

They are highly coveted because they were very well prepared, and often become leaders within the school,” says Hoagland. “I would spread these Marquette students out in the dissection lab because it was like having another dozen TAs to help those with little to no dissection experience. Due to this highly advanced training, it was typical for the former Marquette students to have time to volunteer for student government, work in research labs, and hold curriculum committee and leadership positions in clinical interest groups,” Hoagland added. “In fact, a Marquette student has been the highest performing student in five of the last 10 years (current class size of 280). So, even with brilliant students coming from all over the country, a Marquette student has topped them all half the time!”



The plaque at the entrance to the Gross Anatomy Lab

At the Speed of Sports Medicine

Luis Rivera's company aims to get injured 'tactical athletes' the same quick care as quarterbacks.

By Dan Simmons | Photo By Aliza Baran

Luis Rivera, Arts '99, PT '01, runs a health care company, Rebound, with operations in nine states. Forty people collect Rebound paychecks. More than 15,000 clients are spread throughout more than 180 public-sector employers who partner with Rebound to expedite care for orthopedic injuries suffered by employees to get them back to work as soon as possible.

Those are pretty impressive stats — and they're all likely to double or triple in the near future — for a startup that's been in business for five years. If you imagine it was all planned this way, and neatly charted by consultants using spreadsheets in boardrooms, think again.

"This whole thing started with me and a cellphone at the Starbucks on Downer Avenue," Rivera says. "And my little laptop here." When the need arose for a company logo, Rivera drew one, on a napkin, while sitting at Colectivo in Walker's Point.

But the man with a laptop and a napkin had a plan. It took root in his studies at Marquette,

where he majored in anthropology as an undergrad, earned a degree in physical therapy, and has folded in knowledge he accumulated practicing his craft at various stops after graduating in 2001. He worked closely with former Marquette head athletic trainer Dave Leigh.

"He really taught me the value of time," says Rivera, "that when you're working with these injuries, just like if you're in the middle of a game, time is of the essence."

When a quarterback went down at Arizona State University, a frequent client when Rivera was working there, doctors and athletic trainers diagnosed and treated the signal-caller within minutes. Care came instantly because it had to. The seconds ticked without mercy.

While at Athletico, the Milwaukee physical therapy clinic that he operated, Rivera helped start Tactical Athlete Health & Performance Institute (TAHPI), the company that would become Rebound, in 2015. It initially was focused on working with fire





Left to right: Rivera with retired head athletic trainer and professor Dave Leigh. Working with the Marquette Harlequins rugby team.

departments to devise better workout regimens for firefighters to prevent injury and speed recovery time when injuries did occur. The work won Rivera and his partners — two others joined him in the venture — praise from the Milwaukee Fire Department, which shaved a whopping \$4.4 million off costs associated with injuries: medical claims, lost time at work and paid time for replacements.

But it also exposed another need to Rivera. Unlike injured quarterbacks, injured firefighters didn't get diagnosed and treated immediately. It could be weeks before they stepped foot in a clinic.

"A lot of the challenges that the city and the department were facing, I felt like they could be corrected by using a sports medicine approach to how we handle health care," he says.

The epiphany caused him to think bigger, about how he could close that time gap and, in a sense, reinvent not just the training that public-sector employees undergo but the very process by which they access health care. It set off a furious push to sell this idea. His business partners left the project before any clients had joined. All Rivera had was a belief he could do things better, and a \$25,000 Idea Advance grant from the University of Wisconsin Extension that funded a trip around the country to share his vision with fire and police chiefs.

"Doing this company has been probably the hardest

thing I've ever done in my entire life," he says. "But if you believe in it to your core, there's really nothing that'll stop you. You just keep putting one foot in front of the other even though you're in quicksand."

Endless pitching of the project, and seemingly endless investing of his own money into it, led to the company's first client, a trio of fire departments in Washington state. It also crystallized the development of the company's operating model, as a lightning-fast middleman helping injured workers sail over the usual hurdles that prevent timely care.

To do so, Rebound has recruited a network of highly rated orthopedists throughout the country who agree on a handshake basis to treat people sent to them. When employees of a governmental body that subscribes to Rebound's service — those in firefighting, public safety, education and public

"What's really impressed me is that guiding values for [Rivera's] business reflect values that he experienced at Marquette." **Dr. Allison Hyingstrom**

works — get hurt, they call a hotline number. Waiting to answer those calls is a network of Rebound employees throughout America. They're athletic trainers who are called navigators.

"They triage the injury over the phone, then they hang up and try to find them the best available doctor within our network" to treat them, Rivera says. If a doctor doesn't have an opening today or soon, they move to the next doctor.

"From the moment you call our hotline to having a diagnosis and plan of care, we want that to be 72 hours," he says.

The business has grown because it's been able to show that speed equals savings: When workers spend less time off work, municipalities spend less money on overtime and workers' compensation.

"Our return on investment is 10 weeks," he says. "So you pay us X amount, and within 10 weeks you'll at least break even on your cost structure." For example, a group of six Illinois municipalities subscribed to Rebound's service in 2019, and their savings totaled \$687,000.

The company is working to grow and expand rapidly, with projections of going from 12,000 total public-sector employees served in 2019 to 50,000 by the end of 2021 and 500,000 by 2022. Steve Bonner, past president and CEO of Cancer Treatment Centers of America, is helping Rivera

develop a strategic plan. The strategy is already beginning to unfold with the company's rebranding in 2020 to Rebound that included a new logo to replace the one Rivera sketched on a napkin.

Rivera's success has paved a road back to his alma mater, where professors laud his work as a great expression of *cura personalis*, the university's broad commitment to serving the whole person.

"Everything about his business revolves around this concept that is echoed throughout the physical therapy curriculum and the way we teach physical therapists to practice," says Dr. Allison Hyingstrom, chair of the Physical Therapy Department in the College of Health Sciences at Marquette. "What's really impressed me is that guiding values for his business reflect values that he experienced at Marquette."

A chance meeting at, where else, a coffee shop, helped deepen Rivera's ties to the school. A few years ago, he was at the Starbucks near campus when he encountered Dr. Don Neumann, a PT professor (now emeritus). When Rivera related what he was doing, Neumann connected him with other professors.

Now, Rivera is helping to fund and collaborate on research on pain management with Dr. Marie Bement, professor of physical therapy, and on health care economics with Dr. Dan Pinto, assistant professor of physical therapy.

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