

**The World is Changing.
Medicine is Changing.
We're Leading the Way.**



THE OHIO STATE UNIVERSITY

COLLEGE OF MEDICINE



At Ohio State We're Leading the Way:

10 *U.S. News & World Report* ranked specialties

- 7 specialties ranked in the Top 25
- #4 ranked Ear, Nose & Throat program
- #1 ranked hospital in central Ohio

\$3B investment in our new strategic plan, which provides infrastructure for exponential growth over the next 5 years, including:

- Building a new state-of-the-art biomedical research facility, 880-bed hospital tower, ambulatory center and College of Medicine
- Adding world-class talent with a goal to hire more than 500 new faculty physicians and researchers

\$115M+ in NIH funding with a 20% increase in 2017

- Emergency Medicine #10 in NIH funding

14,000+ College of Medicine MD and residency program graduates practice in all 50 states and in more than 50 countries

#12 ranked among public medical schools by *U.S. News & World Report* (in its 2018-2019 America's "Best Graduate Schools" list)



The world is changing. Medicine is changing. At The Ohio State University College of Medicine, we are *leading the way*.

Here at the Ohio State College of Medicine, we have a long tradition of excellence. This tradition reflects the hard work that our faculty, staff and students put forth every day to fulfill our mission of *improving health in Ohio and across the world through innovation in research, education and patient care*. And our new strategic plan provides a clear vision for our collective future, affording countless opportunities to imagine and realize amazing new heights.

The plan, which includes a building project termed Framework 2.0, outlines significant growth and improvements for the medical center and the College of Medicine. Over the next five to seven years, campus will boast a new College of Medicine, a state-of-the-art biomedical research facility, a new 880-bed hospital tower as well as four new ambulatory sites. As we strive to continue our trajectory as a top academic medical center, these new facilities will help us grow in all three areas of the academic mission.

Ohio State College of Medicine is among the best places anywhere to train to become a doctor. This year, we welcomed *our most diverse class ever*; 24 percent of the incoming class is underrepresented minorities, the average GPA was 3.8 and the average MCAT score was at the 90th percentile. We invite you to read more in this report about the ways our rich diversity has enhanced our students' education as well as their connection with the community.

This past year, our researchers obtained more than 500 awards totaling well over \$200 million. And because our generous donors supplied millions more, *our laboratories and research programs are bursting with breakthrough discoveries*. Here within, we will introduce you to several of our most generous supporters and our most impressive researchers – clinician scientists and scientists who are pioneering life-altering biomedical discoveries and their translation into breakthrough healthcare solutions.

Our mission is clear. We are committed to success. The future of medicine is happening today at Ohio State.

Sincerely,

K. Craig Kent, MD
Dean, College of Medicine
Vice President for Health Sciences
Leslie H. and Abigail S. Wexner Dean's Chair in Medicine

@KCraigKentMD

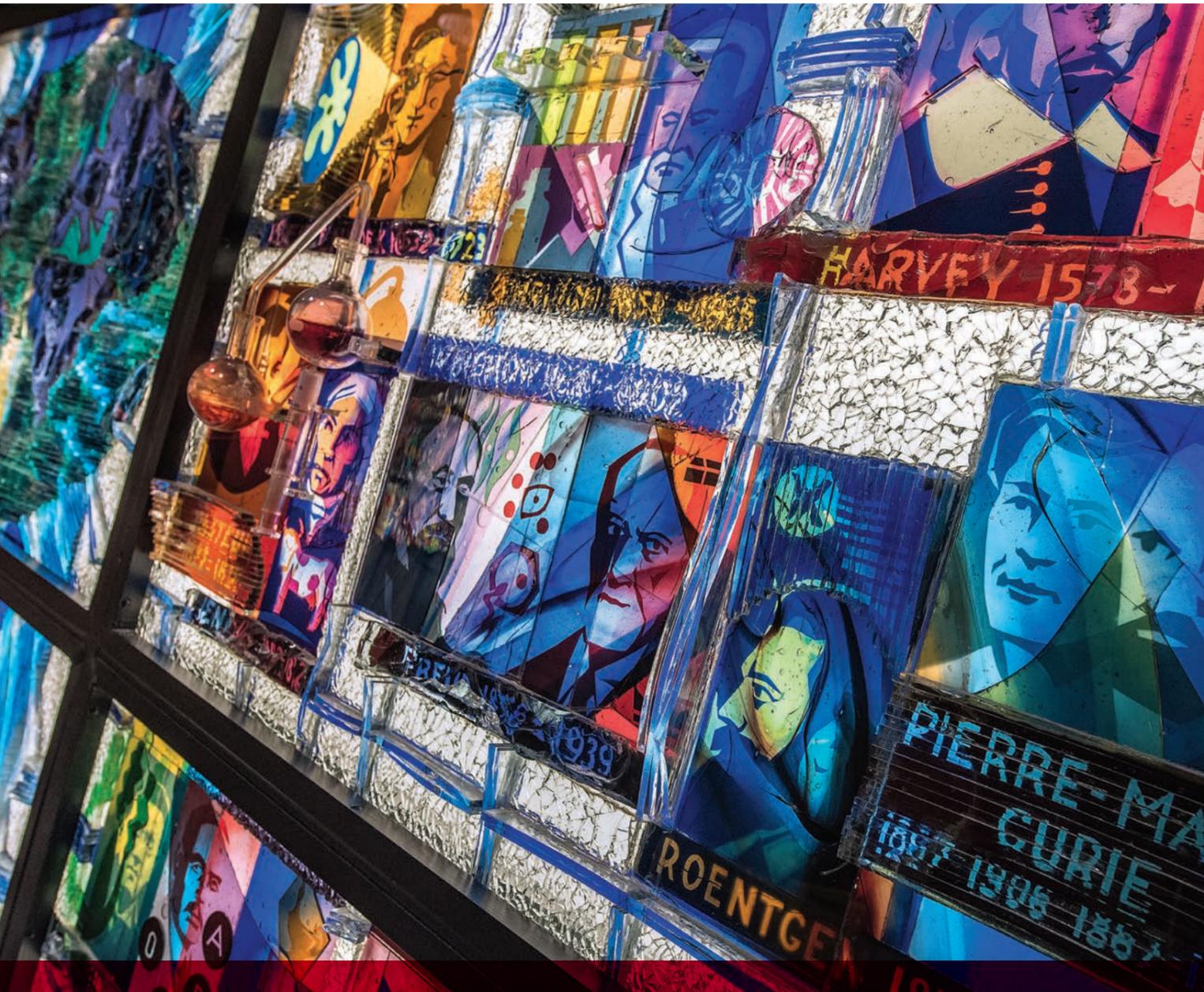


Table of Contents

Letter from the Dean	1
The Ohio State University College of Medicine Is Leading the Way.....	4
Leading the Way Summaries:	
Heart Doctors, Engineers Save Lives With 3D-Printed Aortas	6
Breakthrough Improves Lung Cancer Survival	6
Innovative Emergency Response Effort Saves Cardiac Arrest Victims	7
We Drive Breakthrough Innovations in Alzheimer’s, Dementia Research	7
Test Improves Detection of Cancer-Causing Genes.....	8
Surgeons Pioneer New Ways to Repair Hips and Knees	8
Our ENT Specialists Are Among the Best in the Nation	9
Ohio State Wexner Medical Center “Best in Ohio” for Heart and Liver Transplants	9
Our Diversity Enhances Academic Medicine	10
Pixie Dust: The Fine Line Between Medicine and Magic	16
The Importance of Stress Reduction to Health	20
Getting Your Head (and Neck) in the Game at Ohio State	24
Heart Programs Align for Real-Time Translation.....	28
Going Beyond Mobility in Spinal Cord Injury Care	32
Celebrating 60 Years of Blood Cancer Breakthroughs.....	36
Rebecca Jackson, MD, Lands One of the College’s Largest Grants	42
Columbus Unexpected.....	44

The Ohio State University College of Medicine Is Leading the Way

The Ohio State University College of Medicine is known for curricular innovation, pioneering research and outstanding patient care at The Ohio State University Wexner Medical Center. With 2,000-plus faculty members, the college comprises 19 clinical departments, seven basic science departments and the School of Health and Rehabilitation Sciences.

Ohio State Wexner Medical Center, located in one of the most comprehensive health sciences campuses in America – with colleges of Medicine, Nursing, Pharmacy, Dentistry, Optometry, Public Health and Veterinary Medicine in close proximity – is part of The Ohio State University campus. This proximity fosters collaborations with other university departments, which makes Ohio State unique in its potential to promote scientific partnerships and the direct translation of research discoveries into new medical therapies and technologies. We offer dual-degree programs such as MD/MBA, MD/JD, MD/PhD and MD/MHA in collaboration with the Fisher College of Business, the College of Law and the College of Public Health.

The only academic medical center in central Ohio is at the forefront of medicine, where discovery and innovation in research laboratories make unique, effective therapies available to patients months, even years, before other hospitals. These initiatives are taking place within Ohio State's College of Medicine, more than a dozen affiliated research centers and seven hospitals.

The Ohio State University Comprehensive Cancer Center – Arthur G. James Cancer Hospital and Richard J. Solove Research Institute is a dedicated cancer hospital and research center. The OSUCCC – James is one of only 49 National Cancer Institute-designated comprehensive cancer centers and one of only a few centers conducting NCI-sponsored phase I and phase II clinical trials on novel anticancer agents.

Education Excellence

The Ohio State University College of Medicine was founded in 1914. It now has 23 programs with 2,568 students: 11 undergraduate programs with 1,129 students, 11 graduate programs with 597 students and one professional program with 842 students.

- *U.S. News & World Report* ranked our College of Medicine 32nd overall and 12th among public medical schools in its 2018-2019 America's "Best Graduate Schools" list. Our Occupational Therapy program is ranked 12th in the nation and our Physical Therapy program 10th
- *U.S. News* ranked our online bachelor's degree in Health Sciences #1 in the nation in 2018
- Our College of Medicine received 7,226 applications for our 2018 entering medical class of 202 students
- The Association of American Medical Colleges in 2018 ranked our College of Medicine sixth out of more than 150 medical schools for total number of African American students enrolled
- More than 800 residents and fellows train in more than 60 accredited residency programs each year
- More than 14,000 College of Medicine MD and residency program graduates practice in all 50 states and in more than 50 countries

The 2017 Blue Ridge Institute for Medical Research Rankings, a compilation of NIH funding rankings for U.S. medical schools, placed four of our programs in the top 20 and one of our programs in the top 10 nationwide:

- Emergency Medicine: #10 with more than \$1.1 million (#17 in 2016)
- Neurosciences: #20 with just under \$7.8 million (#27 in 2016)
- Otolaryngology: #16 with more than \$2.1 million (#17 in 2016)
- Physiology: #19 with nearly \$7.8 million (#40 in 2016)
- Surgery: #18 with more than \$6.2 million (#15 in 2016)



Heart Doctors, Engineers Save Lives With 3D-Printed Aortas

Before performing a complicated aortic valve replacement at The Ohio State University Wexner Medical Center, cardiologists collaborate with engineers at Ohio State's College of Engineering to make 3D-printed aortas and computer models that match the patient's anatomy.

Using lasers and a high-speed camera, Prasad Dasi, PhD, a biomedical engineer, and his team can determine which type of valve and specific placement work best, while minimizing the chance for complications such as leakage, clotting or obstruction.

The engineering team also creates computer models to capture the data from each simulation. Long-term, they want to understand each patient's anatomy and circulation without the 3D-printed model to speed personalized treatment decisions.



Dr. Dasi's lab is working to make future transcatheter heart valves more durable and more blood compatible, potentially eliminating the need for blood thinners for these patients. Through this unique collaboration, our physicians and research engineers are at the forefront of a new era in heart valve replacement.

To learn more, visit wexnermedical.osu.edu/LTW

Innovative Emergency Response Effort Saves Cardiac Arrest Victims

We're testing a new way to treat cardiac arrest, and we're getting results.

It's called an ECPR (Extracorporeal cardiopulmonary resuscitation) alert. When a cardiac arrest victim's heart stops, if they're not in a hospital, the chance of survival is less than 10 percent. The new ECPR alert is changing that.

Our heart doctors work with Columbus Division of Fire on a carefully planned chain of events:

1. First responders follow their protocol for sudden cardiac arrest. 2. If the deadly heart rhythm remains, they call an ECPR alert. 3. Medics use a mechanical CPR device on the patient and head



straight to the cardiac catheterization lab, where Ohio State's team is ready and waiting. Doctors connect the patient to an external system that takes over for the heart and lungs.

This seamless process from the field to the catheterization lab gives doctors a chance to fix what caused the cardiac arrest – a chance they didn't have before.

To learn more, visit wexnermedical.osu.edu/LTW

Breakthrough Improves Lung Cancer Survival

A new approach to treatment is providing hope to many patients with lung cancer, thanks to researchers at The Ohio State University Comprehensive Cancer Center – Arthur G. James Cancer Hospital and Richard J. Solove Research Institute (OSUCCC – James). Our oncologists and researchers are developing prevention strategies and treatments that target patients' specific cancers, which is crucial because lung cancer is the leading cancer killer.

Doctors and scientists such as David Carbone, MD, director of the OSUCCC – James Thoracic Oncology Center, and his colleagues have developed ways to re-energize the body's immune system, defeat "force fields" surrounding cancer cells and enable the immune system to seek out and destroy rogue cells.

"We're looking at new therapies for lung cancers involving gene-modified cells and custom vaccines," Dr. Carbone says.

Our discoveries deliver the most advanced individualized treatments, leading to better outcomes, fewer side effects and more hope for patients and their families in Ohio and around the world.

To learn more, visit wexnermedical.osu.edu/LTW



We Drive Breakthrough Innovations in Alzheimer's, Dementia Research

Scientists are still uncovering the mysteries of Alzheimer's and other forms of dementia. One life-changing breakthrough came out of an Ohio State study using a brain pacemaker to slow the deterioration of problem-solving and decision-making skills in patients with Alzheimer's.

Stimulating the frontal lobes of Alzheimer's patients appears to stave off the decline in those key cognitive abilities, says Douglas Scharre, MD, interim chair of the Department of Neurology and co-author of the study.

Dr. Scharre has also led endeavors to diagnose patients with dementia as early as possible. The Self-Administered Gerocognitive Examination (SAGE) is designed to allow earlier treatment options for people showing cognitive changes associated with Alzheimer's and other conditions. SAGE is available to download for free at wexnermedical.osu.edu/sage, and is now used worldwide.

The university is expanding the number of faculty dedicated to studying dementia. We are hiring at least 15 more faculty members across colleges to work under one roof on the systems, molecular and cellular mechanisms of dementia.

To learn more, visit wexnermedical.osu.edu/LTW



Test Improves Detection of Cancer-Causing Genes

Thanks to a genetic screening method developed at Ohio State, thousands of patients could receive the diagnoses needed to treat their cancer more effectively than ever. The innovation could also uncover genetic information in time to help doctors prevent some cancers from developing at all.

Researchers at the OSUCCC – James tested a one-step process for determining whether someone has a gene mutation that causes Lynch syndrome, an inherited disorder that dramatically increases the likelihood of developing colon cancer, uterine cancer and several other types of cancer.



“Identifying Lynch syndrome allows us to save lives by beginning more frequent cancer screenings and prevention options for those who have the gene mutation,” says genetic counselor Heather Hampel, MS, LGC. “Correctly identifying Lynch syndrome is critical because the associated cancers are extremely preventable.”

The new test also produces results faster and more accurately than the current screening process.

To learn more, visit wexnermedical.osu.edu/LTW

Our ENT Specialists Are Among the Best in the Nation

Our Ear, Nose and Throat specialists are ranked first in Ohio and fourth in the nation by *U.S. News & World Report*. Joshua Fellows knows firsthand what that means. He always had plenty of reasons to smile, but a 2008 procedure at another hospital left one side of his face paralyzed. A smile was impossible.



In late 2016, ENT surgeon Leslie Kim, MD, director of Ohio State’s Facial Plastics Division, accepted Joshua as a patient. At Ohio State, the only central Ohio institution performing facial reanimation surgery, Dr. Kim’s team was able to transplant a muscle from Fellows’ leg to replace his smile function. By February 2017, Fellows could smile for the first time in nearly nine years. It restored his confidence, and his young children were able to see him grin for the first time in their lives.

To learn more, visit wexnermedical.osu.edu/LTW

Surgeons Pioneer New Ways to Repair Hips and Knees

Our sports medicine experts are pioneering better methods for treating and preventing the injuries that can sideline athletes. A recent breakthrough is a procedure to help avoid hip replacement surgery by injecting a bone substitute into the hip joint. The patient’s body then replaces that substitute with their own healthy bone.

In another advancement, our physicians became the first in the United States to use an implant that could reduce the need for knee replacement surgeries nationwide. This involves a device that replaces a patient’s own meniscus (the fibrocartilage between the thigh and shin bones).

Our surgeons also are Ohio’s first to treat knee cartilage damage using healthy cartilage regrown from a patient’s own cells.

To learn more, visit wexnermedical.osu.edu/LTW



Ohio State Wexner Medical Center “Best in Ohio” for Heart and Liver Transplants

Ohio State’s Comprehensive Transplant Center has been providing exceptional care for organ transplant patients for 50 years, and we’re among the best and busiest centers in the nation.

We’re 15th in the country by number of transplants performed, and in the top 10 percent for number of kidney transplants. We’re above the national average in all transplant patient survival rates and “Best in Ohio” for heart and liver transplant survival rates. We’ve performed 500 heart transplants since 1986, and our extensive and successful mechanical assist program helps patients stay alive while waiting for a new heart. We’re also one of the nation’s leaders in treating heart failure.

Our team is working hard to advance organ perfusion, the ability to rehabilitate organs that were once considered unusable. We’re the first transplant center in Ohio to perform ex vivo lung perfusion. We’ve perfused kidneys for years, and we’ll soon begin testing this method on livers.

To learn more, visit wexnermedical.osu.edu/LTW





DIVERSITY ENHANCES ACADEMIC MEDICINE

Inclusiveness. *It's not only the right thing to do – it's the smart thing to do.*

At The Ohio State University College of Medicine, we believe diversity is more than a good idea or an ideal to strive for. It's a value we uphold with pride. Why? Because we believe in empowering physicians to provide quality health care and compassionate care to everyone.

Studies Prove Diversity in Medicine Matters

- Physicians from underrepresented minority and/or socioeconomically disadvantaged backgrounds are more likely to practice in medically underserved communities.
- Physicians who attend medical schools with diverse student bodies describe themselves as more comfortable treating diverse populations than peers at other schools.
- Minority men are more likely to comply with preventive health recommendations when they are provided by minority physicians.
- Diverse thinkers outperform homogenous groups on complex tasks, resulting in improved problem solving, increased innovation and more accurate predictions.

Diversity + Inclusion Move Medicine Forward

It's been nearly 40 years since Roy Penchansky and J. William Thomas defined *The Five A's of Access* in their hallmark article, "The Concept of Access: Definition and Relationship to Consumer Satisfaction."

For our College of Medicine faculty, staff and students, Availability, Accessibility, Accommodation, Affordability and Acceptability in health care continue to drive unprecedented breakthroughs at Ohio State, especially when it comes to diversity.

Leon McDougle, MD, MPH, chief diversity officer and professor of Family Medicine at Ohio State Wexner Medical Center and associate dean for Diversity and Inclusion at The Ohio State University College of Medicine, believes Acceptability is the "A" that drives foundational thinking from a cross-cultural context, ultimately offering better Access through diversity.



Quinn Capers IV, MD, associate dean for Admissions at Ohio State College of Medicine and interventional cardiologist at The Ohio State Wexner Medical Center, interacts with students during Orientation Week. In his role as associate dean for Admissions, Dr. Capers instructs admissions teams on the art and science of Holistic Review – an admissions process that goes beyond metrics alone.

 @DrQuinnCapers4



We seek to lead, serve and inspire in all we do at Ohio State College of Medicine, as evidenced by our innovative **Lead.Serve.Inspire. curriculum**. And according to Dr. McDougle, diversity and inclusion are strategic imperatives for two important reasons:

1. Diversity drives excellence and innovation.

Lead. We are committed to reinvesting in underserved communities – and we’re willing to focus on impact over income to do so.

A beautifully refurbished Ohio State University Hospital East stands as a tangible commitment to the people of Columbus’ diverse near East Side. “It’s why I chose to come to Ohio State,” Dr. McDougle says.

Serve. We have proved that increased opportunities for underrepresented medical professionals create increased opportunities for diverse patients.

According to cohort studies, College of Medicine students who came from underserved communities are more likely to serve in similar underserved communities after graduation, enhancing quality health care for all.

Inspire. “Diversity in people drives diversity in *ideas*, which are integral to the success of our research endeavors and research training programs,” says Ginny Bumgardner, MD, PhD, associate dean for Research Education at Ohio State College of Medicine.

As a reflection of the complex diversity and synergy of the human body, each medical team is intentionally diverse and open to new methods. It’s a holistic systems approach that not only works – it *inspires*.

The college’s Office of Diversity and Inclusion oversees pipeline programs to encourage greater diversity in medical school, including:

- **Medical Careers Pathway (MEDPATH)**
- **DISCOVERY PREP**
- **ASPIRE program**
- **Visiting Student Program Scholarship**

2. Diversity not only improves lives – it saves lives.

Lead. From a public health perspective, diversity is a life-or-death concern. We’re serving patient populations more diverse than ever before. And we know understanding and embracing our differences directly correlate to improved patient care and outcomes.

Providing quality health care to everyone – regardless of ability, sexual orientation, gender identity and expression, culture, race and ethnicity, as well as socioeconomic and educational experience – is a need that cannot be ignored.

Serve. Increasing our collective cultural competency allows caregivers to communicate more effectively in cross-cultural situations. It not only ties to Availability, Accommodation and Acceptability – it drives Affordability and Access.

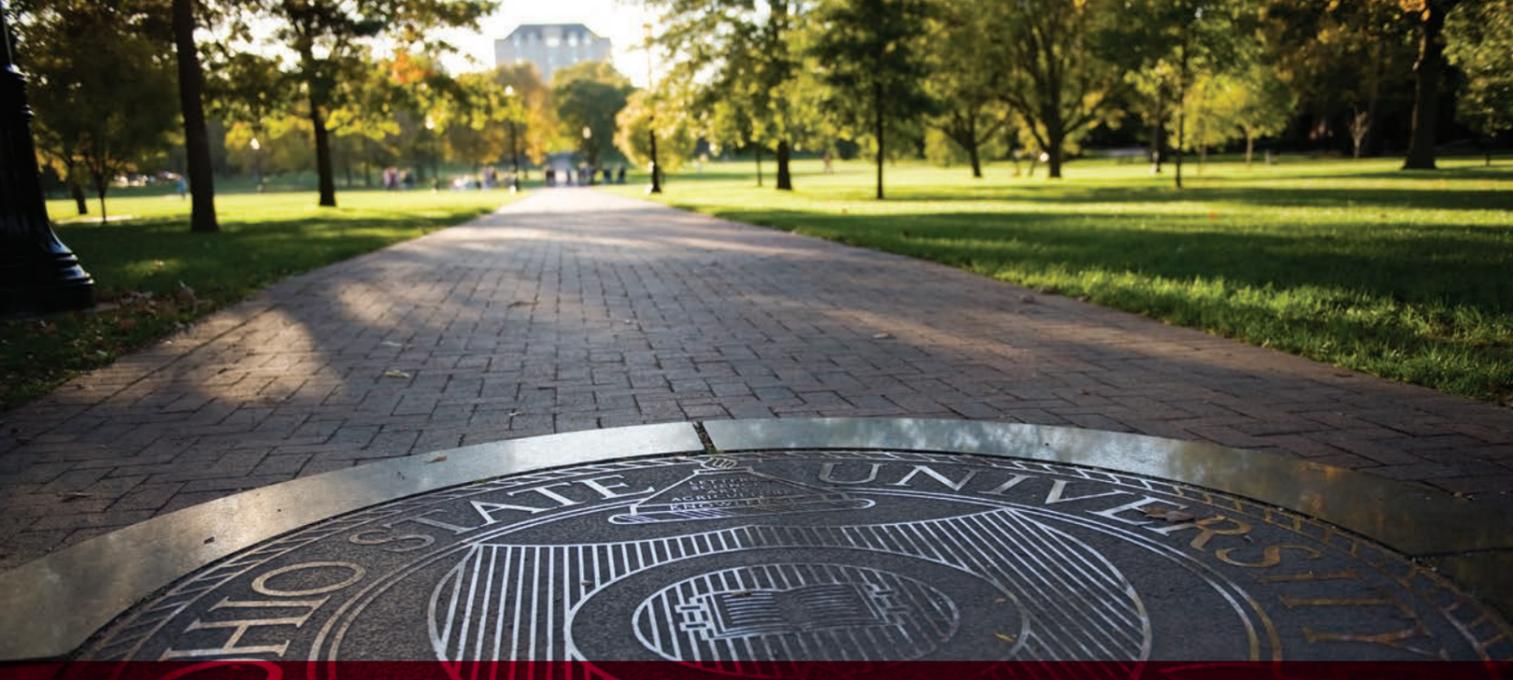
When patients need to feel fully seen, heard and understood by their doctors, fears of marginalization may keep them from seeking the care they need. Access to medical professionals from diverse backgrounds increases the potential for empathetic, compassionate care.

Inspire. As medical professionals training the next generation of medical professionals, we know this much to be true: Diversity is a life-or-death imperative.

We’re not only committed to improving lives through quality care – we’re committed to saving them. A diverse population enriches the educational experience of all our students and trainees, and we know that clinicians from groups underrepresented in medicine and biomedical sciences are key healthcare providers to advancing health equity and eliminating health disparities.

To advance our diversity and inclusion goals, Quinn Capers IV, MD, associate dean for Admissions and an interventional cardiologist at the Ohio State College of Medicine, instructs Admissions teams on the art and science of Holistic Review – an admissions process that goes beyond metrics alone.

Reviewers use a blend of experience, attributes and academic metrics for College of Medicine admissions to obtain a well-rounded, diverse student population.



Overcoming Implicit Bias Starts in Admissions

Dr. Capers facilitates Implicit Bias workshops at the Ohio State Wexner Medical Center two to three times per month to help overcome implicit bias in the academic medical community. The 140-member College of Medicine Admissions committee also undergoes implicit bias awareness and mitigation training annually under his leadership.

“If you’re human, your brain makes associations,” Dr. Capers explains. “These associations can be helpful or harmful.” His research proves that people with the very best of intentions are in fact capable of making decisions that are discriminatory.

Dr. Capers’ workshop participants take robust association tests to uncover any implicit biases – attitudes or stereotypes that affect our understanding, actions and decisions in a subconscious manner. The results are often shocking, especially for those participants with strong commitments to impartiality.

“It’s an awful place to be ethically and morally,” Dr. Capers says. The good news is, implicit associations formed over the course of a lifetime can be gradually unlearned through a series of debiasing techniques taught in his workshops.

Once participants acknowledge and understand their biases, they can begin to take steps to meaningfully reduce the impact of implicit bias in their personal and professional lives.

Drs. McDougle and Capers both agree – it takes full alignment of purpose and commitment from senior leadership to create a totally integrated academic experience.

That’s why Dr. Capers offers Implicit Bias workshops at other academic medical centers, universities and partnering organizations upon request. Our culture of diversity is something so good, we know we need to share it with the world.

Visit go.osu.edu/medicine to learn more and contact us.

Overcoming Implicit Bias the Ohio State Way

Our groundbreaking work in overcoming implicit bias in the admissions process speaks volumes for Ohio State College of Medicine. But we know that moving medicine forward together takes not only the identification of problems, but also the identification of practical, replicable solutions. Here are four techniques to help you begin to debias yourself and your teams:

1. **Find some common ground.** Engaging in meaningful conversation and looking for unifying experiences or preferences can soften biases and foster understanding and respect. Whether it’s professional passion or a favorite sports team that unites, use it to honor the individual.
2. **Build empathy.** Nothing disables unconscious biases more powerfully than putting yourself in another person’s shoes. It not only increases understanding and enhances communication – it moves you with compassion to help the other person.
3. **Consider the opposite.** When the evidence before you points to one conclusion, go through it again looking for anything that might support the opposite conclusion. Ask yourself, “What else might be true?”
4. **Counter stereotype exemplars.** Take the opportunity to purposefully seek out and spend time with people who are different from you. When you do, you’ll discover traits you admire – and they will shift your perceptions.

Ohio State College of Medicine is reaffirming our universitywide commitment to expanding opportunity as part of our overarching strategic plan. We know we’re setting the tone for other academic medical centers across the country – and we’re committed to helping them achieve the same success.

Award-Winning Diversity + Inclusion: Locally Known, Nationally Recognized

At Ohio State College of Medicine, we see diversity as the uniqueness each person brings to achieving our goal to move medicine forward, together. This commitment not only sets us apart locally – it gains national recognition.

We are a proud recipient of the **2018 Health Professions Higher Education Excellence in Diversity (HEED) award**, alongside two other colleges from The Ohio State University. The HEED Award is the only application-based higher education diversity award that recognizes colleges and universities that demonstrate an outstanding commitment to diversity and inclusion.

Our very own Ohio State Wexner Medical Center was recognized as a **BlackDoctor.org Top Hospital for Diversity** for delivering quality care at the highest level while promoting equity and inclusion in our operations, programs, services and staffing – alongside Johns Hopkins, Mayo Clinic and Cleveland Clinic.

Academic medical centers working hard to ensure everyone is treated fairly, regardless of race or creed, will be the ones that thrive, now and into the future. And we will be leading the way in inclusiveness.



PIXIE DUST: THE FINE LINE BETWEEN MEDICINE AND MAGIC

A busy executive has a heart attack. A professional athlete gets a concussion. A brave soldier steps on a land mine. A grandparent loses precious memories to Alzheimer's disease. What do these people have in common? They all suffer from cell injury.

Unfortunately, humans can't regenerate heart, brain or muscle cells the way a salamander regrows a limb. At least not yet. But at The Ohio State University Wexner Medical Center, we believe that day may be close at hand.

The Science Behind Prevention and Treatment of Cell Injury

Ohio State Wexner Medical Center and College of Medicine researchers are working to engineer a special protein that will allow the human body to regenerate and repair damaged tissues.

Jianjie Ma, PhD, professor and Karl P. Klassen Chair of Thoracic Surgery in Ohio State's Department of Surgery, has studied this regenerative protein for years, uncovering its functions as a "molecular bandage."

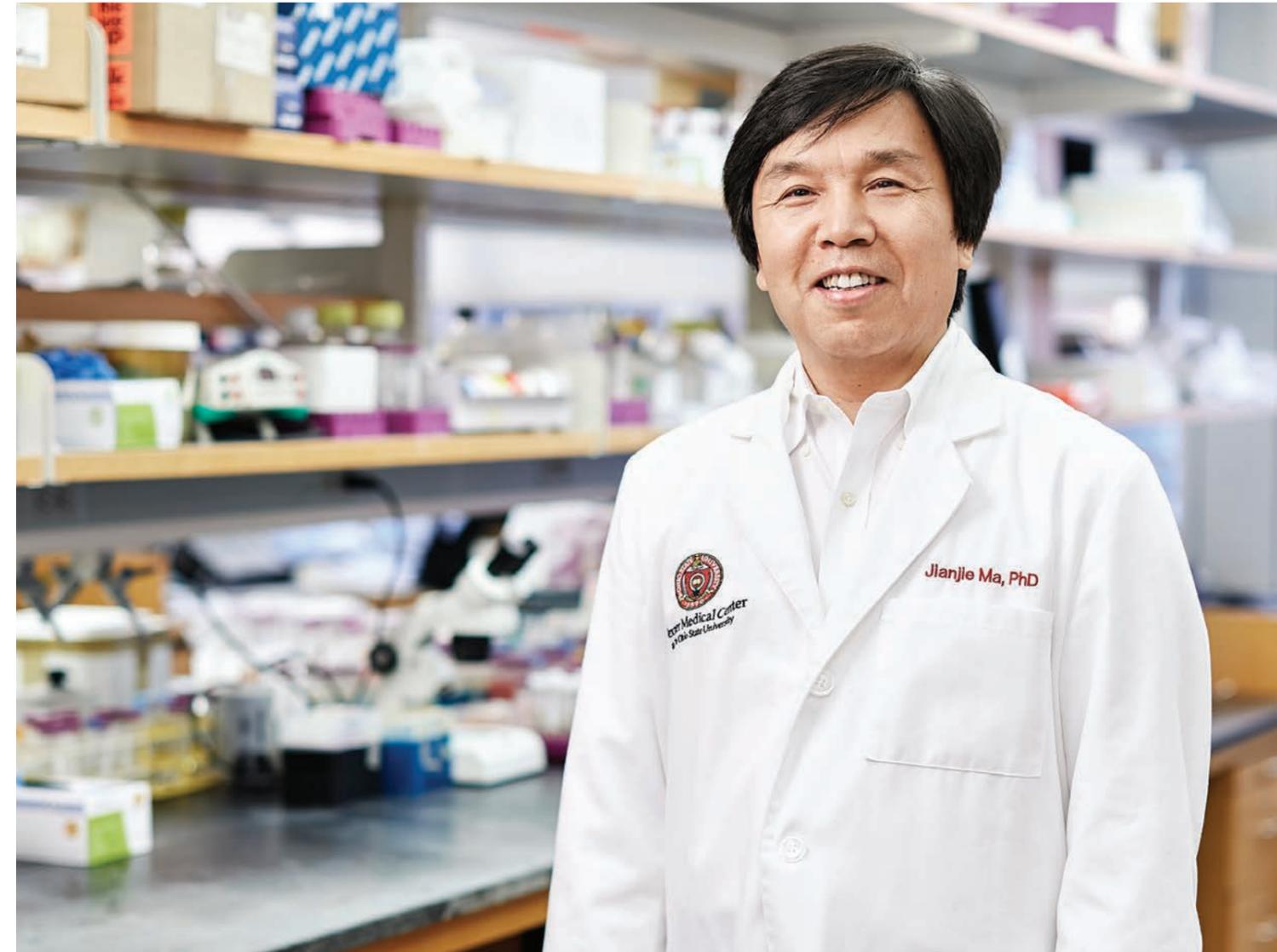
The protein is named MG53, though Dr. Ma often calls it "pixie dust" because its wide-ranging healing properties seem positively magical.

"Over the past few years, we've found that MG53 can function to prevent and treat injuries to the heart, kidney, brain, skin and lungs," Dr. Ma says.

Dr. Ma and his research team of post-docs, fellows and students believe the protein will not only enhance healing, but also reverse the cell death process altogether at a molecular level.

Heart care. Cancer care. Neurological care. Transplantation care. Trauma care. Post-surgery care.
The pixie dust applications are endless.

However, translating laboratory findings into treatments for patients is no small task. That's why our researchers at Ohio State's College of Medicine regularly collaborate with patient care teams to help turn Dr. Ma's basic research into clinical applications faster than at other academic medical centers.



Jianjie Ma, PhD, professor and Karl P. Klassen Chair of Thoracic Surgery in Ohio State's Department of Surgery and the Dorothy M. Davis Heart and Lung Research Institute, has studied this regenerative protein for years, uncovering its functions as a "molecular bandage."

Diverse Applications Require Diverse Teams and Thinking

Dr. Ma came to Ohio State six years ago when he realized the close proximity his research teams would have to translational and clinical facilities. Everything he needed was right here on our vibrant Columbus campus. He knew The Ohio State University was poised to drive basic research to application and clinical trials. “It’s why I came, and it’s why I stay,” he says with a smile.

Dr. Ma enjoys being part of diverse, cross-functional teams across campus. “When you’re solving complicated problems, nobody can do it alone,” he explains.

In Dr. Ma’s experience, the most successful teams are bound together with complementary synergy, focused on one goal – expanding the science of true biology. “There is no room for selfishness or ego in our teamwork,” Dr. Ma says. “We all work together as one body, with many different parts. Each person is infinitely valuable.”

Growing a solid team of collaborative researchers remains Dr. Ma’s number one priority. He remains committed to mentoring a new generation of leaders who will not only be recognized and celebrated in their own right, but will also help bring this pixie dust magic to life.

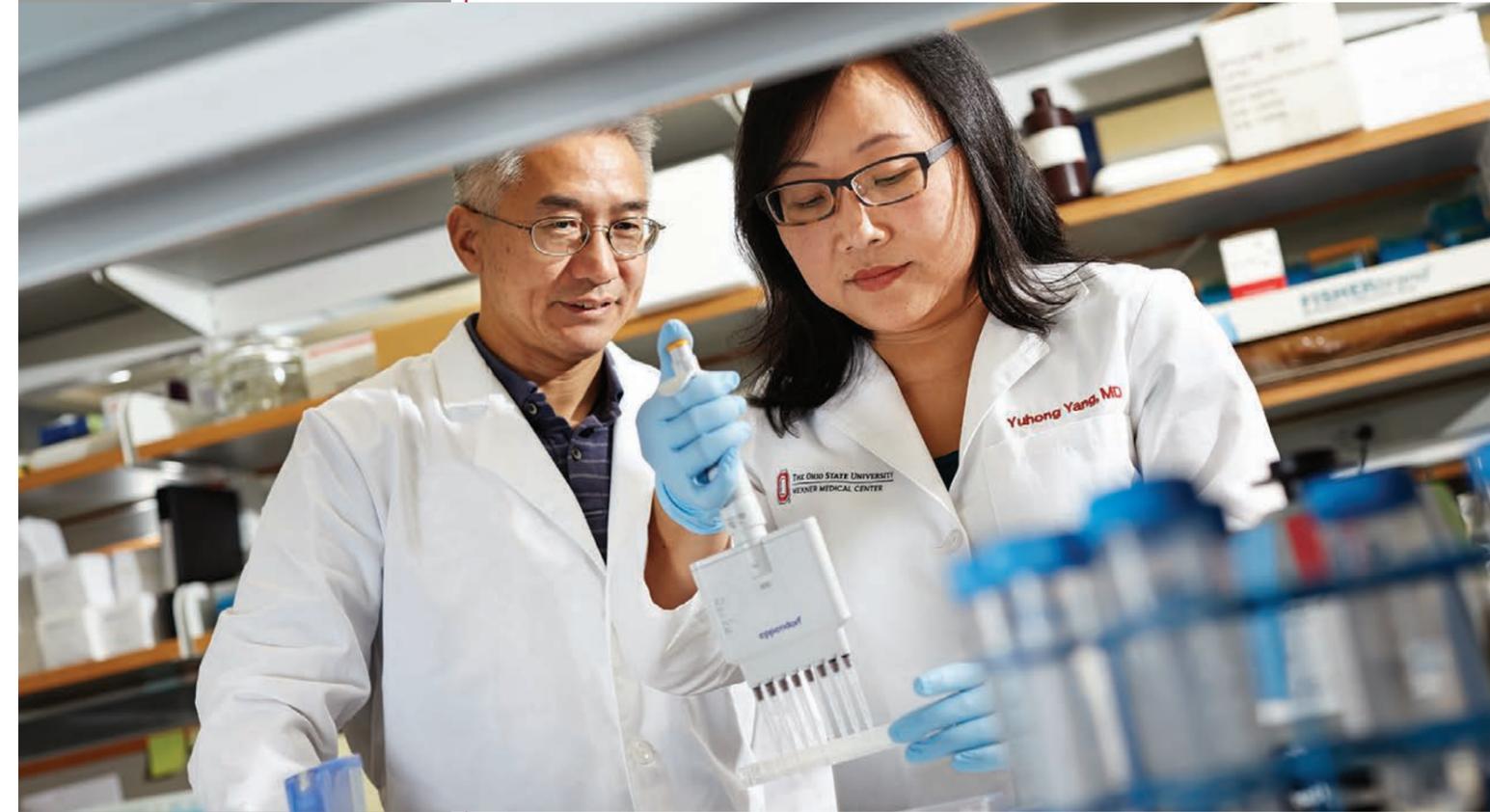
Ma’s research has powerful implications for the medical, pharmaceutical and personal care industries – and the possibilities are limitless from a public health perspective.

Leading in regenerative medicine means doing basic research differently. While many researchers work with stem cells and gene therapy, Dr. Ma uses the MG53 protein for its broader application potential.

Practical next steps may include clinical trials and commercialization, starting with simpler solutions that will in turn fund bolder, more complex endeavors. Dr. Ma and his team hope to develop the protein as a therapeutic drug for human uses in the next 10 years.

The Ohio State College of Medicine’s regenerative medicine research enhances the whole field – but there is still a great deal left to be translated. Dr. Ma’s research team goal is simple: take findings from the lab and use them to innovate and heal.

Visit go.osu.edu/medicine to learn more and contact us.



Collaborating Care Teams at the Wexner Medical Center:

- Cardiothoracic Surgery
- Cardiovascular Medicine
- Organ Transplantation
- Trauma, Critical Care and Burn
- OSUCCC – James Center for Cognitive and Memory Disorders

Collaborating Colleges at The Ohio State University:

- College of Medicine
- College of Veterinary Medicine
- College of Engineering
- College of Pharmacy
- College of Optometry
- College of Public Health



THE IMPORTANCE OF STRESS REDUCTION TO HEALTH

Feeling stressed? You're not alone. A recent Gallup poll says eight out of 10 Americans feel so, too. Chronic stress is fast becoming a public health crisis, according to the American Psychological Association. Studies show stress is rising, willpower is waning and self-care is a diminishing priority for adults and children nationwide.

Thankfully, researchers at The Ohio State University College of Medicine are doing something about it.

Janice Kiecolt-Glaser, PhD, professor of Psychiatry and director of the Institute for Behavioral Medicine Research (IBMR) at The Ohio State University Wexner Medical Center, is leading a multidisciplinary team of 22 faculty members representing five colleges and nine departments in research efforts to help combat stress in the United States and around the world.

"We believe research is a team sport," Dr. Kiecolt-Glaser says. She also believes pulling multidisciplinary investigators together from all over campus is simply a testament to the spirit of collaboration at Ohio State. And, in true Buckeye fashion, we're leading the way in behavioral health research – together.

Stress and the Human Body

When Dr. Kiecolt-Glaser began her research at Ohio State in the 1980s, the medical community didn't yet recognize that stress could have clinically relevant effects on the immune system. Because of her efforts and those of her colleagues in the IBMR, now we do.

In fact, Dr. Kiecolt-Glaser's team has scientifically proven how stress limits the body's ability to heal wounds, respond to vaccines, fight infection and maintain a healthy gut.

- **Stress slows wound healing.** In both mouse and human models, researchers created small wounds to see how stress affected healing. They found stress can extend the time required to heal wounds by 25 percent or more.
- **Stress impairs vaccine responses.** Researchers gave the influenza vaccine to men and women who were providing care for a spouse with Alzheimer's. Many of the stressed caregivers were unresponsive to the flu shot – demonstrating how stress can alter the body's ability to respond to important vaccines. In fact, we've shown that even young healthy medical students have delayed responses to vaccines when they're stressed.
- **Stress impairs response to infection.** Immunology researchers pushed the limits of basic science to discover how stress inhibits the immune system's ability to respond to infectious agents, making stressed people more likely to get sick – and stay sick.
- **Stress affects metabolism in ways that promote weight gain.** Recent studies show that when stressed people eat a fast food-type, high-fat meal, they burn fewer calories, oxidize less fat and produce more insulin than non-stressed people. This increases fat storage and promotes weight gain.



*"Close personal relationships are important for health, particularly when we're stressed."
–Janice Kiecolt-Glaser, PhD*

Mission Statement: The Institute for Behavioral Medicine Research functions as an incubator to create and disseminate cutting-edge mind-body research that will enhance individual and community health.

9 Departments + 22 Faculty Members

5 Colleges

- College of Medicine
- College of Dentistry
- College of Public Health
- College of Arts & Sciences
- College of Education & Human Ecology

10 Disciplines

- Anesthesiology
- Biostatistics
- Endocrinology
- Immunology
- Microbiome/Microbiology
- Molecular Biology
- Neuroscience
- Nutrition
- Psychiatry
- Psychology

Because of IBMR research, the impacts of stress are becoming increasingly clear. But Dr. Kiecolt-Glaser and her team also know that people need to be able to identify strategies to combat stress.

“Close personal relationships are important for health, particularly when we’re stressed,” she says. And Dr. Kiecolt-Glaser would know. Her research teams were the first to show how loneliness impacts the immune system.

Stress, Microbiology and Gut Health

While the connection between stress and stomach trouble is easy for most people to accept, the reasons why have remained elusive. Until now. The answer lies in microbiome research conducted by some of the top experts in the nation – right here at Ohio State.

Dr. Kiecolt-Glaser’s lab delves deep into the similarity of the gut microbiome within couples. “When people live together, their microbiomes become similar,” she explains. “You share everything, for better or for worse.” And when those relationships are troubled, you’ll discover elevated biomarkers for leaky gut – lipopolysaccharide-binding protein, to be exact – which directly promotes inflammation. What’s more, the odds for gut-related inflammation skyrocket in patients with a history of depression and other mood disorders.

The gut microbiome is an important connection between mother and child. Tamar Gur, MD, PhD, assistant professor of Psychiatry and a maternal-fetal psychiatrist at The Ohio State Wexner Medical Center, is looking at mouse models in pregnancy to determine how prenatal stress affects the offspring’s gut microbiome. Her work has demonstrated how prenatal stress leads to problematic behavior and heightened inflammation in children. She believes helping the mother is the best possible treatment for the infant – and she’s making a strong scientific case for it.

Meanwhile, Lisa Christian, PhD, associate professor of Psychiatry, is examining the effects of psychosocial stress and obesity on maternal antibody responses to the influenza virus vaccine during pregnancy, maternal antibody maintenance over time and efficiency of antibody transfer from the mother to the neonate.

Leah Pyter, PhD, assistant professor of Psychiatry and Neuroscience, is exploring the gut microbiome in both mouse models and women with breast cancer, showing how chemotherapy may disrupt the gut microbiome, with negative effects on cognitive functioning, known as “chemo brain.”

A unique partnership has allowed Michael Bailey, PhD, to straddle the line as part of Ohio State’s IBMR and The Research Institute at Nationwide Children’s Hospital. Because of his co-placement, he has established clear links among stress, the sympathetic nervous system and changes in the microbes in the gut. Some of his work has shown how stress can increase the number of pathogenic bacteria in the gut.

The National Institutes of Health share Dr. Kiecolt-Glaser’s enthusiasm. IBMR faculty have received federal funding from a broad spectrum of institutes:

- National Cancer Institute
- National Institute on Aging
- National Institute of Mental Health
- National Institute of Nursing Research
- National Institute of Dental and Craniofacial Research
- National Institute of Child Health and Human Development
- National Institute of Allergy and Infectious Diseases
- National Center for Complementary and Integrative Health
- National Institute of General Medical Sciences

Behavioral and basic science researchers working side by side is nothing new at Ohio State. With a quickly evolving knowledge base and a commitment to translating scientific theory to clinical application, the IBMR is taking behavioral health to unprecedented levels – from molecular and cellular findings to real-world mind and body solutions.



Mindfulness, Yoga and Presurgical Cognitive Interventions

The term “mindfulness” is thrown around casually in modern self-help circles. But the IBMR believes mindfulness could not only be helpful from a preventive medicine standpoint, but also in healing, recovery and pain relief.

IBMR teams were also the first to demonstrate the anti-inflammatory effects of yoga in 2005. Breakthroughs continued as the researchers showed that yoga was a beneficial therapy for cancer survivors, reducing fatigue and inflammation, while improving sleep.

Michelle Humeidan, MD, PhD, assistant professor of Anesthesiology, is studying the effects of cognitive training exercises before surgery and impacts on post-surgery delirium. She’s also exploring factors that influence the development of chronic pain.

Other efforts include the work of John Sheridan, PhD, professor of Dentistry and associate IBMR director for basic science. He uses a preclinical model to show how the social stress of a new aggressive group member and the resulting defeat/subordination in the group can ultimately lead to mood disorders and anxiety-like behavior, with inflammation playing a key role.

Dr. Kiecolt-Glaser beams at the success of her IBMR teams. “I have such extraordinary collaborators spanning so many disciplines,” she says. “It’s the only way we can do the depth and breadth of work we do. Together, we are the *biggest* and *best* group in the world.”

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GETTING OUR HEAD (AND NECK) IN THE GAME AT OHIO STATE

Patients can expect the best from The Ohio State University College of Medicine's ear, nose and throat specialists, and not only because the program was just ranked fourth in the nation by *U.S. News & World Report* in 2018.

"This ranking is a true testament to our entire team's unwavering commitment, talent and hard work," says James Rocco, MD, PhD, professor and chair of the Department of Otolaryngology – Head and Neck Surgery. "At Ohio State we offer multidisciplinary, intensely collaborative treatment for head and neck cancer."

Broad Experience Means Better Care

Ohio State has maintained an exceptional reputation for our head and neck cancer expertise for decades, having one of the highest-volume programs in the country. Behind the scenes of life-changing oncology procedures, our ENT specialists are leading the way in research and clinical breakthroughs in a broad range of ear, nose, throat, head and neck problems.

The department averages more than 180 cochlear implants and over 200 microvascular head and neck reconstructions per year. For Ohio State College of Medicine students, residents and fellows, more experience means greater confidence, enhanced skills and, ultimately, an increased ability to provide excellent patient care.

The opportunity to participate in such a high-volume program, combined with the department's trajectory of growth, brings researchers and clinicians from around the world to Ohio State's dynamic Columbus campus. "We attract the top otolaryngology residents and fellows in the country," Dr. Rocco says. "They could go anywhere, but they choose to work with us."

The impact of the Otolaryngology department is readily seen through Ohio State's medical students. This past year, 12 Ohio State students selected and successfully matched into otolaryngology programs across the country. For such a competitive subspecialty, this is an "amazing achievement," shares Dr. Rocco, which he attributes to the quality of Ohio State's medical students, and the outstanding faculty and residents of the department and their commitment to mentoring.

In 2018, the department residency program had its best match year ever, matching all four residents from their top seven candidates on the match list with the College of Medicine – rivaling the numbers of Johns Hopkins University School of Medicine and Harvard Medical School. Recruiting exceptional talent in both the clinical and research divisions remains a top priority for the department.



At Ohio State, clinicians collaborate to provide world-class patient care. Here, James Rocco, MD, PhD, and Stephen Kang, MD, examine a patient and determine the surgical plan for a patient with tongue cancer. This includes complete resection of the tumor and associated lymph nodes with free tissue transplantation to reconstruct the tongue.

Enhanced Learning Benefits Patients With Leading-Edge Care

Unique otolaryngology research and teaching focus keeps patients at the forefront, with vast clinical trial opportunities and streamlined patient care. Through weekly multidisciplinary tumor board screening sessions, Matthew Old, MD, division director of Head and Neck Surgical Oncology, works with cross-functional clinical and research teams to determine patient eligibility for the latest trials.

Dr. Old revels in the vision that's come to life for his team on the 21st floor of Arthur G. James Cancer Hospital and Richard J. Solove Research Institute. "We're all right down the hall from each other," he says. "Patients are here, and so are the clinicians and researchers working on their treatments. It's truly unique." Dr. Old says bringing the teams together both physically and collaboratively has allowed for more fruitful patient care, treatment and clinical trials.

Good Work Gives Back

When Dr. Old isn't researching head and neck tumors and recurrences, he's leading a powerful boot camp-style microvascular reconstruction course for head and neck microvascular fellows. In partnership with Case Western Reserve and Wright State universities, the annual grassroots learning experience brings together more than 30 head and neck fellows from around North America looking for hands-on advanced reconstruction experience with fresh cadavers.

"Additionally, we're developing a national resident course to complement the fellow course in the same setting, led by Drs. Stephen Kang and Rod Rezaee," Dr. Old explains. "Otolaryngology residents perform complex surgeries with cadavers – and then the fellows are expected to reconstruct the defects." The two-day course, attended by over half of the Otolaryngology – Head and Neck fellows in the nation, has grown so rapidly it's now recognized and endorsed by the American Head and Neck Society.

With ardent faculty and staff camaraderie, a culture of transparency and hard work and opportunities for shared discovery, Otolaryngology teams are setting a new standard for excellence at Ohio State. "The future will bring us even closer together in proximity and practice," Dr. Rocco says. "It's an inspiring time."

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When the lab coat comes off, the helmet goes on as Dr. Old bike rides for his team's cancer research funding. He completed all 200 miles in Pelotonia 2018 and has ridden every mile in the 10-year history of the fundraiser that benefits cancer research at Ohio State.

Otolaryngology Breakthroughs Make Headlines

With accomplishments like these, it's easy to see why The Ohio State University Department of Otolaryngology – Head and Neck rose two spots in the 2018 U.S. News & World Report "Best Hospitals" rankings.

Renowned Vestibular Scientist Joins Ohio State and the Navy's Aeromedical Research Unit

– Daniel Merfeld, PhD, professor of Otolaryngology, intends to help reduce morbidity and mortality associated with vertigo, imbalance, spatial disorientation and other symptoms of vestibular dysfunction. Dr. Merfeld transitioned his research to Ohio State from Harvard in 2017, bringing three NIH grants. He's also been named senior vestibular scientist for the Naval Medical Research Unit Dayton, the Navy's aviation-related medical research program housed at Wright-Patterson Air Force Base.

Surgical Precision in Skull Base Tumor Removal

– Ricardo Carrau, MD, professor and Lynne Shepard Jones Chair in Head & Neck Oncology Department of Otolaryngology-Head & Neck Surgery Department of Neurological Surgery and director of OSUCCC – James' Skull Base Program, and Daniel Prevedello, MD, professor, Department of Neurosurgery and director, Minimally Invasive Surgery, are revolutionizing the removal of skull base tumors. Blending minimally invasive robotic surgery with endoscopic endonasal surgery, they're removing such tumors through the nose or mouth, reducing adverse facial effects for patients.

"We have incredible faculty, and it's impossible to take credit for their desire to achieve," Dr. Rocco says. He believes his highly sought after fellows are the mark of a great program.

New Study on Kids with Cochlear Implants Is First of its Kind

– Irina Castellanos, PhD, assistant professor of Otolaryngology and NIH-funded investigator, studies how delays in language and executive control impact psychosocial development in preschoolers with cochlear implants.

Research Explores Cognitive Functions and Outcomes in Adult Cochlear Implant Recipients

– Aaron Moberly, MD, assistant professor of Otolaryngology and NIH-funded investigator, will spend the next five years exploring variability in speech recognition outcomes among adults with cochlear implants.

New Genomics Tool Could Help Predict Tumor Aggressiveness, Treatment Outcomes

– James Rocco, MD, PhD, and Edmund Mroz, PhD, research associate professor of Otolaryngology, developed a new method for measuring genetic variability within a tumor that might one day help oncologists select appropriate therapy to improve patient outcomes.

Facial Reanimation Surgery Restores Smiles, Natural Facial Expressions

– Leslie Kim, MD, MPH, director of Facial Plastic and Reconstructive Surgery, is restoring smiles, natural facial expressions and self-confidence for patients with facial nerve injury and inflammation with resultant facial muscle atrophy.

The Ohio State University Department of Otolaryngology – Head and Neck Surgery ranked No. 4 in the country and No. 1 in Ohio by U.S. News & World Report.



HEART PROGRAMS ALIGN FOR REAL-TIME TRANSLATION

Heart failure. Heart rhythm disorders. Research shows when a patient suffers one, they're more likely to also suffer the other. And yet, most medical centers still silo these clinical programs into two disparate research organizations, delaying the translation of research into treatment.

At The Ohio State University College of Medicine, we believe our cardiac patients – as well as our students, faculty, researchers and physicians – deserve better.

Earlier this year, the two heart clinical and research groups aligned under the new Bob and Corrine Frick Center for Heart Failure and Arrhythmia at the Ohio State Richard M. Ross Heart Hospital through gifts totaling \$18 million. The result? *Real-time* translation from research to patient care.

Enhancing Science and Treatment, Together

Heart disease is personal for the Frick family. Bob Frick's parents, as well as an aunt, three uncles and two brothers, have dealt with heart problems. Bob Frick suffered a heart attack when he was 40 years old and had triple bypass surgery 11 years later — the same year his brother, Bernie, died of arrhythmia and heart failure. He was 60.

Funded by the family's generous gifts, the Frick Center supports life-changing research and education focused on integrating clinical and basic research on heart failure and arrhythmia. The donation also funded three endowed research chairs: a chair in heart failure, a professorship and a fellowship for the College of Medicine.

Beyond research, a second benefit of the Frick Center is realized in patient care. The unique approach provides a seamless integrated clinical experience in which a patient can easily see both heart failure and arrhythmia teams in one location.

Treatment decisions are coordinated and streamlined, and research and learning are bridged with patient care.

- **Heart failure** occurs when the heart muscle doesn't pump blood as well as it should, or stops entirely. According to the Centers for Disease Control and Prevention (CDC), it's the leading cause of death for both men and women in the United States.
- **Heart arrhythmia** is a chronic condition that occurs when electrical impulses that coordinate heartbeats don't work properly, causing the heart to beat too fast, too slow or irregularly. It can lead to stroke, heart failure and cardiac arrest.

More than 6 million Americans live with heart failure and about 8 million have irregular heartbeats, according to the CDC. Understanding how the two conditions are related, researchers and clinicians at Ohio State work side by side to facilitate rapid translation of discovery into patient care.



On the tails of a triathlon – fueled by coffee, adrenaline and a real heart for their work – Vadim Fedorov, PhD; Ning Li, MD, PhD; and Brian Hansen, MD/PhD candidate, stayed strong through a 24-hour marathon research session to combat arrhythmia through cardiac imaging.

Research translations that previously took years to get to patients can now happen in a matter of days – and, in some cases, hours.

“You can see translation in real time,” says Peter Mohler, PhD, vice dean for Research, director of the Dorothy M. Davis Heart and Lung Research Institute, and professor and chair of the Department of Physiology and Cell Biology. **“You don't have to wait 15 years. We see it every day at Ohio State.”**

“When we get out of our silos, we get a better real-time approach seeing patients,” says Sakima Smith, MD, a heart failure transplant cardiologist. **“What we're doing from a basic science standpoint is not only applicable but readily translatable every day.”**

The Real Heart of the Matter

If you want to make breakthroughs in human heart research, one thing is certain – you need the real thing. One key benefit of keeping researchers and clinicians in close quarters is the ability to use actual human hearts for scientific study. While lab mice offer significant insight into basic science, human hearts respond differently to treatment and add significant value to translation and treatment.

Research teams at Ohio State understand that the privilege of working with a human heart comes with great responsibility. When a new heart becomes available, time is of the essence – teams must mobilize immediately, before cell deterioration begins. Recently, Vadim Fedorov, PhD, associate professor of Physiology and Cell Biology, was participating in a triathlon with his research team when they received the call that not one but two new hearts had become available. “We had to finish the race by relay as a team,” he explains with a smile. “We arrived at the lab one by one – as we finished the race – and got right to work.”

3D Imaging Identifies “Tornadoes” on the Heart

Dr. Fedorov’s laboratory research is focused on developing new targeted antiarrhythmic treatments. They do so by using state-of-the-art 3D imaging techniques to uncover functional, structural and molecular mechanisms of malignant cardiac arrhythmias..

“Trying to identify electric function can be very difficult with atrial fibrillation patients, as the electrical function isn’t straight as it should be. It swirls, like a tornado,” he explains. When arrhythmia micro-scars are present on the heart, they create anchors for these spiraling waves of electricity, keeping them from flowing as intended. With help from 3D infrared camera imaging and a fluorescent dye, Dr. Fedorov and his team are able to not only identify the inhibiting micro-scars, but also precisely deliver treatment to the tissue and connection pathways for local healing of the heart. “Using this technology, we can make the heart beat properly again,” he says.

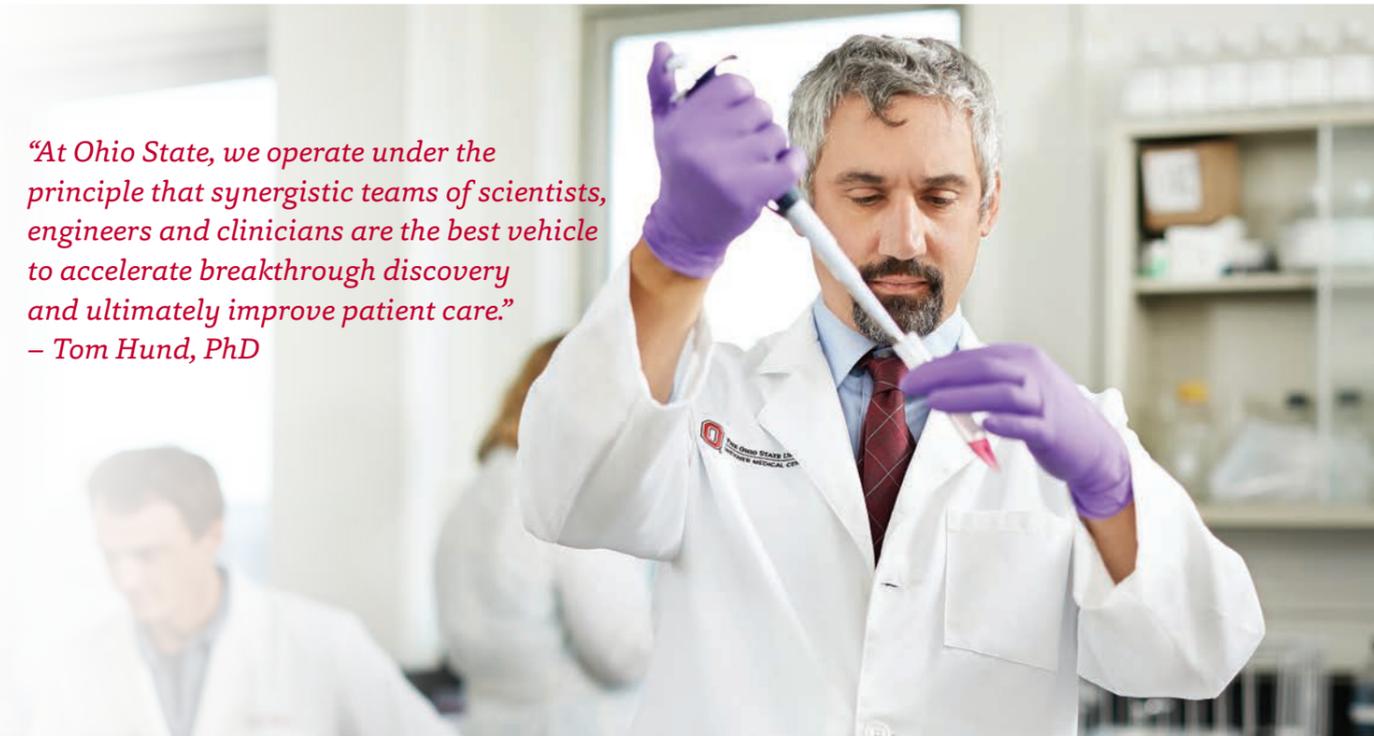
Dr. Fedorov’s team is also using this technology to improve or restore the impaired portions of the sinoatrial node (SAN), the heart’s main natural pacemaker, which normally consists of three intranodal pacemakers and five conduction pathways. “Patients are at high risk of cardiac arrest if the SAN gets down to one pacemaker, or one conduction pathway,” Dr. Fedorov says. “Knowing this, our next quest is to work with electrophysiologists to more precisely identify who needs a pacemaker implant, and who still has backups and can get along without one.” Clinicians are excited by this discovery. Their hope is that, someday, pacemaker implants will be obsolete – and the heart’s natural electrical and mechanical capabilities can be restored.

Diagnostics Display Fingerprints of Disease

When it comes to heart health, sometimes patients need cardiac diagnostic tests to identify issues properly and get their motor running again. “The heart is mechanical – it contracts and circulates blood like a machine,” explains Tom Hund, PhD, professor of Biomedical Engineering. “At Ohio State, we fix electrical and mechanical problems together, not in isolation.”

As a biomedical engineer, Dr. Hund is part of Ohio State’s College of Engineering. Yet, his state-of-the-art, cross-functional lab resides in the heart of the College of Medicine, where he’s been studying arrhythmia mechanisms for nearly a decade. “There are no centers that combine research and clinical in the heart failure and arrhythmia space like this,” he says.

Ohio State’s diverse, holistically built teams allow Dr. Hund and his colleagues to stay highly specialized with depth of expertise, while synergistically complementing the cross-functional collaborators next door. “You’d be pressed to find a similar environment,” he says. “Not only in the United States, but in the world.”



*“At Ohio State, we operate under the principle that synergistic teams of scientists, engineers and clinicians are the best vehicle to accelerate breakthrough discovery and ultimately improve patient care.”
– Tom Hund, PhD*

Dr. Hund’s team is currently studying the human heart’s cytoskeletal response to stress and exercise, for better or worse. “We know an elite athlete’s heart gets bigger as they train in a way that supports increased cardiac output,” Dr. Hund explains. “A heart failure patient also has an enlarged heart – but for very different reasons, with deadly outcomes.”

Uncovering the reasons for the growth at a molecular level allows for the identification of biomarkers to benefit both research findings and patient therapies. This unique approach allows for precision therapies, rather than typical trial-and-error treatments.

Genetic Pathways Overcome Cultural “Curses”

Discovering new genetic pathways for heart disease and testing varying treatments happens off-campus, too. “We get calls from groups around the world asking to collaborate,” Dr. Mohler says.

Because Ohio State is invited to contribute to unsolved heart failure and arrhythmia cases internationally, research and clinician teams are able to discover new genetic mechanisms for heart diseases across the globe.

Whether we’re fighting heart disease and arrhythmia in children in Saudi Arabia or elite athletes in Southern California, Ohio State’s College of Medicine is restoring hearts and expanding minds internationally. “It’s changing the way we do medicine,” Dr. Mohler says.

“It takes a top-down commitment from leadership to build an organization like ours,” Dr. Hund says. “And we have that here at Ohio State. I love the innovation that comes with being a Buckeye.”

And breaking down physical and administrative barriers between once-thought unrelated heart conditions is how Ohio State will continue to lead the way, now and into the future.

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GOING BEYOND MOBILITY IN SPINAL CORD INJURY CARE

The Ohio State University College of Medicine has recruited the world's top researchers focused on spinal cord injury (SCI). Together, we are making substantial strides in some of the most critical areas impacting patients with SCI – inflammation, infection, digestive health and liver/metabolic disease – with more than 30 years of continuous NIH funding. Our researchers' findings are instrumental in creating a new clinical care model that will improve lives of SCI patients worldwide.

Spinal Cord Injury Triggers Systemic Spinal Cord Diseases

SCI is more than a matter of immobility. "The spinal cord injury creates a systemic disease that is secondary to the dysfunction of organs throughout the body," explains Phillip Popovich, PhD, chair of Neuroscience at Ohio State and director of Ohio State's Center for Brain and Spinal Cord Repair.

"When the spinal cord's neural output centers are damaged, the brain can no longer communicate with other organs in the body," he says. "The brain can't send its normal messages out through the spinal cord, and those messages that do get out are fragmented and scrambled."

"We do need to fix the injured part of the spinal cord," explains Dana McTigue, PhD, professor and vice chair of Research in Neuroscience and the Center for Brain and Spinal Cord Repair. "But we're one of the only places committed to looking at the body as a whole."

The team's out-of-the-box thinking and research focus have revolutionized the way liver pathology and systemic changes are viewed after injury to the spinal cord. Access to willing expert research collaborators at Ohio State helped Dr. McTigue connect the dots to a major scientific discovery.

"I found a liver expert in Human Nutrition at Ohio State," she says. "Together, we were the first to prove liver damage as an unexpected but direct systemic effect caused by spinal cord injury."

While many SCI researchers focus on restoring a patient's ability to walk again, Ohio State neuroscience teams are focused on equally important areas such as reducing mortality and disability rates and improving chronic health and quality of life.

How the brain and spinal cord communicate with the immune system is important for virtually every human disease, including spinal cord injuries. Previous research by Ohio State has shown that spinal cord injuries can cause a "paralysis" of the immune system.

"Your immune system requires an intact and functional spinal cord," explains Dr. Popovich. "When your spinal cord is injured, it takes the immune system offline."



While many SCI researchers focus on restoring a patient's ability to walk again, Ohio State neuroscience teams including Phillip Popovich, PhD, above, are focused on equally important areas such as reducing mortality and disability rates and improving chronic health and quality of life.

 @PhiPop

Spinal cord injuries often lead to secondary health conditions, including high blood pressure, incontinence, gut health issues, dysregulated metabolism leading to obesity and diabetes and an increased risk for developing life-threatening infections or sepsis.

"Patients with injured spinal cords are 37 times more likely to die of an infection than someone without an SCI. Largely because of these conditions, the high mortality rate for people with chronic spinal cord injuries hasn't changed in more than 30 years. Until now," says Jan Schwab, MD, PhD, professor of Neurology, physician-scientist and director of the SCI Division.

With a powerhouse research team, visionary leadership and a unique neuroscientific approach, Ohio State's Neurological Institute is already developing measurable, replicable and unprecedented therapies to combat systemic and often life-threatening conditions in patients with SCI.

New Belford Center One of First to Treat SCI as a Disease

Generous philanthropy has the power to improve the lives of patients with SCI and their families. And the smartest philanthropists are investing creatively, where they know they'll see phenomenal return – at the Ohio State College of Medicine.

Thanks to a recent \$10 million endowment from The Belford Family Charitable Fund, a new **Belford Center for Spinal Cord Injury**, in collaboration with Ohio State's Neurological Institute, will be entirely dedicated to reducing systemic problems associated with SCI.

Initial conversations with the Belford family revolved around expanding quality of life opportunities for patients with SCI. "The Belfords wanted to offer a gift that would make a difference for spinal cord injury patients in their lifetime," says Dr. Popovich. In a yearlong visioning process, proposals were created, revised, refined and solidified. Finally, plans for the center came into clear view.

Because of the Belford gift, the SCI team will be one of the first in the nation to study SCI as a "disease" affecting the entire body. It will provide sustaining support for leadership of the center, along with a current-use fund to support the center's research mission. The gift will also support two endowed chairs in spinal cord injury and provide sustained support for research innovation.

"This gift will allow us to continue advancing basic and translational neuroscience research at the university, with a focus on supporting innovation to repair, protect and restore function to enhance recovery of the diseased or injured nervous system," Dr. Schwab explains.

The Future of SCI Is in Our Hands

The SCI breakthrough is just beginning at Ohio State. The Belford Center will break ground in an already thriving community of forward-thinking researchers, committed to training a new generation of SCI leaders.

In the past decade, Ohio State's Center for Brain and Spinal Cord Repair has trained more than 200 researchers worldwide, thanks to funding from the National Institutes of Health and the Craig H. Neilsen Foundation. Many of these professionals trained at Ohio State are now leading other SCI research teams in the United States and abroad.

"Fellows and trainees want to come to Ohio State because they're interested in making an impact," Dr. McTigue explains. "We're building on a critical mass of novel findings and innovative SCI research relevant to improving future patient care that you won't find in many other places."

She and her colleagues are convinced that better basic research drives better patient care – and better patient care ultimately not only leads to better patient outcomes but also drives better translational research.

One thing is certain – when it comes to SCI research, learning and clinical application, Ohio State is leading the way.

Visit go.osu.edu/medicine to learn more and contact us.

"This gift will allow us to continue advancing basic and translational neuroscience research at the university, with a focus on supporting innovation to repair, protect and restore function to enhance recovery of the diseased or injured nervous system." — Jan Schwab, MD, PhD



VISION: To improve quality of life and longevity for those with spinal cord injury

GOAL: To improve health outcomes and transform the lives of patients with spinal cord injury (SCI) and their families by treating SCI as a "systemic disease"



CELEBRATING 60 YEARS OF BLOOD CANCER BREAKTHROUGHS

The Ohio State University College of Medicine has been leading the way in the world of hematological malignancies, or blood cancers, for nearly six decades.

Ohio State’s distinguished history in leukemia research began in 1958, when Bertha Bouroncle, MD, identified the cell responsible for hairy cell leukemia, a rare chronic form of leukemia. And we’ve been pioneering blood cancer innovations ever since – with a powerhouse team of faculty, researchers, clinicians and students.

Today, millions of dollars in research grants, including multiple grants from the National Cancer Institute, American Cancer Society and the Leukemia and Lymphoma Society, support studies at The Ohio State University Comprehensive Cancer Center – Arthur G. James Cancer Hospital and Richard J. Solove Research Institute, including studies on how blood cancers develop and the creation of promising investigational treatments.

Home to an internationally renowned program focused on hematologic malignancy, cellular immune therapy and non-malignant blood disorders, our increasingly diverse, highly collaborative teams believe the next “big idea” in blood cancer will be shaped by our researchers.

Innovation: it’s in our blood

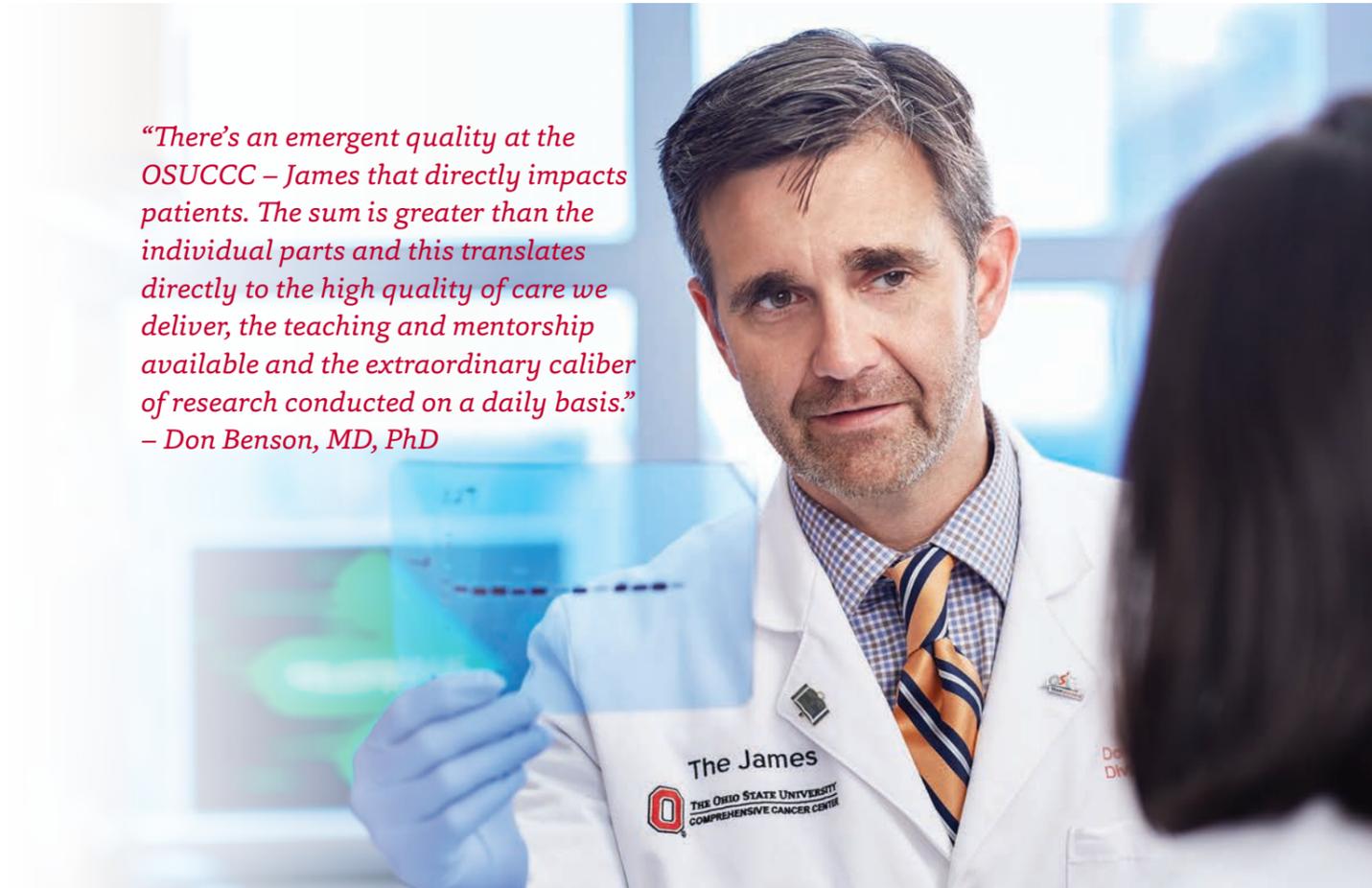
Just ask Don Benson, MD, PhD, professor-clinical of Internal Medicine, Myeloma Program director and interim director of the Division of Hematology. As an oncologist and hematologist caring for patients with multiple myeloma and amyloidosis as well as patients undergoing blood and marrow transplant, Dr. Benson sees his work as more than a career path – it’s a calling.

After losing his grandfather to cancer and watching his father battle the disease, he knew he needed to be in the trenches. “I didn’t choose a career path in cancer,” he says. “Cancer chose me.” He uses that clear sense of purpose in caring for his own patients, in the classroom with students and in his research to bring forth treatments that encourage the immune system’s natural ability to kill cancer cells, prolonging and improving the overall quality of life for patients.

Dr. Benson came to Ohio State in 2003 with an unyielding commitment to a multidisciplinary appointment. “I wanted to do research, teach and provide care to patients,” he explains. “I came here – and I stay here – because it’s the only place I can do what I want to do and make an impact in all three missions. Each dimension fosters and empowers the others, making my experience at the OSUCCC – James truly fulfilling.”

And our patients are better for having him. Dr. Benson, like many other Hematology faculty, is perennially rated in the top 10 percent of physicians in the nation for patient satisfaction.

“There’s an emergent quality at the OSUCCC – James that directly impacts patients. The sum is greater than the individual parts and this translates directly to the high quality of care we deliver, the teaching and mentorship available and the extraordinary caliber of research conducted on a daily basis.”
– Don Benson, MD, PhD



Our transdisciplinary teams of hematologists, oncologists, advanced practice providers and physician assistants, researchers, nurses and other experts specialize in distinct hematologic conditions, including:

- Acute myeloid leukemia and myelodysplasia
- Acute lymphoblastic leukemia
- Bleeding and clotting disorders
- Blood and marrow transplantation
- Cellular therapy
- Chronic lymphocytic leukemia
- Hairy cell leukemia
- Hodgkin lymphoma
- Multiple myeloma and amyloidosis
- Myeloproliferative disorders
- Non-Hodgkin lymphoma
- Sickle cell disease and hemoglobinopathies

Experimental Hematology at its Finest

There are hundreds of clinical trials underway at the OSUCCC – James, offering patients the opportunity to try the latest advances in detecting and treating hematologic malignancies.

To deliver the most effective cancer prevention, detection, diagnosis and treatment, our world-renowned experts identify and understand blood cancers and blood diseases at the genetic level, unlocking the unique genetic and molecular code of each patient's disease. This enables them to pinpoint what makes it grow or cause symptoms – then discover what stops it.

One example is in chronic lymphocytic leukemia (CLL), the most prevalent adult leukemia. Clinical, translational and laboratory investigators on the CLL disease team, including John Byrd, MD; Rosa Lapalombella, PhD; Natarajan Muthusamy, DVM, PhD; Kerry Rogers, MD; Jennifer Woyach, MD; as well as former team members Leslie Andritsos, MD; Farrukh Awan, MBBS; Joseph Flynn, DO; Amy Johnson, PhD; and Jeffrey Jones, MD, have worked over the past decade in the laboratory and clinic to develop a series of targeted medicines (ibrutinib, acalabrutinib) that have greatly impacted outcomes in CLL – with a 90 percent success rate. Most patients who receive this therapy do well long-term with medication – and return to their normal way of life.

With research focused on molecular and immune pharmacology in hematologic malignancies – as well as on the biology of malignant leukemia B-cell transformation – this team identifies new targets for therapeutic exploitation and translating novel targeted therapies and antibody-based treatments. Similar approaches are being applied in other blood diseases, including acute myeloid leukemia, multiple myeloma, lymphoma and hairy cell leukemia.

The Secret Behind Our Success

Moving forward as a team is key to driving the kind of breakthroughs Dr. Benson has experienced. As a leader, he's cultivated an inclusive and empowering culture at the OSUCCC – James and takes great joy in helping students, residents, fellows and junior faculty members grow to see the power of research and actively participate in the process.

When interviewing potential recruits, Dr. Benson shares two important insights about the Department of Internal Medicine, where the Division of Hematology is located:

Everybody's optimistic, but nobody's satisfied. Curiosity and creativity permeate our culture. We're encouraged to innovate.

The bar is set very high – and so are our expectations. In turn, you'll receive unyielding support from leadership. You're coming here to create a cancer-free world, one patient at a time, one discovery at a time.

As accomplished physicians and scientists become established and independent, they step aside and mentor the next generation to step into leadership. This not only creates fantastic opportunities for incoming faculty, but allows seasoned leaders to “pay it forward” and to branch out to try something new.

Just in the past year, for example, Hematology faculty members have developed numerous programs that differentiate our team and our ability to provide world-class care, provide meaningful educational experiences and move research forward.

- Robert Baiocchi, MD, PhD, led a team to Ethiopia to set up research programs and clinical trials to support local collaborators for patients with lymphoma.
- Yvonne Efebera, MD, spearheaded the launch of a unique multidisciplinary clinic to conduct research and provide subspecialized care to patients with the rare disease amyloidosis.
- The Cancer and Aging Resiliency (CARE) program of Ashley Rosko, MD, garnered national attention for research in geriatric oncology and for emphasizing the unique needs and special circumstances in the care of older patients with cancer.
- Payal Desai, MD, has developed a nationally recognized program for patients with sickle cell anemia, which includes a home visit program to partner with patients and empower them to successfully manage their condition.

Focusing on growth opportunities keeps Ohio State's Hematology teams flexible, innovative, impactful and able to do more – with cross-functional teams across campus and in underserved communities around the world.

Growing teams and changing times bring about opportunities for enhancing diversity – a top priority for Dr. Benson. The rest of the faculty – over half of whom are women – applaud Dr. Benson for carrying the torch and driving a provocative and positive way of thinking. Lifting up new role models prevents prejudice and drives impact.

“We have so many powerful, inspirational women helping to lead our division under Dr. Benson,” says John Byrd, MD, Distinguished University Professor and senior advisor for cancer experimental therapeutics. “I'm so honored to be part of this team because of the unique style of problem solving having diverse representation in leadership allows.” In fact, three of the four associate directors of the Hematology division are women, and four of the six disease-group section leaders are women, as well.

“We're surrounded by amazing people – physicians, scientists, nurses, pharmacists, social workers, our entire team, every member of which believes in and contributes to the mission – that's the secret here,” Dr. Benson says. “There's an emergent quality at the OSUCCC – James that directly impacts patients. The sum is greater than the individual parts and this translates directly to the high quality of care we deliver, the teaching and mentorship available and the extraordinary caliber of research conducted on a daily basis. Our team members believe in each other, support and collaborate with one another and share a common, authentic commitment to our shared mission.”

We're leading the way – as only Buckeyes do. And you can believe our hematologists bleed scarlet and gray.

Visit go.osu.edu/medicine to learn more and contact us.



Pelotonia Supports Rising Women Leaders in Hematology

Since its founding in 2008, Pelotonia has covered central Ohio and beyond with lime green arrows pointing toward one goal: ending cancer. The grassroots bike tour has raised millions for cancer research at the OSUCCC – James. Annually the Pelotonia Fellowship Program allots \$2 million to support promising Ohio State students in any discipline or level of scholarship who want to conduct cancer research under the guidance of faculty mentors at the OSUCCC – James. Here are two funded students from the Division of Hematology:

- Tiffany Hughes, PhD, received a Pelotonia Two-Year Post-Doctoral Fellowship to create an entirely new approach to treating multiple myeloma that shows great promise in unleashing the immune system’s natural killer cells to detect and kill the malignant cells. She developed a special coating to make the drug more soluble – a vital step allowing the drug to better navigate through the body and target multiple myeloma cancer cells, and has made fundamental discoveries that may lead to a new understanding of how multiple myeloma occurs.
- Shauna Collins received a Pelotonia Undergraduate Fellowship to investigate the use of a drug called elotuzumab to combat multiple myeloma. Under the mentorship of Dr. Benson, her laboratory research contributed directly to the translational understanding of how elotuzumab works. Two large clinical trials of elotuzumab for patients with multiple myeloma then led to the drug’s successful approval in the United States as a new treatment for the disease.

Many Hematology faculty and staff participate in Pelotonia every year, cycling countless miles, volunteering numerous hours and raising hundreds of thousands of dollars toward the cause.

Through its first 10 rides, Pelotonia raised more than \$173 million for cancer research.

Tiffany Hughes, PhD, and her team have made fundamental discoveries that may lead to a new understanding of how multiple myeloma occurs.



Hematology: A Year for the Record Books

– Fiscal Year 2018 –

Our Clinic: New Records for Annual Performance

- 41,889 ambulatory visits
- 4,421 inpatient admissions
- 312 blood/marrow transplants

Our Faculty:

- 45 new therapeutic clinical trials
- 14 new faculty recruited from world-renowned centers
- With more than 60 faculty members, Ohio State’s Division of Hematology is one of the largest in the nation

\$16 million in new research funding

- Training Grants (K-awards)
- Research Grants (NCI R01 research grants)
- Program Grant (NCI P01 in mantle cell lymphoma)



Proudly caring for patients from 44 states and 4 continents.

Expanding Cellular Therapies

- One of first 10 centers in the nation to offer both commercially available CAR-T cell therapies
- Burgeoning portfolio of investigational CAR-T cell therapy trials
- CAR-T cell trials for blood cancers and solid tumors
- Cellular therapies and collaborations ongoing in non-cancer areas, including infectious disease and cardiovascular disease

Celebrating Our Success

5,000+
bone marrow
transplants since 1984

1st ever
Joint Commission-
certified sickle-cell
program in the nation

Ranked **#20 in Cancer** by
U.S. News & World Report –
nationally ranked for 20 years

REBECCA JACKSON, MD, LANDS ONE OF THE COLLEGE'S LARGEST GRANTS

Q&A with Alumna Dr. Jackson

In July 2018, the National Institutes of Health (NIH) granted a \$26.4 million Clinical and Translational Science Award (CTSA) to Rebecca Jackson, MD, professor of Endocrinology, Diabetes and Metabolism. This amount is one of the largest grants ever received by Ohio State's College of Medicine. Also associate dean for Clinical Research and director of the Center for Clinical and Translational Science (CCTS), Dr. Jackson plans to use the funds to create programs that grow research cores and to establish career development initiatives for translational scientists and members of the research team.

Dr. Jackson graduated from The Ohio State University College of Medicine in 1978 and returned to Ohio State in 1983 following her training programs. Her years of outstanding service to the College of Medicine continue to garner her national awards and accolades, including being named a 2018 Castle Connolly Top Doctor.

Q. Congratulations on receiving an exemplary score on your CTSA grant application. How did you accomplish this?

A. We did receive an incredible score on our first submission. This is testament to the hard work and tremendous successes of a large and passionate team of researchers and program staff that help facilitate the work and career development of our researchers across Ohio State.

Q. This is the center's third five-year cycle of funding from the National Center for Advancing Translational Sciences since 2008. How will these resources be utilized?

A. This award will allow us to continue to contribute to the national conversation on translational research. CCTS will further expand its clinical and translational research infrastructure, pilot funding initiatives and education and career development programs for investigators and the scientific workforce. We convene, catalyze and support new interdisciplinary team science. The grant promotes and supports innovative research taking place at Ohio State and Nationwide Children's Hospital to advance breakthrough discoveries that can ultimately help us accelerate many lifesaving efforts. This brings transformational care to our patients.

Q. Who will participate in this research?

A. The CCTS is a partnership among Ohio State Wexner Medical Center, the 15 university colleges, NCH and more than 75 central Ohio community

stakeholders representing patients, community organizations, industry and government. There are more than 4,400 faculty, staff and researchers participating as members of the CCTS.

Q. What are some of the outcomes related to this research?

A. Our goal is to support the most innovative science and help create an environment that translates those findings to enhance health. Toward that goal, a critical outcome of our success is to broadly disseminate that new knowledge to the scientific community to advance scientific translation. Over the past 10 years, research funded or supported by CCTS research cores has resulted in more than 1,400 publications that have been cited by other scientists more than 55,000 times.

There have been advances across the translational spectrum from the lab to the clinic to communities, including the development of an innovative laboratory model for studying sarcoidosis and tuberculosis; pharmacokinetic studies of chemicals in foods that help determine the "correct dose" of food that might reduce risk for cancers and other diseases; and the development of new electronic health record decision support tools to help clinicians better counsel patients about cardiovascular risk. CCTS-supported early career faculty and pilot awardees have completed 18 patent filings and disclosed more than 25 inventions.



About Dr. Jackson

Rebecca Jackson, MD, is a nationally recognized translational clinician-scientist who studies women's health with a focus on defining clinical factors, biomarkers and genetic associations for diseases that disproportionately or uniquely affect women, including osteoporotic fractures, cardiovascular disease, cancer and osteoarthritis.

Together with her collaborators in the Women's Health Initiative, she elucidated the risks and benefits of hormone therapy and calcium plus vitamin D therapy to reduce risk for osteoporotic fracture. Her laboratory has received continuous funding for the last 30 years from the National Heart, Lung, and Blood Institute; the National Institute on Aging; and the National Institute of Arthritis and Musculoskeletal and Skin Diseases. Dr. Jackson has authored or co-authored more than 250 peer-reviewed manuscripts.

Visit medicine.osu.edu/alumni to connect with our alumni.

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Our city has transformed rapidly and you may be interested in what life looks like beyond the hospital walls. You're in luck. It's likely that Columbus has more than you expected.



"...Ohio's capital is the city others want to be." – Delta Sky Magazine

JUST THE FACTS

Not to brag, but here are a few facts and figures to convince you that Columbus is indeed one of America's premier cities:

We're big. Ohio's state capital is the 14th largest city in the United States. That makes us bigger than cities like Charlotte, Seattle, Denver, Boston, Nashville and Baltimore — seriously, Google it. And when you factor in the entire Columbus metropolitan area, our population increases to over 2 million.

We're affordable. The cost of living in Columbus is 10 percent below the national average. The median home price for the quarter ending May 2018 was \$145,000. As of May 2018, the median monthly rent was \$815 for one bedroom, \$900 for two bedrooms and \$1,100 for three bedrooms.

We're accessible. Columbus is within 550 miles of nearly half the nation's population. Day trips abound and weekend getaways are easy. Also, John Glenn Columbus International Airport, which is just 10 minutes from downtown, typically offers more than 150 daily nonstop departures to 40 airports. During the work week, the average Columbus commute is just 20.8 minutes and, depending on where you choose to live, it can be significantly less.

We're a microcosm of America. Our diverse population makes us a top test market. More than 109 languages are represented in Columbus.

We're smart. In addition to being named one of the "Top7 Intelligent Communities of the Year" by the Intelligent Community Forum, we have more PhDs than the national average and the largest concentration in the Midwest. There are more than 50 college and university campuses within the Columbus region, and 24 area high schools were in the top 10 percent of rankings for the *U.S. News & World Report* 2018 "Best High Schools" in America.



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COLLEGE OF MEDICINE

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