

MARSHALL UNIVERSITY JOAN C. EDWARDS
SCHOOL OF MEDICINE & MARSHALL HEALTH

PROGRESS REPORT



2019

Message from the Dean

Dear colleagues,

This has been a banner year for Marshall University Joan C. Edwards School of Medicine and Marshall Health. We are seeing unprecedented progress on the time, energy and resources we have invested into each of the pillars of our strategic plan—service, citizenship, education and research.

Each year brings with it new challenges and exciting opportunities as we work to make health care more accessible to the people of West Virginia and central Appalachia, while improving overall health and wellness in the communities we serve. Some of our most notable accomplishments from the past year have come through our Division of Addiction Sciences and how we're working to address a very public opioid crisis in Huntington and throughout southern West Virginia. It is important to call out the tremendous efforts of Dr. Stephen Petrany and the Department of Family & Community Health, which have spearheaded these efforts. Because of the success that we've enjoyed in Huntington, the Governor appointed our own Bob Hansen as executive director of the state's Office of Drug Control Policy and named Brian Gallagher as chairman of the Governor's Council on Substance Abuse Prevention and Treatment.

We continue to expand Marshall University's health science footprint with a new medical student wellness center, graduate student housing complex and more opportunities for clinical care across the region. With a newly defined department of urology headed by Dr. James Jensen, we've opened the door for additional specialty care, training and research in this field.

As an institution, we welcomed the Liaison Committee on Medical Education (LCME) for a site visit in April. After hundreds of hours spent in preparation for the visit, I'm pleased to report that we received a full eight-year accreditation from LCME, the maximum period a school can receive. I'm extremely grateful to the entire School of Medicine faculty and staff, but in particular, I have to call out the amazing efforts of Dr. Bobby Miller, our vice dean for medical education who coordinated the self-study and the LCME visit itself.

The investments the School of Medicine has made into growing its research enterprise in biomedical and clinical



and translational sciences are beginning to pay dividends. We're seeing more research activity than ever before, including a multitude of new National Institutes of Health grants. I must acknowledge the efforts of our vice deans for research, Drs. Uma Sundaram and Gary Rankin, as well as Marshall Institute for Interdisciplinary Research Director, Dr. Zijian Xie, in making this renaissance a reality. Largely because of these School of Medicine efforts, Marshall University has been granted Carnegie Research Level II status, a jump of two categories from its previous designation and only one short of the coveted Research Level I designation. I am confident that with the amazing group of scientists we're assembling, Research Level I designation is not far off.

I hope you enjoy reading about our progress and that it gives you a better sense of the exciting work taking shape at Marshall. We also look forward to sharing more with you in the years to come.

Regards,

JOSEPH I. SHAPIRO, MD

Dean, Marshall University Joan C. Edwards School of Medicine
Chair, Marshall Health

For additional information, follow us on social media or visit jcesom.marshall.edu or marshallhealth.org.

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OUR MISSIONS

Marshall University Joan C. Edwards School of Medicine is dedicated to providing high-quality medical education and postgraduate training programs to foster a skilled physician workforce to meet the unique health care needs of West Virginia and central Appalachia. Building upon its medical education foundation, the school seeks to develop centers of excellence in clinical care, including primary care in rural underserved areas, focused and responsive programs of biomedical science graduate study, biomedical and clinical science research, academic scholarship and public service outreach.

Marshall Health supports the clinical, educational, research and services missions of the Joan C. Edwards School of Medicine in order to build a healthier tomorrow.



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For more than 40 years, the Marshall University Joan C. Edwards School of Medicine has provided a dynamic, interactive learning experience as it trains medical students and new doctors in both skill and compassionate care. The 60 Doctor of Medicine and six Doctor of Philosophy in Biomedical Research graduates of the Class of 2019 join our more than 1,900 alumni who practice in a wide range of specialties across the country.

The year 2019 brought a successful self-study and site visit by our accrediting body, the Liaison Committee on Medical Education (LCME), which resulted in a full-eight year accreditation of the School of Medicine. We also began preparing to implement a major revision to our MD curriculum during the 2020-2021 academic year, a change that will merge pre-clinical and clinical education into an active-learning format.

The development of a new Physician Assistant program and launch of three new fellowship programs capped off an exciting year for our medical school.

EDUCATION





Percentage of
the 62 students
staying in WV for
residency:

29%

Percentage of
Class of 2019
entered primary
care residencies:

53%

The Class of 2019 celebrated outstanding residency matches with friends and family during the National Residency Matching Program's annual Match Day on March 15, 2019.

School of Medicine prepares to implement new MD curriculum

Medical education is evolving. Change is sweeping the entire medical education community. Marshall is taking steps to bridge the gap from theory to practice by reimagining its pillars of medical education and shifting emphasis from teaching to learning, with support and guidance from community physicians, school leaders and most of all, its students.

In a redesigned, vertically-integrated curriculum, students will learn the theories of human health and disease as they explore the skills and attitudes of an effective physician. The focus becomes the transference of skills, including life-long learning, problem solving, data analysis and critical thinking, communication and team building. The goal is to nurture the development of a “master learner” with proficiency in skills and attitudes of a physician that serves the community—much like the apprenticeship model used in the past.

This new curriculum will employ active-learning pedagogies while moving away from a lecture-driven format. Programmatic assessment and constant feedback to the students are also key to this developmental process. Programmatic assessment is driven by frequent, low-stakes assessments for student learning followed by national, standardized examinations for evaluation of their performance on institutional standards. This approach takes a developmental outlook to medical education and provides students with effective and timely feedback for their growth and learning.

Finally, early clinical exposure and greater opportunities for clinical electives are a few of the principal drivers for this change. Vertical integration of the pre-clerkship



Kathleen M. O'Hanlon, MD ('86), professor of family & community health, with medical student David Bartlett.

content will reduce unplanned redundancies and provide more time in the clinics for our students—allowing increased opportunities for career electives, including research, rural medicine and specialized care.

In June 2019, the school submitted its revised curriculum plans to its accrediting body, the Liaison Committee on Medical Education (LCME). Although the LCME does not decide whether a school can move forward with curriculum changes, the LCME accreditation notice validated that Marshall has the necessary resources to proceed with implementing its new MD curriculum during the 2020-2021 academic year.

2018/2019 Academic Medicine by the Numbers

Medical Students:

322

BS to MD Students:

28

Residents and Fellows:

217

Graduate Students:

72

Graduate medical education programs see continued growth

With 20 residency and fellowship programs and counting, graduate medical education at Marshall University has experienced tremendous growth in recent years. In fact, since 2012, the number of approved residency and fellowship positions at Marshall has increased 31%.

There's no doubt that resident physicians and fellows make valuable contributions to patient care, medical student education and research. A high-quality training program helps develop medical school graduates into first-rate, fully-trained professional physicians.

"We make people into doctors, and that's really rewarding," said Paulette S. Wehner, MD ('89), vice dean for graduate medical education at the Marshall School of Medicine.

More than 215 resident physicians and fellows are receiving training at Marshall, which leverages partnerships with 10 hospital sites and Marshall Health's more than 40 clinics.

Training programs also help recruit and retain physicians. In rural America, residents are exceptionally critical in helping academic health systems like Marshall create access to advanced specialty care. That's why Marshall is focused on growing its residency and fellowship offerings. The most recent additions have included a neurology residency and fellowships in child and adolescent psychiatry, geriatric psychiatry and pediatric hospital medicine. Several Marshall programs were also approved for expansion by the Accreditation Council for Graduate Medical Education (ACGME), making room for additional residency slots in internal medicine and psychiatry.

In an effort to explore new ways to bring care into rural communities, the Marshall School of Medicine partnered with Marshall Health, Cabell Huntington Hospital and Valley Health Systems to create the Marshall Community Health Consortium. The goal of the consortium is to support primary care residency programs in small communities. The program's first residency, the Holzer Osteopathic Family Medicine Residency Program, established an integrated allopathic-osteopathic program, allowing Holzer Health System's existing family medicine program to expand to 12 positions.



Katherine Bennett, MD ('16), a family medicine resident, gives a pediatric patient a checkup.

Participating Hospital Sites

Cabell Huntington Hospital
Charleston Area Medical Center
Hershel "Woody" Williams VA Medical Center
King's Daughters Medical Center
Mildred Mitchell-Bateman Hospital
Ohio State Wexner Medical Center
River Park Hospital
St. Mary's Medical Center
Shriner's Hospitals for Children Medical Center – Lexington
University of Kentucky Medical Center

Residency Programs

Dental – General Practice
Family & Community Health
Internal Medicine
Medicine/Pediatrics
Neurology

Obstetrics/Gynecology
Orthopaedic Surgery
Pediatrics
Psychiatry
Surgery

Other Residency Partnerships

Marshall Community Health Consortium

Fellowships

Cardiology
Child and Adolescent Psychiatry
Endocrinology
Geriatric Psychiatry
Hematology-Oncology
Interventional Cardiology
Nephrology
Pediatric Hospital Medicine
Pulmonary
Sports Medicine

School of Medicine announces physician assistant program

A new physician assistant program is under development at the Marshall School of Medicine.

Physician assistants are in demand nationwide. Employment of physician assistants is expected to grow 37% between 2016 and 2026, according to the Bureau of Labor Statistics.

The Marshall program is designed to include both didactic and clinical components, including 28 months of rigorous academic courses and challenging clinical rotations. Under the leadership of program director Ginger Boles, MS, PA-C, program graduates will be prepared to evaluate, diagnose and manage patients in primary and specialty care across all stages of life as well as patients in culturally diverse and rural settings.

The physician assistant program, which will award a Master of Medical Science in Physician Assistant, has submitted its application for initial accreditation from the



The necessary leadership and faculty are in place to begin developing the program's curriculum. From left are Clinical Coordinator Dean Wright, PA-C; Clinical Skills Director Denise Chambers, PA-C; Program Director Ginger Boles, PA-C; Medical Director Stephen Wilson, MD; and Program Administrator Diana Maue.

Accreditation Review Commission on Education for the Physician Assistant. Marshall anticipates welcoming its first class in January 2021, pending provisional accreditation approval.

Another step toward an integrated health sciences campus

Marshall University continues to expand its health sciences footprint in Huntington. In addition to the Linda S. Holmes Student Wellness Center, which opened in May 2019, a new graduate housing complex and new School of Pharmacy building moves Marshall closer toward an integrated health sciences campus in which pharmacy students, medical students and residents have the opportunity to work, study and live in a collaborative, supportive academic and clinical community.

Fairfield Landing is located between the Erma Ora Byrd Clinical Center and Forensic Science Building. This all-inclusive housing complex opened in August 2019, along with Stephen J. Kopp Hall, the new academic pharmacy building located on Hal Greer Boulevard named in memory of the university's late president.

Continued expansion of Marshall University's health sciences campus will soon include a new parking garage adjacent to Erma Ora Byrd Clinical Center.



Zoning in on medical student wellness



Medical students like Alexandra Gillispie, Lee Mendenhall and Alexandrine Ratnani use yoga as a way of putting good wellness strategies into action.

Medical students face a unique set of challenges when it comes to their mental, emotional and physical well-being. Learning how to cope with those challenges is part of setting students up for success in practice and in life.

Since 2010, medical student wellness has taken a front seat as part of the overall student experience at Marshall, including teaching students healthy ways to manage stress and promote resiliency. Those efforts take many forms—from home-cooked meals and more designated study spaces to frisbee games in the park and mini-wellness challenges.

“Teaching medical students healthy ways to manage stress and giving them a place to intentionally come to ‘refuel’ is part of our holistic care of our students,” said Joseph I. Shapiro, MD, dean of the Marshall School of Medicine.

Linda S. Holmes Student Wellness Center

In May 2019, the School of Medicine opened its own student wellness center located just across Hal Greer Blvd. from the Marshall University Medical Center and



Cabell Huntington Hospital. It features five study rooms, group meeting space and a large gathering room. The 4,200-square-foot center also houses the school’s student affairs and financial aid offices. The center is designed to provide a safe, convenient relaxation space for medical students when they need to take a break from studying to relax and decompress.

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Marshall School of Medicine alumnus R. Mark Hatfield, MD, OD, ('83) and his wife, Mrs. Monica J.W. Hatfield, generously donated the funds to support the renovation of the Student Wellness Center and opted to name it in honor of their friend, Linda S. Holmes.

Holmes has served as director of development and alumni affairs at the School of Medicine for more than 20 years. She has devoted her career to the students and alumni of Marshall University.



From left are Dr. Mark Hatfield, Monica Hatfield, Linda Holmes and Dr. Joseph Shapiro.

Culinary encounters



Medical students Sydney Sheppard, Emma Nellhaus and Maggie Meadows



Medical student Deena Dahshan

The idea of having medical students learn about nutrition in the kitchen is a concept that has taken off nationwide. Studies have shown that students not only become more comfortable in discussing nutrition with their patients but actually change their own dietary selections to more dark green vegetables and other healthy choices.

Marshall School of Medicine faculty currently host informal training opportunities for medical students at Huntington's Kitchen. The school is also in the early stages of incorporating this training into a more formal curriculum to set the stage for our future physicians to effectively begin a conversation with their patients about nutrition.

Next-level student leadership and engagement through learning communities



Learning community houses were named by the students in honor of beloved leaders within the school.

Learning communities are close-knit groups that support students as they face each milestone of the medical school journey.

Now fully integrated into all four classes of current Marshall medical students, these relationship-centered communities pave the way for curricular and co-curricular learning and development. Six student-led networks comprised of students from various years provide medical students a familiar cohort for the duration of their medical school experience; facilitate the development of trust and collaboration among the medical student body; support student efforts to adapt to and succeed in the culture of medicine in general and medical education in particular; and provide students with a broad range of resources for learning, advising, support, teamwork and community engagement.

Each learning community “house,” led by three faculty advisors and two student leaders, honors an individual who has made a difference in the lives of students.

- **Shelvy L. Campbell-Monroe**, PhD, Assistant Dean for Diversity & Inclusion
- **Bobby L. Miller**, MD ('97), Vice Dean for Medical Student Education

- The late **Laura L. Richardson**, PhD, Assistant Dean of Academic Affairs and Director of Pre-Clinical Education (2017-2018)
- **Cindy A. Warren**, Assistant Dean of Admissions
- **Kevin W. Yingling**, RPh, MD ('85), Professor of Medicine, Chair of Internal Medicine (2001-2011), Founding Dean of Marshall University School of Pharmacy (2011-2016)
- **Sasha Zill**, PhD, Professor of Biomedical Sciences

Helping students LEAD

As physicians, being able to communicate and collaborate within a team are important. Leadership Exploration and Development, or LEAD, is a new initiative of the School of Medicine’s learning communities to help fellow students understand and develop leadership skills, starting with personal development and followed by interpersonal development. The program includes access to a leadership podcast, a leadership self-assessment and large group conflict resolution exercise.

Rural health readiness

There are a number of hurdles to health care faced almost exclusively by rural communities. From access to care to higher incidence of disease and disability, the Marshall School of Medicine remains true to its mission of training and retaining physicians prepared to meet the unique health care needs of Appalachia through targeted training, research and pipeline efforts.

During 2018-2019, 26% of third- and fourth-year medical students completed 163 weeks of voluntary, rural/underserved community-based educational rotations.

Rural Family Medicine Scholars Track Program

For medical students interested in rural health care and who want to remain in West Virginia for residency, this program offers fourth-year electives in family medicine with a focus on rural issues and targeted case studies, research projects, rotations and opportunities to work with underserved populations.

Through the Rural Health Initiative grant, resources were allocated to the Rural Family Medicine Scholars Track program for fourth year medical students. Three Rural Family Medicine Scholar participants matched into Marshall's family medicine residency program and received a match bonus.

Rural Research Grants

The Robert C. Byrd Center for Rural Health at Marshall University, through the Rural Health Initiative grant, provides resources for community-based research. During the 2018-2019 academic year, the Center for Rural Health provided seven grants to medical students, residents and fellows for rural research projects totaling approximately \$95,000 with topics to include:

- A Comparative Analysis of the Relationship Between Patient Malnutrition and Opioid Use Disorder in Rural West Virginia
- Office-Based Spirometry Evaluation of Community Dwelling Oldest-Old
- Impact and Trends of Novel Nicotine Delivery Systems in Rural Appalachian Youth

Rural Health Service Program

This program provides a financial incentive for medical students intending to practice primary care in rural or underserved communities. In exchange for a year of practice in a rural and/or underserved area, third- and/or fourth-year medical students receive \$25,000. Four students were selected in 2019 and received the financial incentive.



Three of our Rural Health Service program participants from the Class of 2019—Drs. Maggie Blackwood DeBolt, Michael Amos and Rachel Marteney.

Project ECHO

Project ECHO®, which stands for Extension for Community Healthcare Outcomes, brings interactive training sessions to specialists and primary care providers, especially those serving a rural patient population, through videoconferencing. Project ECHO increases the capacity of primary care providers to safely and effectively treat chronic, common and complex conditions associated with endocrinology and cardiology issues. Primary care provider participation in teleECHO clinics is free and includes continuing medical education (CME) opportunities. This is available to students and residents.

Opening doors: Pipeline programs bring medical school to life for minority students

An immersion experience on a college campus can be life changing. For minority students thinking about a career in medicine, programs like Marshall's Project PREMED and Health Care Pipeline Initiative offer an opportunity to get a hands-on look at what medical school is really all about and help them navigate the process.

Interventions in the health care educational pipeline have been successful in increasing minority entrants into health professions. Interventions at the college and post-baccalaureate levels have been found to be particularly high-yield, short-term strategies for increasing health professions diversity.

"Being on campus and fully immersed in the experience gives you a different perspective so that students are prepared to make major career decisions when the time comes," said Shelvy L. Campbell-Monroe, PhD, assistant dean of diversity & inclusion.

Project PREMED is organized by the School of Medicine's Office of Diversity & Inclusion and sponsored by the School of Medicine, Marshall Health and Marshall University's Office of Intercultural Affairs.

Project PREMED students who have gone on to medical school:

13%

Project PREMED brings real-world experiences to minority students

Since 2011, Project PREMED, which stands for Providing Real-World Experiences for Marshall-Educated Doctors, has done just as its name suggests for more than 120 minority undergraduate students from 22 states. Project PREMED was established to create opportunities for future doctors of color and to implement additional efforts to address barriers for students who are underrepresented in the health professions.

This program brings medical school to life through a three-day summer immersion experience. Participants explore and experience the medical school journey through mock interview sessions, robotic surgery demonstrations and discussions with current medical students and residents about life as a medical student and as a physician. Program participants are assigned a Marshall University medical student mentor, and staff from the Office of Diversity & Inclusion maintain ongoing contact with Project PREMED mentees.



Health Care Pipeline Initiative

Each year, more than two dozen high school students from West Virginia, Kentucky and Ohio explore medicine, pharmacy, nursing, research and engineering careers through a four-week immersion experience at Marshall.

Students learn about the educational requirements, skills, typical job duties and personal qualities of specific health professionals and paraprofessionals. They participate in interactive hands-on activities that highlight the skills, equipment, technology and resources used by science, technology, engineering and mathematics (STEM) professionals.

Establishing a dynamic research culture doesn't happen overnight, but the Marshall School of Medicine is well on its way. Faculty, students and residents are producing publications, presenting their findings and earning significant grant awards at a higher rate than ever before. In recognition of this growth, Marshall University achieved 'R2' status as a "high research activity" institution from the Carnegie Classification of Institutions of Higher Education in March 2019.

Enhanced extramural funding as well as diverse peer-reviewed awards are bringing individual faculty and student research interests to life while significant programmatic grants build a robust infrastructure for meaningful research at Marshall.

In the past several years, the school has received many individual faculty grants (R00, R01, R15 and R21) from the National Institutes of Health (NIH) as well as programmatic grants from the National Center for Advancing Translational Sciences (NCATS); Clinical and Translational Science Awards (CTSA); National Institute of General Medical Sciences (NIGMS); Clinical and Translational Research (CTR); and IDeA Networks of Biomedical Research Excellence (INBRE); and the Health Resources and Services Administration. In addition, funding from the U.S. Department of Veterans Affairs (Merit Review and Career Development Award), West Virginia Higher Education Policy Commission, West Virginia Department of Health and Human Resources and foundations such as Claude Worthington Benedum Foundation, American Gastroenterological Association, American Heart Association, NASA, Hearst Foundations and Merck Foundation are all laying the groundwork to establish Marshall as a regional leader in research.

RESEARCH





Your Partners
for Life



Cabell Huntington
Hospital

More than 100 students and post-doctoral, residents and fellows presented their basic science and clinical research during the annual Marshall University Health Science Research Day.

Pre Anesthesia Assessment
and Testing





THE NEXT GENERATION OF RESEARCHERS

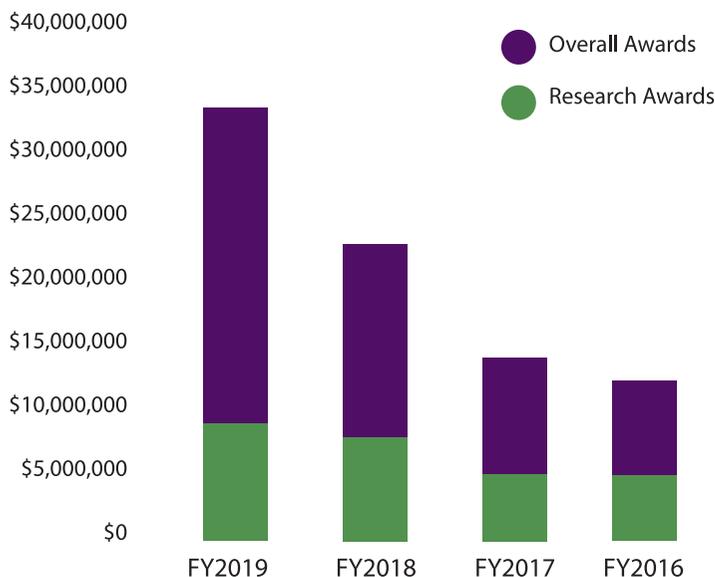
From laboratory research and community-oriented programs to drug and clinical trials, research efforts at the Marshall School of Medicine remain focused on conditions that most impact West Virginians, including obesity, diabetes, heart disease and addiction. The more we understand these conditions, the better equipped we are to make early interventions and develop new strategies to improve health outcomes. Most notably, a Center of Biomedical Research Excellence (COBRE) and Appalachian Center for Cellular Transport in Obesity Related Disorders (ACCORD) were established at Marshall University in order to comprehensively address the obesity epidemic affecting both the local population as well as rural America.

The School of Medicine’s research departments—Biomedical Sciences and Clinical and Translational

Sciences—work in concert to promote collaboration between basic scientists and clinicians and advance translational research. To fully engage the community and promote regional health care centers, the Appalachian Clinical and Translational Science Institute (ACTSI) at Marshall University was formed.

These efforts have resulted in a dramatic increase in new faculty recruitment, medical student involvement in research, enhanced extramural funding, regional collaborations and new areas of graduate biomedical education at Marshall. The research enterprise at the School of Medicine is growing, the infrastructure/resources are improving, the opportunities for collaboration are increasing and most importantly, its future is bright.

RESEARCH BY THE NUMBERS



Overall percentage increase in research awards from FY2016 to FY2019:

71%

Overall federal and non-federal grant awards more than tripled

Number of New Awards

FY2019 / 53 – totaling \$24.6 million
 FY2018 / 57 – totaling \$11.1 million

Number of New Proposals

FY2019 / 88 – totaling \$86.2 million
 FY2018 / 85 – totaling \$58.1 million

Growing clinician scientists at Marshall

The Marshall Clinical Research Center (MCRC) has been instrumental in granting access to nationally sought-after clinical trial programs to patients in West Virginia, southern Ohio and eastern Kentucky. Since its creation, the Clinical Research Center has helped develop and support dozens of clinical trials, improving treatment for hundreds of patients.

“During the last few years, patient accrual in investigator-initiated trials has increased five-fold and double that in sponsored trials,” said Usha Murughiyan, MD, medical director of MCRC.

Much of its growth can be attributed to the comprehensive clinical research services the center now provides, including: trial discovery; contracting, regulatory, site qualification and initiation; faster screening and potential subject identification; patient visits; agency monitoring; data entry and documentation; and study closeout. Now studies in many areas of medicine are underway at MCRC.

“In addition to a robust growth in clinical trials, studies at MCRC have resulted in four co-authored publications in the prestigious New England Journal of Medicine in just the past year.”

Uma Sundaram, MD
Vice Dean for Research & Graduate Education

Current ongoing trials include:

- Hepatitis C in pregnancy
- Inflammatory bowel disease (IBD)
- Meningococcal and respiratory syncytial virus (RSV) vaccines
- Migraine headaches
- Multiple sclerosis
- Non-alcoholic steatohepatitis (NASH)
- Parkinson’s
- Pediatric constipation



Science Spotlight on Maternal RSV



Dr. Hisham Keblawi
Professor of Obstetrics & Gynecology

Obstetrician-gynecologist Hisham A. Keblawi, MD, a professor in the department of obstetrics and gynecology, and his team are running a study to determine if maternal Respiratory Syncytial Virus (RSV) vaccination during pregnancy provides any immunity to the newborn babies during the first year of life.



Science Spotlight on Spinal Surgery



Dr. Nicolas Phan
Associate Professor of Neurosurgery

Marshall School of Medicine is one of 30 health care organizations throughout the U.S. and the only location in West Virginia taking part in an FDA investigational device exemption (IDE) study, sponsored by Premia Spine, Ltd., to evaluate the efficacy and safety of the TOPS™ System compared to traditional lumbar fusion.

Led by Nicolas Phan, MD, an associate professor in the department of neurosurgery, the TOPS™ device works to restore motion of the spine in all directions. Instead of permanently locking the two vertebrae with a fusion, the device allows the two vertebrae to continue moving.

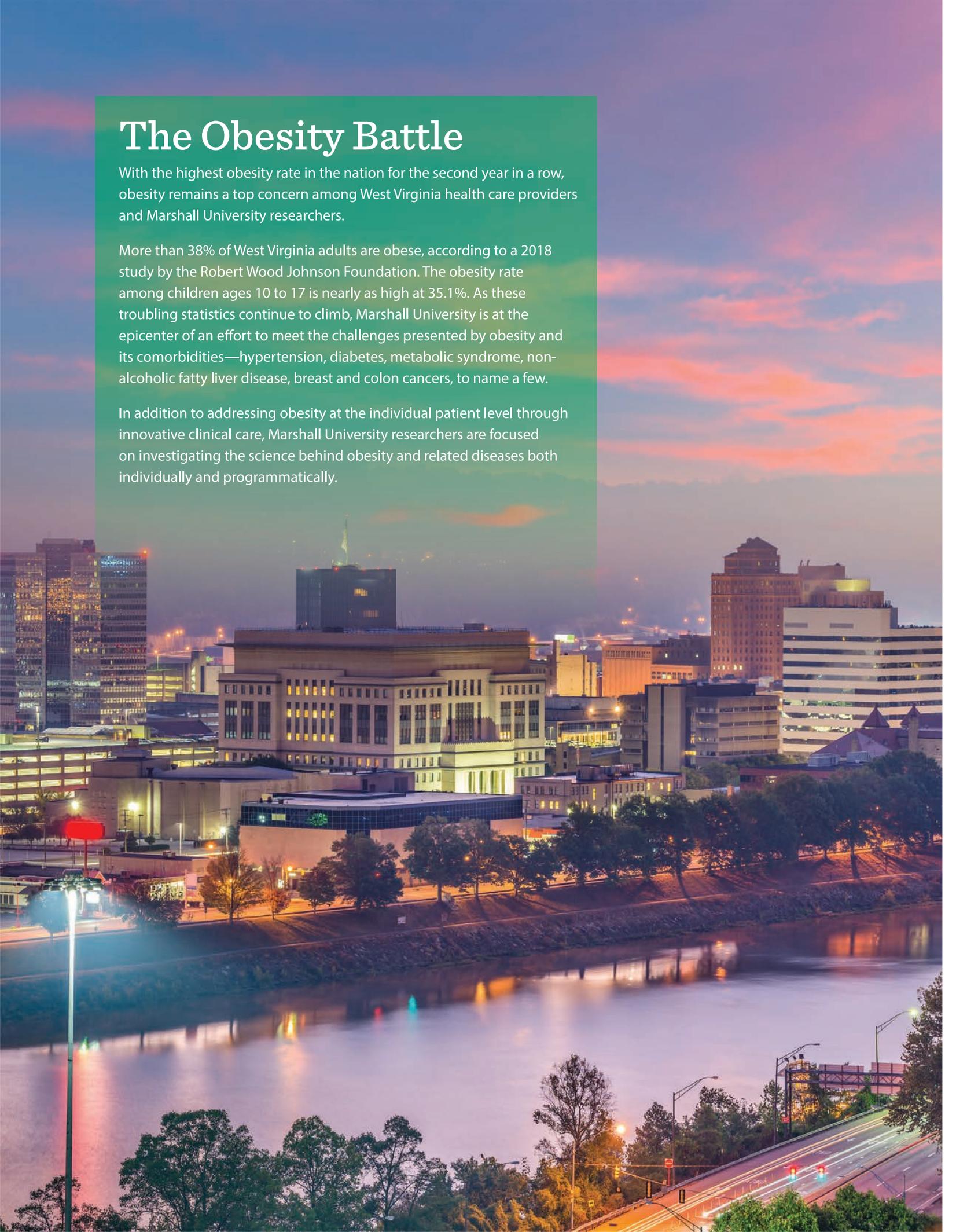
Patients who meet the study’s criteria are randomly placed into two groups—one undergoing surgery with the TOPS™ System and the other lumbar spinal fusion – with 67% percent undergoing surgery with the Premia device.

The Obesity Battle

With the highest obesity rate in the nation for the second year in a row, obesity remains a top concern among West Virginia health care providers and Marshall University researchers.

More than 38% of West Virginia adults are obese, according to a 2018 study by the Robert Wood Johnson Foundation. The obesity rate among children ages 10 to 17 is nearly as high at 35.1%. As these troubling statistics continue to climb, Marshall University is at the epicenter of an effort to meet the challenges presented by obesity and its comorbidities—hypertension, diabetes, metabolic syndrome, non-alcoholic fatty liver disease, breast and colon cancers, to name a few.

In addition to addressing obesity at the individual patient level through innovative clinical care, Marshall University researchers are focused on investigating the science behind obesity and related diseases both individually and programmatically.



INDIVIDUAL RESEARCH

Fat storage cells in anti-obesity intervention

New research from Komal Sodhi, MD, an associate professor of surgery and biomedical sciences, and Dean Joseph I. Shapiro, MD, has established a role for adipocyte Na/K-ATPase signaling in worsening obesity and its primary liver complication, non-alcoholic steatohepatitis (NASH).

The results of this study demonstrated that the Na/K-ATPase oxidant amplification loop in adipocytes, or cells specialized for fat storage, when impaired, could cause adipocyte dysfunction, worsening obesity and potentially increasing the severity of related diseases. By specific targeting of Na/K-ATPase signaling in the adipocyte with an antagonist, pNaKtide, the investigators demonstrated a reversal in fat deposition

and fibrosis of NASH in a mouse model of diet-induced obesity.

“Our data clearly suggests that the Na/K-ATPase oxidant amplification loop plays an important role in obesity,” said Rebecca Pratt, first author and a graduate student in biomedical research. “Thus, treatment with pNaKtide showed a whole-body effect, which highlights the much larger role that adipocytes play in obesity and related diseases.”

The findings were published in the May 28, 2019, edition of *Scientific Reports*, an online journal from the publishers of *Nature*.

Spectrum of biomedical, translational and clinical research in obesity



Dr. Uma Sundaram
Professor and Vice Dean
of Research and Graduate
Education

The most serious liver complication of obesity is non-alcoholic steatohepatitis, or NASH, which is very common in West Virginia and central Appalachia. Currently, NASH, which inevitably leads to cirrhosis and its many complications, has no available medical treatment, only liver transplantation. Led

by Vice Dean of Research and Graduate Education Uma Sundaram, MD, a clinical trial evaluating the safety and efficacy of an investigational drug for late-stage liver disease is underway at Marshall University.

Marshall is the only clinical trial site in West Virginia and the tri-state region participating in the ongoing Phase 3 AURORA study through Allergan to assess the efficacy and safety of the investigational drug for the treatment of liver fibrosis in adult patients 18 to 75 with NASH. The approach evaluates the effectiveness of the investigational drug, compared to the placebo.

Diabetes as a common complication of obesity



Dr. Jung Han Kim
Professor of Biomedical
and Clinical and
Translational Sciences

Jung Han Kim, PhD, a professor in the departments of biomedical research and clinical and translational science, received a \$440,405, three-year R15 grant from the National Institutes of Health (NIH) to study genes causing diabetes during obesity in a

polygenic mouse model of obesity by analyzing the interaction between genes and diet. She is also the recipient of a \$154,000 two-year grant from the American Heart Association for a study that tests links between genetic variants and obesity susceptibility in this model. Dr. Kim's long-term research focuses on understanding the underlying causes of Type 2 diabetes, obesity and related conditions. The research findings will provide new potential targets for intervention and contribute to the prevention of the diseases.

PROGRAMMATIC RESEARCH & RELATED FUNDING

Building bridges with ACCORD

In 2018, Marshall University, under the direction of Uma Sundaram, MD, established the Appalachian Center for Cellular transport in Obesity-Related Disorders (ACCORD) at Marshall University as one of 22 Centers of Biomedical Research Excellence (COBRE) across the country. An \$11 million grant as part of the National Institute of General Medical Sciences (NIGMS) Institutional Development Award (IDeA) propelled ACCORD into action and new, innovative team science research to fight the obesity epidemic began to take shape.

ACCORD provides support for 18 senior scientists at Marshall's School of Medicine and College of Science, University of Kentucky, Case Western Reserve University and University of Cincinnati; five junior investigators; four cores (genomics/bioinformatics, imaging, biostatistics and research design and manpower); as well as several pilot grants.

The ultimate goal of ACCORD is for it to become a national center of excellence focused on molecular mechanisms of cellular transport abnormalities in obesity-associated health disparities in West Virginia and central Appalachia.

Some state-of-the-art obesity-related research projects currently underway through ACCORD include:

- How altered bile salt absorption in the intestine leads to the all too common dyslipidemia of obesity
- Better understanding of the role of adipose-derived secretome on breast cancer in obese postmenopausal women
- Abnormal accelerated bone elongation in childhood obesity
- Role of renal oxidative stress and renal tight junction in the causation of obesity-associated hypertension
- Altered intestinal amino acid absorption during obesity
- Better understanding of the causation of obesity-associated diabetes and hypertension



Goals of the Marshall COBRE program:

- Conduct novel obesity-related research
- Train the next generation of biomedical scientists in obesity-related research
- Establish cores to support all research at the University
- Expand and foster collaborative research between departments and schools/colleges at Marshall University as well other institutions
- Recruit and support new junior investigators with funding through the program as current investigators graduate from the COBRE

20th anniversary of seminal cell biology discovery



Dr. Zijian Xie
Director of MIIR and
Professor of Biomedical
Sciences

Twenty years ago, Zijian Xie, PhD, director of the Marshall Institute for Interdisciplinary Research (MIIR) and professor in the department of biomedical sciences at the Marshall University School of Medicine, discovered the scaffolding/signaling function of the Na/K-ATPase sodium pump, a significant research finding that has had tremendous applications in both biology and medicine.

“Dr. Xie’s seminal discovery 20 years ago launched a trail of additional research, further increasing our understanding

of Na/K-ATPase signaling in clinical conditions ranging from cancer to obesity,” said Joseph I. Shapiro, MD, dean of the Marshall School of Medicine.

In honor of Dr. Xie, the *International Journal of Molecular Sciences* published a special issue co-edited by Dr. Shapiro and V. Gustavo Blanco, MD, PhD, professor and chair of the department of molecular and integrative physiology at the University of Kansas. Marshall’s School of Medicine also hosted a two-day research symposium that brought together leading researchers from the field to discuss recent scientific pursuits investigating the now broad subject of Na/K-ATPase signaling.

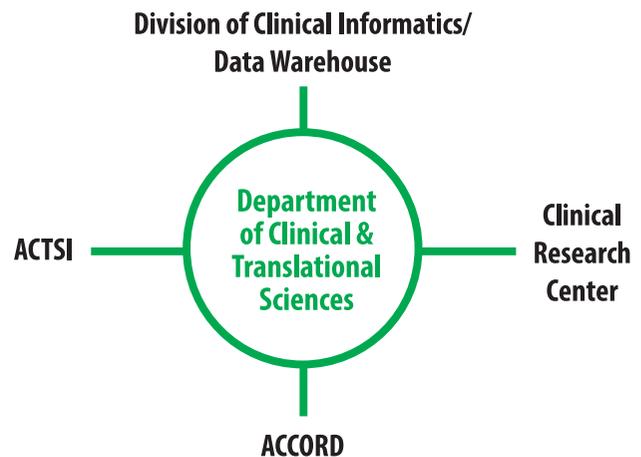
Where the practice of medicine meets research



In medical schools across the country, departments of clinical and translational sciences are still relatively new and rare entities.

Designed to foster collaboration and enrichment among clinicians and basic scientists, this multidisciplinary department at the Marshall School of Medicine leverages a variety of expertise to address issues through the full spectrum of translational science in central Appalachia.

Within a few years, the Department of Clinical and Translational Sciences has grown to include 25 full-time



and joint faculty members. All perform research and present their work at national-level scientific meetings and publish in peer-reviewed journals. They also serve on scientific study sections and review manuscripts for peer-reviewed journals.

Percentage of CTS faculty with extramural funding from NIH and/or Veterans Affairs:

90%

No. of scientific publications by CTS faculty in 2018/19:

60



Walnuts tied to gene expressions related to breast cancer

Led by W. Elaine Hardman, PhD, a professor in the department of biomedical sciences, a Marshall University team revealed that consumption of two ounces of walnuts a day for about two weeks significantly changed gene expression in confirmed breast cancers.

This pilot, two-arm clinical trial is the latest of a series of related studies at Marshall University related to dietary walnut links to tumor growth, survival and metastasis in breast cancer. The work is described in a March 10, 2019, paper published in the journal *Nutrition Research*.

“Consumption of walnuts has slowed breast cancer growth and/or reduced the risk of mammary cancer in mice,” Dr. Hardman said. “Building on this research, our team hypothesized that walnut consumption would alter gene expression in pathologically-confirmed breast cancers of women in a direction that would decrease breast cancer growth and survival.”

Changes in gene expression in the surgical specimen compared to baseline were determined in each individual

woman in walnut-consuming ($n = 5$) and control ($n = 5$) groups. RNA sequencing expression profiling revealed that expression of 456 identified genes was significantly changed in the tumor due to walnut consumption. Ingenuity Pathway Analysis showed activation of pathways that promote apoptosis and cell adhesion and inhibition of pathways that promote cell proliferation and migration.

This study is an example of the critical role of a team in modern research. Breast surgeons Mary Legenza, MD, of Marshall School of Medicine and Edwards Comprehensive Cancer Center, and James Morgan, MD ('88), formerly of St. Mary's Medical Center, collected biopsies from patient volunteers for the clinical trial. Donald A. Primerano, PhD, Jun Fan, PhD, and James Denvir, PhD, of the Genomics and Bioinformatics Core Facility at the Marshall School of Medicine performed the RNA expression profiling, bioinformatic and statistical analyses.

Animal care and use program earns reaccreditation

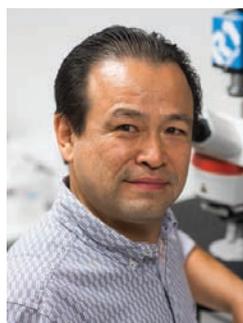


Marshall University's Animal Care and Use Program received full three-year accreditation from the Association for Assessment and Accreditation of Laboratory Animal Care (AAALAC) International, a private, nonprofit organization that promotes the humane care and use of animals in science by voluntary assessment, including an on-site inspection of research programs. In its report, the AAALAC International Council on Accreditation

commended Marshall for maintaining a quality program, committed staff and strong institutional support.

The Marshall University program has maintained continuous ongoing accreditation from AAALAC since 1986. Reaccreditation occurs every three years. Marshall's next site visit will be in 2022.

New Thrombosis Research



Dr. Wei Li
Associate Professor of
Biomedical Sciences

Dr. Wei Li, an associate professor in the department of biomedical sciences, received a \$434,461, three-year R15 grant from the National Institutes of Health (NIH). By using animal models and human platelets, Dr. Li's laboratory found that thymidine phosphorylase (TYMP), a platelet cytoplasmic protein, is necessary for platelet activation, aggregation and thrombosis. The

goal of this grant is to look deeper into those findings to determine the functional and mechanistic role of TYMP and clarify the detailed pathways that mediate TYMP enhanced platelet activation and thrombosis and to establish pharmacological inhibition of TYMP as a novel and safe anti-thrombotic therapy.

Top Toxicology Honors



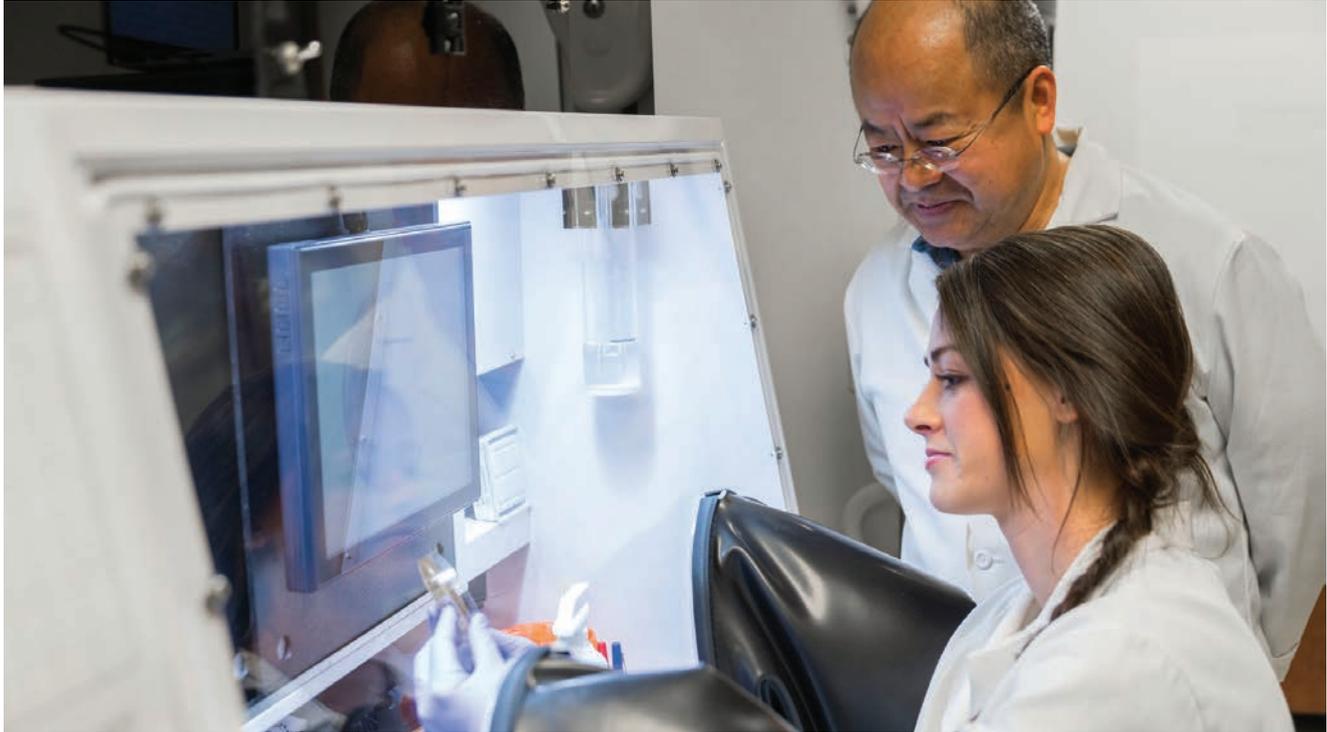
Dr. Gary O. Rankin
Professor and Vice Dean
for Basic Sciences

Gary O. Rankin, PhD, professor and vice dean for basic sciences, received the 2019 Career Award from the American Society for Pharmacology and Experimental Therapeutics (ASPET) Division for Toxicology.

Dr. Rankin was selected for the honor as a result of his mentorship and leadership in the field of toxicology, exemplary service to ASPET and in recognition of his long history of scholarship in the area of nephrotoxicity.

WV-INBRE builds biomedical research network in West Virginia

Marshall awarded \$17 million renewal for biomedical research efforts in West Virginia



Professor of Biomedical Sciences Hongwei Yu, PhD, and PhD student Lexie Blalock

Now in its 19th year, West Virginia IDeA Network of Biomedical Research Excellence (WV-INBRE) has brought more than \$71 million in grant support to West Virginia for the purpose of building a solid infrastructure and increased capacity for biomedical research throughout the state. Marshall University serves as the lead institution on this project and works with partner lead West Virginia University and 14 other colleges and universities in West Virginia to implement the initiative.

Earlier this year, Marshall School of Medicine received a five-year, \$17 million award from the National Institutes of Health (NIH) for continued funding of WV-INBRE.

West Virginia is one of 23 states, along with Puerto Rico, to receive Institutional Development Award (IDeA) funding from NIH for INBRE programming. INBREs enhance biomedical research capacity, expand and strengthen the research capabilities of biomedical faculty and provide access to biomedical resources for promising undergraduate students throughout the eligible states.

INBRE puts the IDeA approach into action by enhancing research infrastructure through support of a statewide research development network that links research-intensive institutions with primarily undergraduate institutions.

“Since the start of WV-INBRE we’ve seen a tremendous cultural shift within our undergraduate institutions that now makes biomedical research an important part of the learning environment,” said Gary O. Rankin, PhD, vice dean of basic sciences at Marshall’s School of Medicine and principal investigator of the award. “Faculty in both undergraduate and professional programs are committed to growing biomedical research programs and introducing students to research opportunities that may help shape their career decisions.”

With Phase 4 renewal funding for WV-INBRE, Marshall University, in partnership with West Virginia University and the WV-INBRE partner institutions, will focus on cellular and molecular biology with an emphasis on

chronic diseases including cancer, cardiovascular disease, diabetes, obesity-related illness and addiction. It will also establish a collaborative project in ovarian cancer research.

WV-INBRE also provides research opportunities for undergraduate and graduate students, including a 9-week summer research program, Health Sciences & Technology Academy (HSTA) Scholar initiative and a developmental research project program that helps provide research skill development and serves as a pipeline for these students into health-related research careers. HSTA high school science teachers and partner institution faculty fellows will also be provided summer research opportunities at the lead and network institutions. By providing workshops, seminars, research training and mentoring and access to

“Once high school and college students have a chance to do research, it makes them more competitive to get into graduate, pharmacy and medical school and other professional programs.”

Gary O. Rankin, PhD
Professor, Vice Dean of Basic Sciences and
Principal Investigator for WV-INBRE

state-of-the-art core facilities, WV-INBRE will help enhance the science and technology knowledge and skill base of the West Virginia workforce.

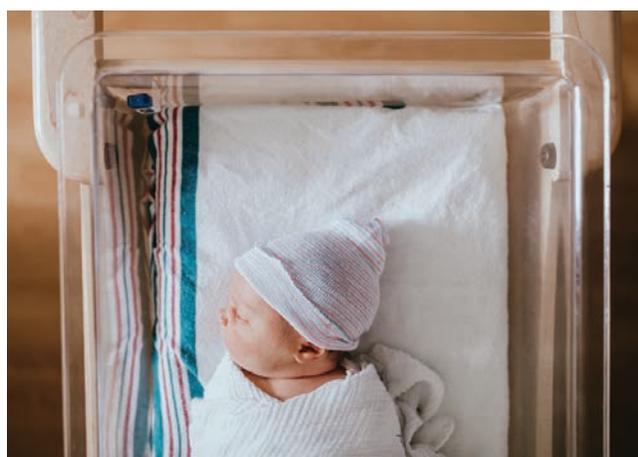
Earlier ID of prenatal exposure to opioids & gabapentin improves timely treatment of newborns experiencing withdrawal symptoms

Marshall University researchers are examining the impact of various interventions to the opioid crisis. Findings such as this have a global impact.

Timely identification of newborns exposed to both opioids and gabapentin during pregnancy could mean more appropriate care and shorter hospital stays for newborns experiencing withdrawal, according to researchers at Marshall University, in collaboration with Marshall Health, Cabell Huntington Hospital and the Centers for Disease Control and Prevention.

Infants exposed to opioids during pregnancy may experience withdrawal symptoms after birth. However, according to the retrospective review study e-published Oct. 24, 2019, in *The Journal of Pediatrics*, those exposed to both opioids and gabapentin during pregnancy may have atypical withdrawal symptoms such as rapid eye movement, restlessness of the arms and legs, tongue thrusting, back arching and involuntary muscle twitching. As a result, health care providers may have a more difficult time treating infants who are co-exposed.

Because maternal self-reporting can underestimate prenatal exposure to substances, Marshall researchers examined the impact of universal, post-delivery maternal toxicology screening including gabapentin.



Before universal screening, newborns with co-exposure began treatment around day 20, on average. After universal screening began, newborns with co-exposure began treatment around day 14 of life, on average. Likewise, before universal screening, newborns with co-exposure had an average hospital stay of 58 days. After universal screening began, newborns with co-exposure had an average hospital stay of 48 days.

Data are limited on the long-term effects of gabapentin exposure during pregnancy on an infant's development. More research is needed to understand the full impact of multiple substances during pregnancy on infants.

At Marshall, being a community-based medical school means meeting the needs of people where they are. As an academic health team, that call to action takes many different forms and happens in a variety of places—from the streets of Huntington to hills and hollows throughout West Virginia.

From nationally-recognized programs aimed at combating the opioid crisis to acute care for the homeless and underinsured to health care collaboratives that are helping West Virginians better manage their chronic diseases, our efforts all exemplify our mission to “meet the unique health care needs of the people of West Virginia and central Appalachia.”

In addition to the organized initiatives outlined in this section, you’ll find our faculty, students and staff at local schools caring for their student-athletes, building houses with Habitat for Humanity, collecting food and other essentials for the needy and much, much more.

We take the sense of family we pride ourselves on at Marshall into the communities we serve, bringing hope and healing with us.

COMMUNITY





As part of a \$75,000 donation from The Health Plan, Marshall Health installed new playground equipment, a basketball court, a bicycle rack and a two-story mural of an apple tree by local artist, Beverly St. Lawrence.

Hope and healing for Huntington

Huntington’s road to recovery goes beyond Marshall. It relies on dynamic partnerships to drive change in ways that can truly make an impact on individuals with substance use disorder (SUD) and their families. Marshall University, its Joan C. Edwards School of Medicine and Marshall Health are at the center of this change.

Through partnerships with other local organizations, the Marshall School of Medicine and its practice plan, Marshall Health, opened two new addiction treatment facilities in late 2018.



PROACT is located at 800 20th Street in Huntington. This innovative approach to treatment focuses on accessible and individualized services.

Collaboration in action at PROACT

The Provider Response Organization for Addiction Care & Treatment (PROACT) brings together behavioral, social and medical resources from the community to effectively triage patients experiencing addiction. The PROACT model consolidates the process into a single-accessible service hub to ensure individuals see a physician and receive timely access to a treatment plan. PROACT, which operates as a separate organization in collaboration with Cabell Huntington Hospital, Marshall Health, St. Mary’s Medical Center, Thomas Health System and Valley Health, opened its first facility in Huntington in October 2018 with goals for further expansion.

Hope and healing focused on family

Project Hope for Women & Children opened in December 2018 as the region’s only comprehensive residential

treatment facility for women with substance use disorders and their children. Project Hope provides onsite peer and residential support, developmental and parenting support and mental health services. Other recovery services are provided through existing community resources and other outpatient locations, including child care, education and job training and wellness classes.

To date, a total of eight women have completed the intensive, six-month therapy and recovery program at Project Hope.

In April 2019, Project Hope for Women & Children and PROACT both received “Innovation Now” awards from a Washington, D.C.-based organization, the Addiction Policy Forum, for being among the top 10 innovative solutions for the prevention and treatment of substance use disorder in West Virginia.



From left, Dr. Stephen Petrany, Dr. Lyn O’Connell, Jessica Tackett and Michael Haney accept Innovation Now awards on behalf of PROACT and Project Hope for Women & Children.

Bringing communities together

In addition to providing comprehensive treatment services, other targeted efforts are designed to aid in long-term recovery and establish a model to help other communities throughout West Virginia struggling with similar diseases of despair.

Creating Opportunities for Recovery Employment (CORE) provides the resources and support necessary to help individuals in recovery re-enter the workforce.

Great Rivers Regional System for Addiction Care

works with 70+ organizations/agencies in Cabell, Jackson, Kanawha and Putnam counties in West Virginia to build an infrastructure and strengthen community collaborations so that partners are empowered to provide comprehensive SUD treatment to their communities.

Marshall Health is working with the City of Huntington on the **Compass** project to develop and promote resiliency and wellness among first responders.

OTHER COMMUNITY COLLABORATIVES

- Healthy Connections
- Quick Response Team (Huntington)
- State Opioid Response (SOR) Project
- Southern West Virginia Opioid Consortium

Community support for Project Hope has been overwhelming. Businesses and foundations have sponsored 8 of the 18 apartments at Project Hope, providing kitchen appliances, furniture and day-to-day living essentials. A newly renovated playground and courtyard in the center of Project Hope provides a beautiful, safe outdoor living space for both Project Hope and Huntington City Mission residents.



From left are Barbara Good, regional manager for The Health Plan; Dr. Lyn O'Connell, associate director of addiction sciences; Beverly St. Lawrence, local mural artist; Dr. Stephen Petrany, chair of family & community health; James Pennington, former president & CEO of The Health Plan; Beth Hammers, CEO of Marshall Health; and Jessica Tackett, director of Project Hope for Women & Children.

Community health at home in Appalachia

Over the years, with the support of federal, state and private funding, the Marshall School of Medicine has created a model for community health programs that are actively working to improve the health of West Virginia and those throughout Appalachia.

Appalachian Diabetes Coalitions and Chronic Disease Management

Since 2001, the Appalachian Diabetes Control and Translation Project (ADCTP) has worked with more than 92 distressed rural counties throughout the Appalachian region to reduce the diabetes epidemic.

A federal, state and community partnership involving the Centers for Disease Control and Prevention (CDC), the Appalachian Regional Commission (ARC) and our team at the Robert C. Byrd Center for Rural Health at Marshall University provides direct technical assistance and training for the coalitions.

Seventy-three active coalitions focus on key diabetes risk factors, such as physical activity and nutrition. During the past year, program staff focused on promoting the CDC's National Diabetes Prevention Program and training community leaders to implement gentle yoga.

The community health worker-based model



Appalachian Diabetes Coalition Coordinator Sheila Plogger with gentle yoga leaders following a training. In 2018, the program trained 206 leaders in gentle yoga.

Care coordination is essential for high-risk patients with chronic conditions. For those in rural Appalachia, the logistics are often a primary barrier to care.

Our model transfers the delivery of rural primary care by implementing a care coordination model through 31 community health workers who team up with federally

qualified health centers, rural hospitals and health departments in 13 rural counties in West Virginia, eight in Kentucky and three in Ohio.

Collaboration with Medicaid Managed Care Organizations has been established to analyze the correlation of health outcomes and cost savings for high-risk patients who are enrolled in care coordination. A preliminary analysis by insurance provider The Health Plan showed an estimated \$5,000 per member cost savings for members participating in the program, and total member prescriptions decreased from 93 to 50 in a four-month period.

**The Appalachian Diabetes Coalition is funded through generous support from Appalachian Regional Commission, Claude Worthington Benedum Foundation, Sisters Health Foundation, Randolph County Housing Authority, Bernard McDonough Foundation, Logan Health Foundation, Highmark Foundation and Merck Foundation.*

Healthy habits start early

The Department of Family & Community Health provides technical assistance and training to the more than 150 school-based health centers in West Virginia, reaching more than 84,000 students in 40 counties.

Partnerships between Marshall School of Medicine and the West Virginia Department of Education and the West Virginia Department of Health & Human Resources' Bureau for Behavioral Health paved the way for expanded mental health programs in our schools as well as early interventions for substance use disorder. The Marshall team currently facilitates the statewide Expanded School Mental Health steering team, representing 20 organizations across West Virginia.

Number of high-risk patients enrolled:

622

2018 Impact

Number of participants in physical activity programs:

62,261

Number of participants in nutrition programs:

30,821



Gina Sharps, MPH, RDH, coordinator of the West Virginia Oral Health Coalition initiative

Oral health matters

Marshall School of Medicine’s community oral health teams are involved in oral health policy development, lead the statewide oral health coalition, work with schools

on oral health education, screening and preventive interventions and collaborate with regional oral health coalitions on local policy issues, access to care and workforce development.

During the 2018-2019 school year, our school-based oral health initiative provided dental screening, sealant, treatment and referral programs in 368 schools in West Virginia—providing more than 17,000 school-aged children with dental services, along with more than 1,200 educational programs.

Oral health teams in the Department of Family & Community Health and Department of Dentistry, Oral & Maxillofacial Surgery support the dental clinic at Ebenezer Medical Outreach, providing general dentistry and dental clinic coordination for the uninsured and underserved.

Herd continues to help homeless

Marshall Medical Outreach (MMO), our student-led free mobile medical clinic, serves more than 32 patients every month in the parking lot behind Trinity Episcopal Church in Huntington.

Number of community service hours by medical students in 2018/19:

6,887

During the three-hour free monthly clinic, about 30 volunteers provide medical care and encouragement for the homeless and those at risk for homelessness in Huntington. In addition to access to primary care and over-the-counter medications, MMO helps patients receive necessary prescriptions, eye screenings and dermatology services.

MMO also hosted a special clinic in Charleston on April 13, 2019, in collaboration with Grace Bible Church.

In addition to students and faculty from the Marshall School of Medicine, MMO also partners with the Robert C. Byrd Center for Rural Health at Marshall University, Marshall University School of Pharmacy, Cabell-Huntington Coalition for the Homeless/Harmony House, Cabell-Huntington Health Department, Ebenezer Medical Outreach and the Bright Clinic.

MMO was established in 2011 and has served more than 2,500 patients to-date.



Class of 2019 graduates, Drs. Matthew Riley, Erin Fankhanel, Ben Jude and Emily Wright, volunteer at MMO on a rainy Saturday morning.



Quality care and unyielded access are the main drivers of a patient-centered approach to care at Marshall Health, the clinical enterprise of Marshall's Joan C. Edwards School of Medicine.

But, the ways in which they're delivered—through innovation and the latest technologies—are what make Marshall different. This year, we focused on bringing more advanced specialty care to our region.

Marshall Health now offers more than 75 in-demand specialties, like neurology, psychiatry, orthopaedics, oncology and more.

As your health care partner, Marshall Health is committed to addressing health disparities and promoting patient wellness, implementing prevention strategies and working together for the health of our patients.

PATIENT CARE





Dr. Adrenele Olajide, associate professor of internal medicine

2018/19 PATIENT CARE SNAPSHOT



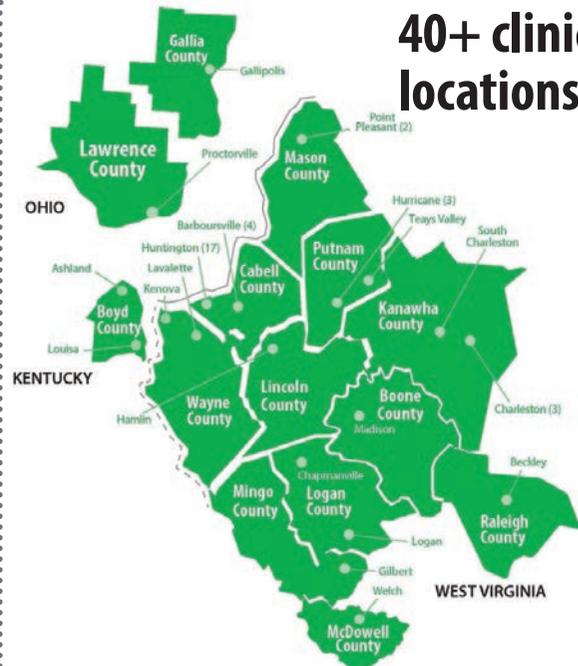
TOTAL VISITS

537,206

NEW PATIENT VISITS

61,316

40+ clinic locations



1,400+ employees

ranked Marshall Health (University Physicians & Surgeons) in the top 35 as one of the largest employers in West Virginia.

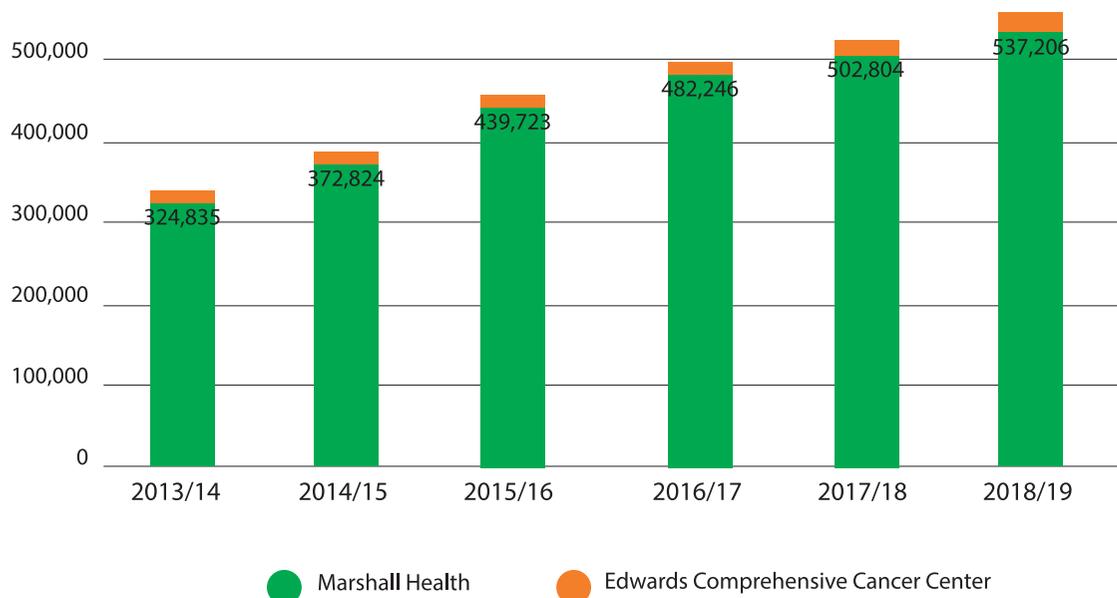


Our care team at Marshall Health includes nursing staff, clinical pharmacists, patient care coordinators, research scientists, medical students, resident physicians, physician assistants, nurse practitioners and physicians who are part of the coordinated health care delivered 365 days a year.

Growth of the clinical enterprise

As part of a community-based medical school, we strive to ensure our families, friends and neighbors have access to high-quality specialty care close to home. We have partnered with 18 area hospitals and opened more than 40 outpatient clinics throughout

southern West Virginia, eastern Kentucky and southern Ohio to fulfill this goal. During the past six years, patient visits at Marshall Health have increased 65%.



INNOVATIONS IN CARE

Faster recovery with augmented ACL

An anterior cruciate ligament (ACL) injury can be devastating for athletes who just want to play the sport they love. Through his innovative new technique combined with biologics, one orthopaedic surgeon at Marshall Health is working toward accelerated rehabilitation and return to play for his patients.

Chad D. Lavender, MD, a board-certified orthopaedic surgeon at Marshall Health and assistant professor in the department of orthopaedic surgery at the Marshall School of Medicine, was the lead on the development of a new technique – known as the “fertilized ACL.”

The procedure explores the use of amnion, bone marrow concentrate and suture tape in ACL reconstruction. This minimally invasive technique uses a mixture of bone marrow concentrate, autograft bone and demineralized bone matrix to fill the

tunnels within the knee joint during traditional ACL reconstruction. This technique also utilizes an innovative concept of internal brace reinforcement to improve stability of the healing ACL.

“There are early advantages to fertilized ACL reconstruction such as decreased pain, and when this is combined with biologics, we may be able to accelerate rehabilitation and return to play more than previously anticipated,” Dr. Lavender said.

Articles on the procedure and its outcomes have been published in *Arthroscopy Techniques*. Lavender and his team have also initiated a clinical trial to evaluate the safety and efficacy of biologic augmentation during ACL reconstruction surgery.

The next era of joint replacement

The orthopaedic surgeons at Marshall Health are using Stryker’s Mako system for robotic-arm assisted total hip and knee replacement to transform the way they perform joint replacement surgery.

During the procedure, a 3D model is used to create a personalized surgical plan and identify the implant size, orientation and alignment. In the operating room, your surgeon follows your personalized surgical plan while preparing the bone for the implant. The surgeon guides the robotic-arm within the pre-defined area, and the Mako System helps the surgeon stay within the planned boundaries that were defined when the personalized pre-operative plan was created.

The joint replacement team recently used the technology to convert a complex hip fusion to total hip replacement.



The joint replacement team of Dr. Alexander Caughran, assistant professor; Dr. Ali Oliashirazi, professor and chair of orthopaedic surgery; Dr. Felix Cheung, associate professor; and Dr. Matthew Bullock, assistant professor

“Now, patients don’t have to travel for these types of complex revision surgeries; we can take care of them right here at home,” said Matthew Bullock, DO, an assistant professor in the department of orthopaedic surgery.

INNOVATIONS IN CARE

Maternal-fetal medicine care just a click away



Assistant Professors of Obstetrics and Gynecology Jesse Cottrell, MD, and Kelly Cummings, MD ('10), with Professor of Obstetrics and Gynecology David Chaffin, MD

High-risk pregnancy patients have access to Marshall Health's maternal-fetal medicine specialists close to home, thanks to the power of technology.

Using a real-time video conference in the office of the patient's local physician, pregnant patients throughout West Virginia are able to interact with board-certified maternal-fetal medicine specialists David Chaffin, MD, Jesse N. Cottrell, MD, and Kelly Cummings, MD.

Similar to a regular office visit, the video interaction may include an exam by the local physician or an ultrasound technician under the direction of one of the specialists. Through this technology, the local physician has the opportunity to be in a discussion on the findings, and the patient can have a consult without having to travel unless necessary to make a diagnosis or for treatment.

The maternal-fetal medicine specialists in Marshall's department of obstetrics & gynecology are experienced in caring for women experiencing



high-risk pregnancies due to advanced maternal age, high blood pressure, gestational diabetes, preterm labor, placenta previa, miscarriage risk, carrying more than one baby and/or other conditions that could endanger the health of the mother or her baby.

Maternal-fetal medicine services are also available in Marshall Obstetrics & Gynecology's Huntington and Teays Valley clinics. In-person care also expanded to Beckley and Charleston in fall 2019.

New urology department paves the way for expanded care



Dr. James Jensen, professor and chair of urology and medical director of Edwards Comprehensive Cancer Center

Although the Marshall School of Medicine and Marshall Health have been providing urology services since 2005 under the school's department of surgery, the formation of a department means added opportunities for training, clinical research and patient care.

Urology services available include urologic oncology, benign prostatic hypertrophy, male voiding dysfunction, kidney stones, male and female urinary incontinence, erectile dysfunction, male infertility, genitourinary trauma and reconstructive urology, men's urology and robotic surgery.

James C. Jensen, MD, a professor, urologic oncologist and medical director of the Edwards Comprehensive Cancer Center at Cabell Huntington Hospital, has been tapped to lead and grow the department as its first chairman. He has performed more than 1,500 robotic kidney, bladder and prostate cancer procedures and was among the first 20 physicians in the nation to adopt robotic surgery as a full-time practice.



Drs. Amjad Alwaal, assistant professor of urology, and Lawrence Wyner, professor of urology

In addition to Jensen, Marshall Urology includes fellowship-trained general urologists Lawrence M. Wyner, MD, and Amjad H. Alwaal, MD.

Ophthalmology welcomes new department chair



Dr. James W. Gigantelli
Professor and Chair of
Ophthalmology

Following a national search, Marshall School of Medicine named James W. Gigantelli, MD, professor and chair of its ophthalmology department in March 2019.

Dr. Gigantelli joins Marshall from the University of Nebraska College of Medicine.

While at Nebraska, he served as professor, assistant dean of governmental affairs

and interim chair of the department of ophthalmology and visual sciences, as well as director of the Stanley M. Truhlsen Eye Institute. Throughout his 28-year professional career, Gigantelli has authored more than 50 publications and research abstracts in clinical care and lectured widely on topics ranging from ocular adnexal disease to medical leadership. He has been acknowledged with local and national awards for excellence in clinical care and teaching. His clinical practice focuses on improved diagnostic accuracy of orbital tumors and innovative therapies for orbital inflammatory diseases.

His goals for the department include developing a graduate medical education program in ophthalmology; expanding the department in southern West Virginia, eastern Kentucky and southern Ohio through the addition of comprehensive and sub-specialty clinical providers and academic researchers to the department's faculty base. The department of ophthalmology currently includes five ophthalmologists and operates two locations in Charleston and Huntington.

Professional Profile

Medical Degree: Vanderbilt University, Nashville, Tennessee

Training: Baylor University, Houston, Texas (ophthalmology residency); Duke University Eye Center, Durham, North Carolina (ophthalmic plastic and reconstructive surgery, orbital disease and ophthalmic oncology fellowship)

Certification: American Board of Ophthalmology

SPECIALTY CARE SPOTLIGHT: Heart Failure



Dr. Carlos Rueda
Assistant Professor of
Cardiology

Professional Profile

Medical Degree:

Universidad Industrial De Santander, Bucaramana, Colombia

Training: University of Miami's Jackson Memorial Hospital, Miami, Florida (internal medicine residency); Advocate Illinois Masonic Medical Center, Chicago, Illinois (cardiology fellowship); Vanderbilt University, Nashville,

Tennessee (advanced heart failure and transplant fellowship)

Certification: American Board of Internal Medicine with a subspecialty certification in cardiovascular disease. He is also board certified in nuclear cardiology and echocardiology.

For patients diagnosed with heart failure, a targeted approach is needed to manage this lifelong, chronic disease. In fall 2018, Marshall Health welcomed Carlos Rueda, MD, to its team of cardiologists. Dr. Rueda's expertise in advanced heart failure, transplant cardiology, mechanical circulatory support, left assist ventricular devices and cardiology, brings a much-needed specialized care to patients in our region.

INNOVATIONS IN CARE

TMS aids in treatment of chronic depression

Antidepressant medications are often the first line of defense in treating depression, but about 40 percent of individuals fail to respond or do not tolerate them due to side effects.

Marshall Health is one of two practices in the region that offers transcranial magnetic stimulation, or TMS, as a non-invasive alternative for individuals with treatment-resistant depression. TMS is performed in a doctor's office using a magnetic coil to activate areas of the brain involved in mood regulation. Treatments take about 45 minutes and are performed daily for four to six weeks.

Although TMS has been FDA approved as a treatment alternative for depression in the United States since 2008, TMS is not for everyone diagnosed with depression. Patients must first be evaluated by Kelly E. Melvin, MD ('05), or D. Scott Murphy, MD ('14), the TMS-trained psychiatrists at Marshall Psychiatry, to determine if the procedure is right for them.



Dr. Kelly Melvin ('05), associate professor of psychiatry and behavioral medicine, uses TMS to treat a patient with chronic depression.

New joint venture toxicology lab implements best practices for safe opioid prescribing



A new laboratory for clinical and lab services located at 2561 Third

Avenue in Huntington's Highlawn neighborhood opened earlier this year as a joint venture among Mountain Health Network, Marshall Health and HealthTrackRx. The new organization known as Mountain Health Clinical Solutions is designed to help health care providers identify and prevent prescription opioid and controlled substance misuse.

The program supports HealthTrackRx's GuideMed program, which aids health care providers in prescribing and monitoring medications for people being treated with opioids and other controlled substances.

"The GuideMed program will provide a framework to assist in return-to-work programs and assure employers in hiring

recovery patients," said Mike Mullins, president and CEO of Mountain Health Network. "It also will assist physicians with safely prescribing and monitoring medications for those requiring treatment for pain management."

GuideMed helps keep providers in line with new legislative requirements for prescribing opioids, provides individualized patient reports including data on risk and compliance and centralizes patient education and provides testing services. Physicians will be able to delegate the monitoring and reporting requirements to this new program, thereby taking that burden from themselves and their staff.

"Research and preliminary data from our program show that comprehensive monitoring yields greater success for our patients to achieve long-term recovery — that's the most important part," said Beth Hammers, CEO of Marshall Health.

Marshall Health brings 24/7 pharmacy services to the region



A child's sudden fever, an ER visit or hospital discharge after hours no longer leaves patients wondering how to fill a prescription. In fall 2018, Marshall Health expanded the hours of its specialty pharmacy located in the Marshall University Medical Center to operate 24 hours a day, seven days a week, 365 days a year, including holidays.

Customers have access to a full range of services at the retail pharmacy, including prescriptions and refills, specialty medications, injectables, a limited supply of over-the-counter items and diabetic supplies. Staff are also on hand to administer vaccines and answer questions about medications either by phone or in person.

In addition to retail pharmacy services, Marshall Pharmacy also provide its Meds to Beds service to Cabell Huntington Hospital patients around the clock. This convenient service delivers patients' prescriptions to their bedsides just prior to discharge.

"We want to be available when our patients and providers need us—whether that's noon or midnight."

Jeffrey A. Fenerty, RPh
Director of Pharmacy Services



Drive-thru service

In April 2019, Marshall Health opened its third retail pharmacy location inside the Provider Response Organization for Addiction Care and Treatment (PROACT) clinic at 800 20th Street in Huntington. In addition to basic retail pharmacy services, it offers medication synchronization and medication review therapy.

"Our new location is available for PROACT patients as well as others in the community looking for the convenience of a pharmacy, especially one with drive-thru service, in their neighborhood or on their drive to work or school," Fenerty said.

SPECIALTY CARE SPOTLIGHT: Dermatopathology



Dr. Jonathan Cuda ('06)
Associate Professor of
Pathology

University, Stanford, California (dermatopathology fellowship)

Certification: American Board of Pathology in Anatomic Pathology with subspecialty certification in dermatopathology

Professional Profile

Medical Degree:

Marshall University
Joan C. Edwards
School of Medicine

Training:

Johns Hopkins Hospital,
Baltimore, Maryland
(anatomic pathology
residency and
surgical pathology
fellowship); Stanford

Prompt, accurate diagnoses of skin conditions through dermatopathology

Through a collaboration between Marshall Health and Cabell Huntington Hospital, West Virginia clinicians are able to work directly with board-certified, fellowship-trained dermatopathologist, Jonathan D. Cuda, MD, a West Virginia native, to accurately diagnose acute, chronic and complex skin conditions at the microscopic level. Dr. Cuda's areas of expertise include all skin disorders and diseases such as skin cancer, melanocytic nevi, vulvar disorders and cutaneous lymphoma. Results are provided within 24 to 48 hours of receipt.

First ALS clinic in southern West Virginia at Marshall University



Dr. Paul Ferguson ('07)
Associate Professor and Chair
of Neurology

facilitates patient therapies and closely monitors disease progression.

"Research has shown improved life expectancy related to multidisciplinary clinics for ALS, so we are thrilled

A multidisciplinary neuromuscular clinic at Marshall University for patients with ALS, or amyotrophic lateral sclerosis, more commonly referred to as Lou Gehrig's disease, gives patients access to comprehensive care close to home. A team of experienced, quality providers

to provide this much-needed service in southern West Virginia," said Clinic Coordinator Sarah Clemins, an assistant professor in the department of communication disorders.

During their first clinic visit, patients receive a comprehensive assessment by their care team, a recommended course of treatment and a schedule of follow-up visits as well as the opportunity to ask questions. In addition to specialized care, the clinic also connects ALS patients and their caregivers with information about a support group and resources available through the ALS Foundation.

Paul Ferguson, MD, associate professor and chair of neurology at the School of Medicine, oversees the clinic's neurology services.

The generosity of alumni and friends brings the mission of the Marshall University Joan C. Edwards School of Medicine to life. The dynamic education and training received at Marshall prepare students for life and practice and provide a skilled physician workforce to care for the people of West Virginia and Appalachia and throughout the U.S.

For more than 40 years, the School of Medicine has been transforming the lives of its students and patients. We are looking toward the future of health care with innovations in medical education and patient care as well as groundbreaking biomedical and clinical research. You can help us continue this important work by giving to the School of Medicine.

Your support helps Marshall rise to the next level and creates an enduring legacy in academic medicine and scientific discovery as we train the next generation of physicians and medical scientists.

DEVELOPMENT





Medical students volunteer in full-force for Standing Out in Our Field, the school's signature annual fundraising event for student scholarships.

Paying it forward

With 36 of 39 class endowments now in place, the School of Medicine is closing in on completing all of its class endowments.

Some classes choose to direct their funds toward student scholarships, while others identify different needs within the school. Regardless, each class chooses to direct their scholarship fund toward something meaningful to them.

“There’s a sense of pride that comes from having a class endowment, like you’re leaving your institution with something to show your appreciation and the camaraderie that came as a result of those hard-earned dollars,” said class president Karl G. Shaver, MD (‘19).

The Class of 2019 wanted to make additional resources available to support and advance the clinical training of medical students, so they designated their endowment to provide materials and educational resources for the Clinical Skills Lab on our health sciences campus. The class prioritized funding to provide more advanced bedside ultrasound equipment accompanied by a robust ultrasound curriculum for students in the lab.

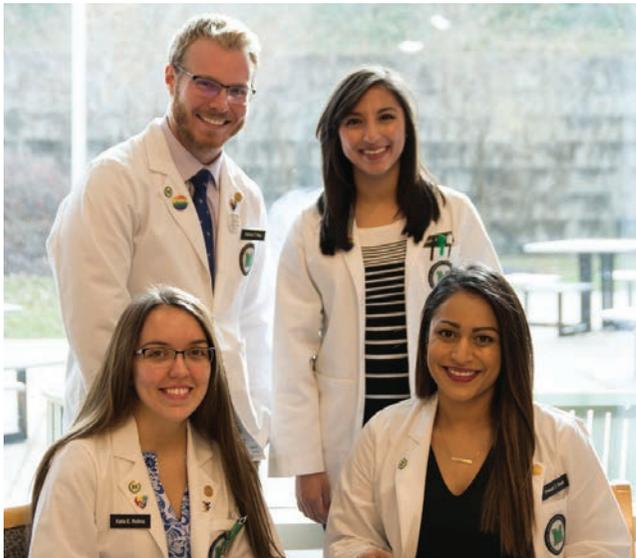
“The School of Medicine has given me my chosen pathway,” said class vice president Emily M. Wright, MD (‘19). “Hopefully, we can provide the encouragement and financial support to make the path easier for others behind us.”

Committed to scholarships

Early in the medical school journey, students are introduced to the world of philanthropy that makes everything from white coats & medical instruments to scholarships possible. Both of the following class scholarships were endowed before students even reached their clinical years and are designated for first-year medical students with financial need.

Class of 2020

The Class of 2020 endowed its scholarship in 2018, less than halfway through their medical school career and making them the first class to endow a scholarship well before graduation. The students raised more than \$20,000 through a variety of fundraising activities.



Class officers Katie Rollins (seated at left), Preeya Shah (seated at right), Dakota May (standing at left) and Alexandrine Ratnani

Class of 2021

The Class of 2021 established a scholarship in memory of Laura L. Richardson, PhD, associate professor of biomedical sciences, assistant dean of academic affairs and director of preclinical education, as “an enduring symbol of their respect, fondness and appreciation of her leadership, support and dedication to the School of Medicine and its students” from 2005 until her death in 2018.



From left are class officers Danny Jayasuriya, Sam Wood, David Bartlett and Hannah Datz

Scholarships build lasting connections

After starting a scholarship last fall to support a medical student on the journey to becoming a pediatrician, Keith and Tamara Huffman had the opportunity this spring to meet the student receiving the scholarship named in honor of Tamara’s late mother, Mrs. E. Pauline Harrell.

Fourth-year medical student Alexandrine “Alex” Ratnani is a native of Hurricane, West Virginia. She graduated from the University of Kentucky and was a member of the dance team. While at Marshall, Alex has served as secretary of the Class of 2020. She enjoys giving back to her community and is an active member of Marshall Medical Outreach. This past spring, Alex was inducted into the Gold Humanism Honor Society. She is currently applying for a residency in pediatrics and plans on becoming a pediatric hospitalist.

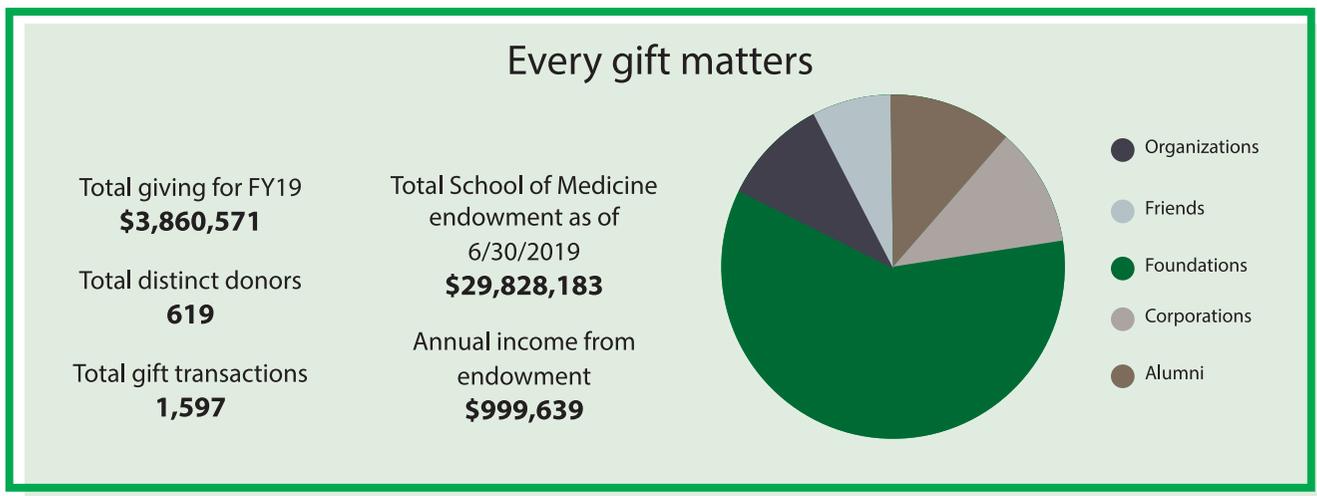
When Alex and Tamara met at this year’s annual scholarship brunch, they had an instant connection. They bonded over Kentucky and their love of people and culture. When asked about her plans before starting residency, Alex shared that it has been a dream of hers to travel to Thailand and volunteer at an elephant sanctuary in order to see and interact with elephants. Tamara could not believe what she had just heard. She was in shock. With a warm smile on her face, Tamara explained to Alex how her late mother loved elephants and how she would give away elephant figurines to people she cared about. Since her mother’s passing, Tamara had three figurines left and said she would send one to Alex. A few weeks



Keith Huffman and Tamara D. Huffman with medical student Alexandrine Ratnani (right)

later, Alex received a package containing one of Tamara’s mother’s favorite elephant figurines as well as a generous check to help fund Alex’s future trip to Thailand. Alex was very emotional when she received this amazing surprise. She is extremely thankful for this tremendous gift and still stays in contact with Tamara.

“It’s incredible how some things are just meant to be,” Alex said. “It’s connections like these that truly impact people’s lives and illuminate our world. It is charitable acts like these that promote and generate a more magnanimous culture.”



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