



Momentum in Medicine 2015

DEPARTMENT OF INTERNAL MEDICINE



Department of Internal Medicine at Rush

Mission, Vision and Values

Mission

The Mission of the Department of Internal Medicine is to provide innovative medical care of the highest quality to our patients. Our research and educational programs will identify and train the next leaders of medicine. Our community service programs will foster relationships with other hospitals and communities in the Chicago area that will lead to healthier lives here and across the nation, now and in the future.

Vision

The Vision of the Department of Internal Medicine is to be the role model department of internal medicine in Chicago and to be considered among the very best in the country. This will be achieved through excellence in patient care, education and research. We will strive to ensure our patients, trainees, students, faculty and staff achieve the highest level of satisfaction.

Values

As a department, we embrace **I Care**. We will live by:

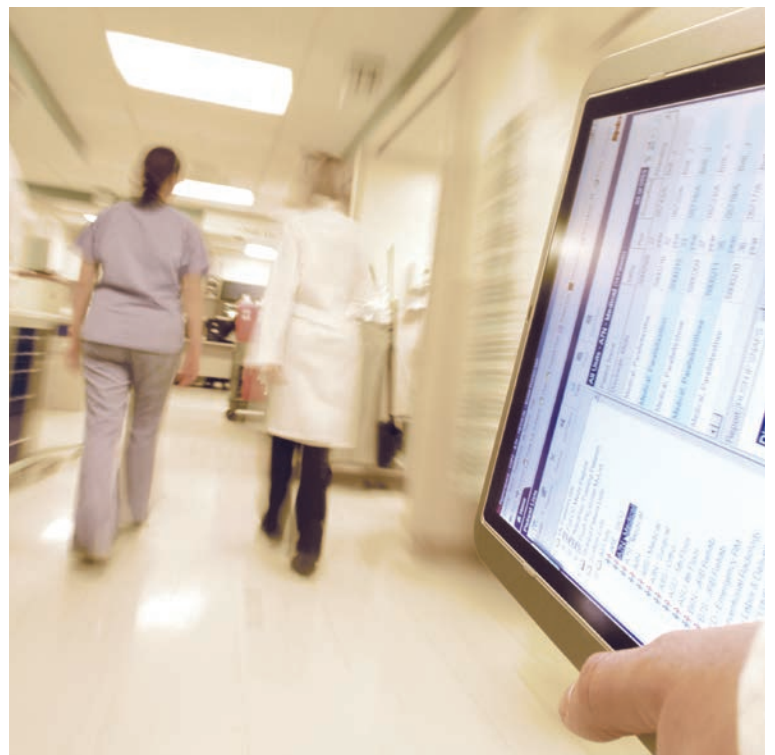
- Innovation
- Collaboration
- Accountability
- Respect
- Excellence

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Department of Internal Medicine Division Chiefs: Top row, left to right: Amir K. Jaffer, MD, MBA, SFHM, Hospital Medicine; Antonio C. Bianco, MD, PhD, Endocrinology and Metabolism; Joel A. Block, MD, Rheumatology; Stephen M. Korbet, MD, Nephrology. Middle row, left to right: Robert A. Balk, MD, Pulmonary and Critical Care Medicine; Gordon M. Trenholme, MD, Infectious Diseases; Kim A. Williams, Sr., MD, FACC, Cardiology. Bottom row, left to right: Anthony J. Perry, MD, Geriatrics, Gerontology and Palliative Medicine; Jochen Reiser, MD, PhD, Chairman of Internal Medicine; Ali Keshavarzian, MD, Digestive Diseases and Nutrition. *Not pictured:* Philip Bonomi, MD, Hematology, Oncology and Cell Therapy, and Margaret McLaughlin, MD, General Medicine.



A New Vision for Medicine at Rush



Today, leaders in academic medicine need to think innovatively to meet the challenges of health care reform and to secure funding in an era when competition for grants is greater than ever. They need to be strategic even when the future is uncertain. In times like these, I am reminded of a quote by the computer scientist Alan Kay: “The best way to predict the future is to invent it.”

That is just what we are doing in the Department of Internal Medicine at Rush — inventing a *better* future for our patients, our community and our institution.

To help us along the way, we have developed a vision that includes six key strategies: **Leadership. Growth. Alliances. Quality improvement. Efficiency. Excellent patient care.**

Each one of these pieces is critical if we want to meet our goal to be the best academic medicine department in the city and one of the top internal medicine programs in the country. We have the right people to help us get there. The department is the academic home to more than 400 faculty, 80 fellows, 114 residents and over 300 medical students who rotate through the department.

As the city’s oldest health care institution, Rush is aware of its academic roots and has built a legacy of providing top-notch medical education and excellent clinical services. Yet we recognize that there are still many unmet needs in the community, which is why we have developed new **super-subspecialty programs** like our cardio-oncology clinic and thyroid cancer clinic. We also realize that internal medicine trainees need to be prepared for higher levels of engagement than ever before, so we have created opportunities for residents to lead **quality improvement and safety** projects that transcend our department.

As part of our departmental transformation, we also are investing time and resources to build a high quality, high impact and **viable research enterprise** that will support our efforts to deliver the most promising therapies in a value-based world. Over the past two years, we have added a senior vice chair of research and created a centralized research office. Additionally, we have made more seed and bridge funding available to investigators and have expanded opportunities for mentorship and career development for our junior faculty in and even outside the Department of Internal Medicine.

These changes are already having an impact, and you can read about some of our recent successes in this report. None of these achievements would be possible without the faculty, fellows, students and staff who make Rush such a nurturing, supportive environment. For those of us who are part of the transformation at Rush and in the Department of Internal Medicine, it is an exciting — and intense — time.

More changes are underway, so we hope you will visit internalmedicine.rush.edu to follow what’s happening in our department in the years to come.

Jochen Reiser, MD, PhD

The Ralph C. Brown, MD, Professor
Chairman of Internal Medicine

Focus on Research

Great science starts with great questions. At Rush, great questions arise from situations that physician-researchers face in the clinic and at the bedside. Sometimes, patients pose these questions directly: *Is there a fiber I can take that doesn't cause so much discomfort? Why don't NSAIDs relieve the osteoarthritis pain in my knee? If I have an aggressive form of ductal carcinoma in situ, do I need a mastectomy or is there a less invasive option?*

At Rush, we find answers to these questions through cross-disciplinary collaborations. From basic science and translational research to clinical and epidemiological research, our focus is on developing high-quality research projects that, ultimately, will provide more options for patients.

At a time when research funding is declining, the Department of Internal Medicine has significantly increased its grant funding as well as the number of submissions in dramatic ways. The spirit of research is more present than ever and improves all aspects of our department.

To continue growing our research program and make advances in patient care possible, the Department of Internal Medicine has built a new research enterprise to support investigators at all stages of their career.

STRONG RESEARCH LEADERSHIP. **Antonio Bianco, MD, PhD**, executive vice chairman of medicine, oversees the department's research program. A critical part of his mission is connecting young faculty with the right mentors and providing clear career development pathways for promising investigators.

CENTRALIZED RESEARCH OFFICE. This new, dedicated resource helps investigators access core services like bioinformatics, statisticians and research coordinators. The office also provides guidance to investigators to help them apply for competitive grants and manage them post-award.

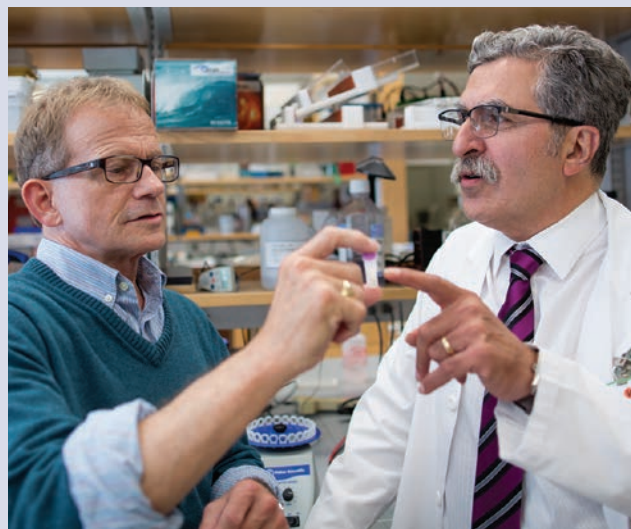
EXECUTIVE COMMITTEE ON RESEARCH (ECOR). Each year, ECOR provides \$500,000 in seed and bridge funding to principal investigators in the department. The goal is to help researchers complete the work they need to receive NIH funding or to publish in a leading journal.

RESEARCH GRAND ROUNDS. Every other week, the Department of Internal Medicine hosts a Research Grand Rounds to share knowledge among students, residents, fellows and faculty and help foster collaborations between departments. It also showcases the various basic and translational research being conducted on the Rush campus and provides an excellent opportunity for the medical students, residents, fellows and staff to get more involved and enhance their training experience at Rush.

INTERDEPARTMENTAL RETREATS. Department leaders regularly invite faculty from different disciplines to present their research projects so they may identify potential collaborators.

NEW DRUG DISCOVERY CENTER. The Department of Internal Medicine's new Drug Discovery Center is focused on developing new treatments for kidney diseases and inflammatory conditions.

CARDIO-RENAL CENTER. The Department of Internal Medicine recognizes the need to decipher the mechanisms behind the heart and kidney connection to lower mortality and develop novel therapeutic strategies.



Chris Forsyth, PhD, (left) and Ali Keshavarzian, MD, (right) collaborate on circadian rhythm research supported by the NIH.

Focus on Technology and Innovation

The Department of Internal Medicine has invested in new technology tools to promote research and improve clinical care.

RESEARCH INFORMATICS PLATFORM. Rush, a national leader in health IT, is among only 5 percent of health systems in the country to achieve Stage 6 HIMSS designation. The Department of Internal Medicine is leveraging the institution's IT resources and data governance infrastructure to create a research informatics platform.

Bala Hota, MD, a nationally recognized IT expert and the department's chief research information officer, is leading the charge to develop a platform that will allow investigators to query the vast amounts of clinical data collected in the electronic health record (EHR). Additionally, Hota is creating a bioinformatics and biostatistics framework to support investigators in their data needs.

NEW DRUG DISCOVERY TOOLS. The Department of Internal Medicine has invested in several cutting-edge research tools as part of the Drug Discovery Center.

- The Opera® High Content Screening System screens and analyzes hundreds of samples in less than one minute. Researchers at Rush are using this robotic system — the only one of its kind in Chicago — to investigate and identify new therapeutics for treating kidney disease, cardiovascular diseases and various inflammatory conditions.
- The Janus® Automated Workstation is a liquid-handling robot that acts as a preprogrammed, multichannel pipettor. Researchers at Rush use Janus to develop multiplex assays to test compounds that could lead to new treatments for a variety of diseases.

To foster the collaboration that is the foundation of today's medical research, the Department of Internal Medicine is making these technologies available to other research teams at public and private institutions across Chicago.

NEW CORE RESEARCH EQUIPMENT. The Department of Internal Medicine has invested in a new SEM/TEM electron microscope, confocal laser microscopes and additional equipment to help foster discoveries that lead to improved patient care. These state-of-the-art tools are being used to investigate disease mechanisms as well as to develop novel drugs and therapeutics.



Using a robotic screening system, researchers at Rush can speed the discovery of new treatments for kidney disease and other conditions.



IT expert Bala Hota, MD, is developing technology tools to support researchers in the Department of Internal Medicine.

Focus on Quality

Rush has been named among the top hospitals in the country for quality, safety and efficiency four consecutive times by the Leapfrog Group, a national organization that promotes health care safety and quality improvement.

The Department of Internal Medicine supports institution-wide quality efforts and spearheads many quality and safety projects within the department that complement these broader initiatives.

QUALITY IMPROVEMENT DRIVEN BY RESIDENTS. All four chief residents in internal medicine play an active role in the department's safety and quality improvement efforts. Each chief resident leads projects that fall under one of four pillars:

- Medication safety
- Handoffs and communication
- Infection control
- High value and cost-conscious care

To date, chief residents have led a number of innovative projects, including the development of a standardized approach to anticoagulation in patients with atrial fibrillation and an initiative focused on early sepsis detection. Some resident-led teams have developed checklists and assessment forms designed to improve patient safety and care transitions. **Jisu Kim, MD**, the department's chief quality officer, oversees these initiatives with assistance from core faculty and leaders in the residency program.

The chief residents also have opportunities to work on institution-wide projects. For example, **Sarah Oddsen, MD**, led an initiative to reduce central line days — and ultimately central line-associated bloodstream infections (CLABSI) — through improved workflows.

BETTER CARE COORDINATION. Quality improvement projects also have been focused on efforts to improve care coordination for patients once they are discharged. The Division of Hospital Medicine established a transitional care clinic to connect discharged patients with their primary care providers after they leave the hospital.



Residents play a central role in quality improvement efforts, including projects focused on medication safety.

Focus on Collaboration

The most exciting innovations in academic medicine often occur through collaborations. To that end, the Department of Internal Medicine has forged alliances with local, national and international organizations.

JOHN H. STROGER, JR. HOSPITAL OF COOK COUNTY.

The Department of Internal Medicine has close ties with other institutions in the Illinois Medical District. Through a unique academic affiliation with Stroger Hospital, Rush internal medicine residents rotate at both institutions and benefit from experience with two distinct patient populations. The joint residency program — the only one of its kind in Chicago — also shares faculty, giving trainees an opportunity to learn from a wide range of experts.

DUPAGE MEDICAL GROUP AND SWEDISH COVENANT HOSPITAL.

Faculty from the Division of Hematology, Oncology and Cell Therapy provide state-of-the-art cancer care to patients at DuPage Medical Group in Lisle, Ill. Additionally, Rush collaborates with Swedish Covenant Hospital to bring cancer protocols and expertise to patients on the North Side.

UNIVERSITY OF CHICAGO INSTITUTE FOR

TRANSLATIONAL MEDICINE (ITM). Through the ITM, Rush faculty work with researchers at other Chicago-area institutions to speed the development of new treatments. The ITM receives funding from the NIH through the Clinical and Translational Science Awards (CTSA).

EUREKA INSTITUTE FOR TRANSLATIONAL MEDICINE.

Each year, two young investigators from Rush join researchers from around the world for one week of focused training through Eureka's International Certificate Program in Translational Medicine. During the training, promising scientists learn skills that are critical for turning ideas into new treatments for patients.

INTRADPARTMENTAL RESEARCH. Faculty from the Department of Internal Medicine regularly collaborate with investigators in the departments of immunology, behavioral sciences, pharmacology, microbiology and other areas, often providing seed money for promising research.

INTERDEPARTMENTAL RESEARCH AND SERVICE

LINES. These initiatives are paramount for the expansion of the research mission. At the core, internal medicine is the focal point for many other disciplines such as physiology and surgery. Connecting programs beyond the barriers of a department is key to having a long-lasting impact in science and health care.



Robert A. Weinstein, MD, (second from right) reviews cases with residents at John H. Stroger, Jr. Hospital of Cook County, which shares a unique academic affiliation with Rush.



Dan Predescu, MD, PhD, (left) and Sanda Predescu, PhD, (middle) from the Department of Pharmacology, and Niranjan Jeganathan, MD, (right) from the Division of Pulmonary and Critical Care Medicine, are working together to understand the role of intersectin in lung function.

Collaboration Provides Foundation for Subspecialty Care

As the population ages, more people are living longer with heart disease and comorbidities such as cancer, dementia and kidney disease. To better care for the complex needs of these patients, cardiologists at Rush are partnering with their colleagues across disciplines to develop specialized clinics that combine multiple areas of expertise.

This multidisciplinary, patient-centered approach has helped Rush earn its ranking as one of the top 50 cardiology programs in the country, according to *U.S. News & World Report*.

CARDIO-ONCOLOGY CLINIC. Led by cardio-oncology specialist **Tochukwu Okwuosa, DO, FACC**, the new clinic cares for patients whose cancer therapy regimens put them at high risk for heart disease, those who develop heart disease as a consequence of cancer therapy, and individuals who have both cancer and heart disease or heart disease risk factors. Aside from second malignancy, heart disease is the next most common cause of death among approximately 14 million cancer survivors in the United States.

STRUCTURAL HEART DISEASE. A team led by **Clifford Kavinsky, MD**, and **Neeraj Jolly, MD**, undertake cutting-edge research and clinical application of the newest, less-invasive

valve repairs and replacements in our valvular and structural heart clinics. The heart team approach with cardiovascular surgery provides the best guidance for the individualized treatment of patients with critical cardiac problems.

FUTURE SUBSPECIALTY CLINICS. The Division of Cardiology plans to partner with other divisions to expand clinical services for cardiac patients with comorbid neurological conditions and renal diseases.

NATIONAL LEADERSHIP. **Kim Williams, Sr., MD, FACC**, the James B. Herrick Professor of Medicine and chief of the Division of Cardiology, serves as the president-elect of the American College of Cardiology (ACC). In 2015, he will serve as ACC president. In





Opposite page: Residents learn about heart disease treatment and prevention from Kim Williams, Sr., MD, FACC, the James B. Herrick Professor of Medicine and chief of the Division of Cardiology (right). **This page:** Above: Jeffrey Snell, MD, (second from left), director of interventional cardiology at Rush, teaches fellows about the clinical and research applications of Rush’s advanced interventional platform.

his leadership role, Williams plans to promote heart disease prevention, as well as the importance of collaboration between primary care physicians and cardiologists.

EDUCATIONAL AND RESEARCH EXCELLENCE. The division’s highly competitive fellowship program, led by joint faculty from Rush and Stroger Hospital, offers extensive clinical opportunities to learn from experts in imaging, heart failure and other areas. Fellows see patients in Rush’s modern, 28-bed coronary intensive care unit (CICU), one of the largest in Chicago. Similarly, fellows benefit from Rush’s state-of-the-art interventional platform, which brings together diagnostic testing, surgical and interventional services, and recovery for closer collaboration between clinicians.

On the research front, Rush cardiologists are leading exciting trials, including a number of NIH-funded studies, to bring new medications, stem cells and devices to heart patients in Chicago and elsewhere.

ADVANCED ECHOCARDIOGRAPHY. The Rush Cardiac Echocardiography Laboratory, directed by **Melissa J. Tracy, MD, FACC**, has advanced technically and diagnostically, including but not limited to the use of non-nephrotoxic intravenous contrast and 3D technology. Advanced technology allows improved visualization of adult structural heart disease procedures, such as the TAVR and MV Clip as well as closure of PFO/ASD/VSD shunts or trans esophageal echocardiograms (TEEs). The lab is certified for echocardiography by the Intersocietal Accreditation Commission.



Top: Tochukwu Okwuosa, DO, FACC, is leading a new cardiology clinic at Rush.

Bottom: Melissa J. Tracy, MD, FACC, (right), directs the Rush Cardiac Echocardiography Laboratory.

Unlocking Mysteries of the Microbiome

The Division of Digestive Diseases and Nutrition at Rush is a patient-centered, fellow-centered program grounded by translational research. The division's clinician-driven research approach has led to exciting breakthroughs at Rush, including discoveries linking compromised intestinal barrier function to neurological diseases such as Parkinson's and Alzheimer's disease.

RESEARCH ON CIRCADIAN RHYTHMS. Supported by four NIH grants, Rush has become an epicenter for circadian rhythm research. Some research highlights:

- In a study sponsored by NASA, **Ali Keshavarzian, MD**, chief of the Division of Digestive Diseases and Nutrition and the Josephine Dyrenforth Professor of Gastroenterology, is collaborating with other top researchers to determine if intestinal bacteria are affected by space travel.
- **Garth Swanson, MD, MS**, and **Helen Burgess, PhD**, director of the Biological Rhythms Research Laboratory, are investigating how alcohol exacerbates the effects of shift work and circadian rhythm disturbances on intestinal bacteria.
- In several studies supported by NIH, **Ali Keshavarzian, MD**, **Chris Forsyth, PhD**, and **Robin Voigt, PhD**, are investigating the impact of the disruption of circadian rhythms on inflammatory bowel disease, colon cancer and alcohol-induced pathologies like leaky gut and liver disease.

OTHER INVESTIGATIONS. The division has been leading other research in the microbiome and intestinal health, and stress and systemic and intestinal health.

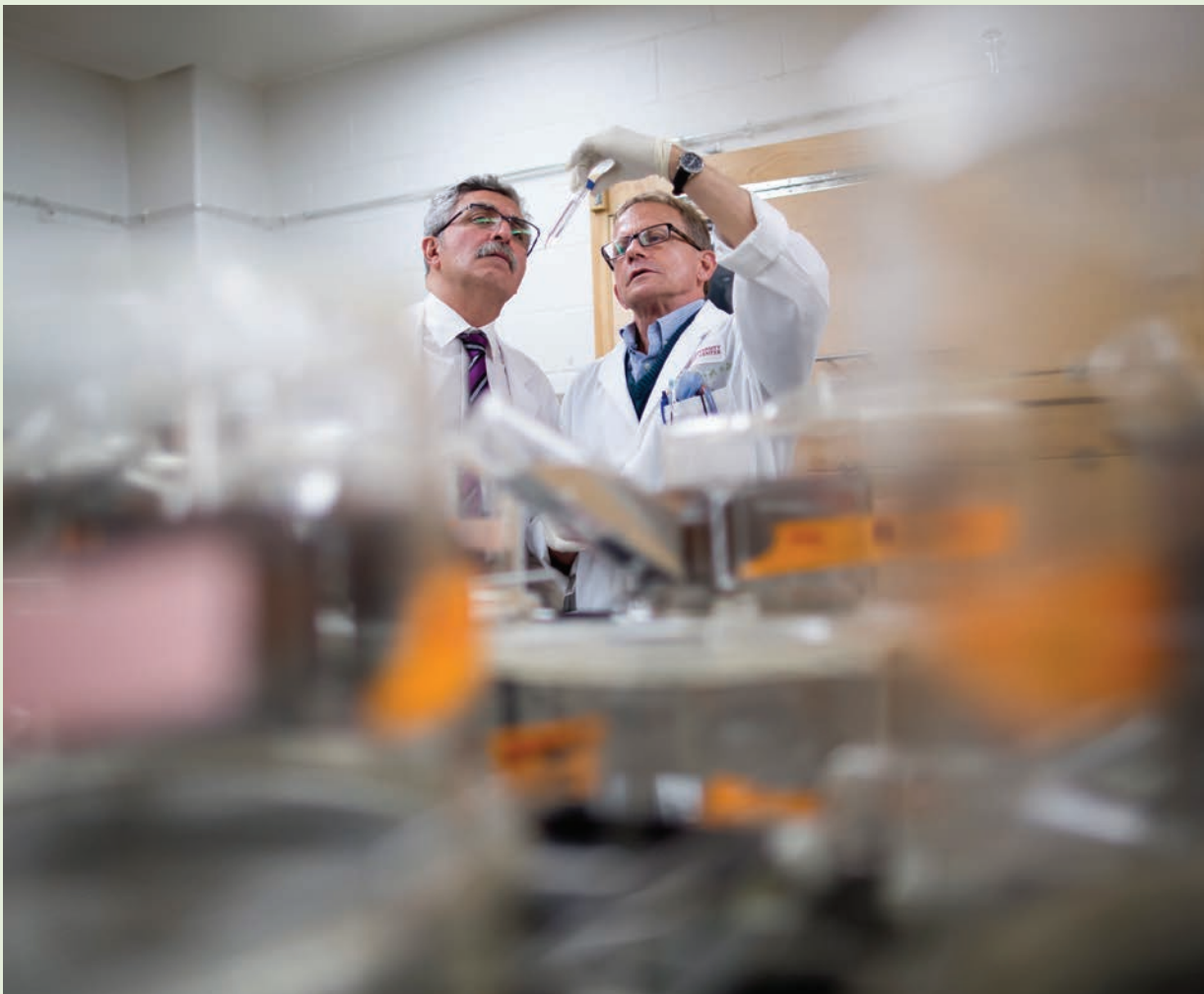
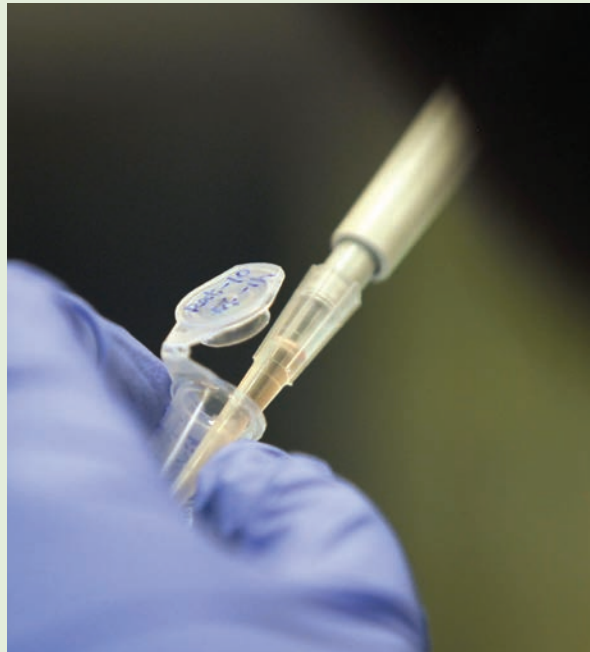
- **Ece Mutlu, MD**, is conducting groundbreaking research to better understand the composition and function of intestinal bacteria and the effects of prebiotics and probiotics on the microbiome, particularly in patients with inflammatory bowel disease (IBD) and irritable bowel syndrome (IBS).
- In a study supported by USDA, **Ali Keshavarzian, MD**, and **Heather Rasmussen, PhD**, are studying the potential beneficial effects of prebiotics, probiotics and symbiotics in management of obesity and metabolic syndrome.
- In a study supported by NIH, **Ali Keshavarzian, MD**, **Sharon Jedel, PsyD**, and **Stevan Hobfoll, PhD**, chair of the Department of Behavioral Sciences, are studying the impact of stress management on ulcerative colitis disease course.
- Gastroenterologists at Rush are collaborating with food scientists at Purdue University to develop a "designer fiber" that may eliminate the uncomfortable side effects associated with current fiber therapies, which are often recommended as a treatment for irritable bowel syndrome (IBS). This work is supported by a \$2.5 million NIH grant.



Helen Burgess, PhD, (left) and Garth Swanson, MD, MS, (right) study the interplay of alcohol, circadian rhythm disturbances and intestinal bacteria.

CLINICAL AND EDUCATIONAL EXCELLENCE. Rush has a highly respected gastroenterology program, in part because of its comprehensive, multidisciplinary treatment approach and reputation for patient-centered care. For example:

- Rush offers a multidisciplinary food allergy clinic, directed by gastroenterologist **Mark DeMeo, MD**, and allergist/immunologist **Mary Tobin, MD**.
- Rush established the first multidisciplinary GI cancer program in Chicago, directed by **Sohrab Mobarhan, MD**.
- Rush has a dedicated multidisciplinary IBD program and is organizing the first IBD medical home in Chicago directed by **Garth Swanson, MD**.
- The division's highly competitive fellowship program draws more than 500 applicants each year.



Several investigators, including Ali Keshavarzian, MD, (*left*) and Chris Forsyth, PhD, (*right*) have made Rush an epicenter for circadian rhythm research.

Excellent Clinical Services with a Renewed Focus on Research

For years, endocrinologists at Rush have earned a reputation for providing excellent care for patients with diabetes and other metabolic diseases. Endocrinologists at Rush lead a highly respected program in glucose management, including an award-winning diabetes center directed by **David Baldwin, MD**, that has earned the American Diabetes Association Education Recognition Certificate.



Antonio Bianco, MD, PhD, the Charles Arthur Weaver Professor of Cancer Research, (left) and Brian Kim, MD, (right) are collaborating on a new, multidisciplinary thyroid cancer program at Rush.

NEW SERVICES ADDRESS ILLNESSES ON THE RISE.

Rush has opened a new multidisciplinary thyroid cancer program, which will serve as the template for future subspecialty services. Led by **Brian Kim, MD**, the thyroid cancer program will provide increased access to care for patients with any stage of thyroid cancer while increasing the quality of their care by coordinating the efforts of a team of experts, while also providing a platform for cancer research.

The division has also added new services focused on primary and secondary osteoporosis prevention utilizing the Rush Osteoporosis Strategic Plan, complementing Rush's expertise in orthopedics and rheumatology. Led by **Sanford Baim, MD, FACR, CCD**, a consultation with a metabolic bone disease expert will automatically be triggered whenever a patient age 50 or older is admitted to Rush for a fracture. All patients seen at Rush with highly correlative clinical risk factors for fracture will be automatically identified through the electronic health record (EHR) and evaluated by bone density testing and/or referred to experts in the field of osteoporosis for further evaluation and treatment recommendations.

MORE EDUCATIONAL AND RESEARCH ACTIVITIES UNDERWAY.

Led by **Antonio Bianco, MD, PhD**, the Charles Arthur Weaver Professor of Cancer Research and an internationally recognized expert in thyroid hormone regulation, the division is growing its basic and translational research program. Thyroid hormone metabolism expert **Elizabeth McAninch, MD**, has joined the basic research faculty.

The division also is expanding its mentorship program to support young faculty in their academic and research pursuits.

Additionally, the division has expanded its highly regarded, integrated fellowship program in partnership with the John H. Stroger, Jr. Hospital of Cook County. The program will now prepare three fellows per year over a two-year course to be outstanding clinical endocrinologists.

Advancing Medical Education

Led by **Margaret McLaughlin, MD**, the Division of General Medicine is the backbone of the Department of Internal Medicine's strong clinical focus on evidence-based medicine as well as its highly respected educational programs.

Faculty in the division provide a supportive, nurturing environment for medical students and residents at Rush. Four faculty members in the division have earned the Rush Medical College Phoenix Award for clinical teaching in the past six years.

Since 2011, 97 of 136 residents have gone on to fellowships in 10 different subspecialties at 35 programs in more than 20 states.

LEARNING IN A VARIETY OF SETTINGS. The residency program, directed by **Richard Abrams, MD**, is one of largest internal medicine residency programs in the country. Residents receive outstanding clinical training in a broad range of settings, including Rush University Medical Center, the John H. Stroger Jr. Hospital of Cook County and a variety of community sites. These clinical rotations provide residents with the opportunity to treat a broad diversity of patients.

COLLABORATION WITH FACULTY. Residents work alongside core faculty on performance improvement teams focused on hospital-acquired infections, hand-offs, drug safety and cost-conscious care.

OPPORTUNITIES FOR RESEARCH. Medical students, residents and fellows can pursue their own original research or join an ongoing project led by a faculty member. In recent years, residents have presented their projects at national meetings, including the American College of Physicians and the American College of Cardiology.

NEW DEPARTMENT CHIEF ACADEMIC OFFICER. **Elizabeth Baker, MD**, is leading a centralized, coordinated effort for all of the Department of Internal Medicine's education programs.



Rush is home to one of the nation's largest internal medicine residency programs, directed by Richard Abrams, MD, (second from right).

A National Leader in the Research and Care of Older Adults

The Division of Geriatrics, Gerontology and Palliative Medicine, led by **Anthony Perry, MD**, is widely recognized as one of the top programs locally and nationally for its clinical and research excellence. In fact, *U.S. News & World Report* ranks Rush as one of the top 50 geriatrics program in the country.

GERIATRIC MEDICINE. The Section of Geriatric Medicine is the core of a multidisciplinary practice focused on advancing the care of older adults. It also administers the longest-running geriatric medicine fellowship in Illinois. The Section of Geriatric Medicine works closely with the Rush Health and Aging program, led by **Robyn Golden, LCSW**, to help craft an array of programs to address the multi-faceted needs to older adults and caregivers. This includes the Enhanced Discharge Planning Program (EDPP), a care transitions model that has been shown to reduce readmissions among older adults.

PALLIATIVE MEDICINE. Led by **Sean O'Mahony, MB, BCh, BAO**, the Section of Palliative Medicine actively manages patients' pain and other symptoms, facilitates discussions about goals of care and eases transitions of care. Currently, the section provides care for 5 percent of Rush inpatients.

Additionally, members of the faculty are co-directing a regional program with the University of Chicago to teach primary palliative care to community physicians and advanced practice nurses. The program is funded by a \$631,600 grant from The Coleman Foundation. Other health service research includes the evaluation of mindfulness-based stress reduction training for palliative medicine providers on their work engagement and psychosocial well-being, and the role of short-acting transnasal fentanyl for oral mucositis pain in patients having stem cell transplantations.



This page: *Left:* Registered nurses and nurse practitioners are key members of the palliative care team at Rush.

Above: XinQi Dong, MD, MPH, is a nationally recognized expert on the causes of elder abuse.

Opposite page: Led by Anthony Perry, MD, *(right)* the Division of Geriatrics, Gerontology and Palliative Medicine is widely regarded for its compassionate, patient-centered care.



EPIDEMIOLOGY RESEARCH. Led by **Denis A. Evans, MD**, the Alla V. and Solomon Jesmer Professor of Gerontology and Geriatric Medicine, the Section of Epidemiology Research is leading many innovative projects.

- One is the Chicago Healthy Aging Project (CHAP), a longitudinal study of common health problems in older adults, especially cognitive decline and Alzheimer’s disease.
- Evans is the PI of an NIH-funded study to trace the genetic epidemiology of cognitive decline in African Americans and European Americans. In this project, researchers will leverage the epigenome to uncover factors in midlife or earlier that could contribute to disease risk in later years.
- **XinQi Dong, MD, MPH**, is currently leading an epidemiological study of 3,200 Chinese older adults, called the PINE Study, to quantify the relationship among cultural factors, elder abuse and psychosocial wellbeing. It is the largest cohort study of the older Chinese population in the Western hemisphere.
- Members of the faculty frequently collaborate on studies with the Rush Alzheimer’s Disease Center, which has more than 20 years of leading, NIH-funded research.

OUTSTANDING EDUCATION. Fellows benefit from thoughtful mentoring from faculty and exposure to an active clinical program in outpatient, inpatient and nursing home settings. Palliative medicine fellows also work as part of a comprehensive palliative care program that includes working on Rush’s inpatient hospice unit, the city’s first at an academic medical center.

Leading the Way in Multidisciplinary Cancer Care

Rush is recognized as a leader in delivering patient-focused, team-based cancer treatment, which has helped it earn a position among the top 50 cancer programs in the country, according to *U.S. News & World Report*. Through The Coleman Foundation Comprehensive Cancer Clinics, Rush provides rapid access to a team of doctors who provide real-time information to patients with:

- Blood and bone marrow transplants
- Brain tumors
- Breast cancers
- Chest and lung tumors
- Gastrointestinal cancers
- Head and neck cancers
- Inherited susceptibility to cancer
- Leukemia
- Lymphoma
- Melanoma and soft tissue tumors
- Multiple myeloma
- Myelodysplastic/myeloproliferative neoplasms
- Prostate cancers
- Sarcomas
- Spine tumors

Rush is home to a widely respected Comprehensive Breast Cancer Clinic led by **Ruta Rao, MD**. Rush also launched two new survivor clinics to help breast cancer and leukemia patients manage the short- and long-term effects of cancer therapies.

Additionally, Rush recently opened a state-of-the-art outpatient cancer center to make treatment more comfortable and convenient for patients.



Melody Cobleigh, MD, the Brian Piccolo Professor of Cancer Research (*left*), and Ruta Rao, MD, director, The Coleman Foundation Comprehensive Breast Cancer Clinic (*right*), are investigating promising treatments for patients with aggressive types of breast cancer.



A LONG TRADITION OF MULTIDISCIPLINARY CARE AND INNOVATIVE RESEARCH. Many key innovations in cancer care have happened at Rush.

- **Samuel Taylor, III, MD**, pioneered the treatment of cancer patients with hormones and chemotherapy.
- **Janet Wolter, MD**, helped design the very first chemotherapy trial and established the Midwest's first comprehensive breast center at Rush with colleagues in other disciplines.
- **Melody Cobleigh, MD**, the Brian Piccolo Professor of Cancer Research, helped develop trastuzumab, a targeted therapy that interferes with the HER2neu receptor. Rush also tested trastuzumab emtansine in trials that led to its FDA approval for patients with metastatic disease. Researchers at Rush are now testing it in patients who had chemotherapy followed by surgery, but still had residual disease at the time of surgery.
- **Philip Bonomi, MD**, the Alice Pirie Wirtz Professor of Medical Oncology, and director, Division of Hematology, Oncology and Cell Therapy, and colleagues were first to use simultaneous chest radiation and chemotherapy, with or without surgery, for lung cancer patients. Today, this approach has become the standard of care. Researchers at Rush also participated in the first trial that showed that erlotinib, an EGFR inhibitor, was active in non-small cell lung cancer.
- **Parameswaran Venugopal, MD**, the Samuel G. Taylor III, MD, Chair of Oncology and director, Section of Hematology, and his colleagues were among the first to test the efficacy and safety of chemoimmunotherapy followed by radioimmunotherapy, which has become the standard of care in low-grade non-Hodgkin lymphoma.

STRONG CLINICAL EXPERIENCE FOR RESIDENTS AND FELLOWS. The division's competitive residency and fellowship programs are designed to help young physicians develop a rich clinical background and have the opportunity to collaborate with basic scientists on translational research. Rush maintains residencies in radiation oncology and nuclear medicine, as well as fellowships in hematology/medical oncology, orthopedic oncology, and hospice and palliative medicine.



Top: Philip Bonomi, MD, the Alice Pirie Wirtz Professor of Medical Oncology, and director, Division of Hematology, Oncology and Cell Therapy and colleagues helped pioneer a new treatment approach for lung cancer.

Bottom: Parameswaran Venugopal, MD, (right) the Samuel G. Taylor III, MD, Chair of Oncology and director, Section of Hematology, and others at Rush helped develop a new standard of care in low-grade non-Hodgkin lymphoma.

Improving Outcomes Here and Abroad

The Division of Hospital Medicine has greatly expanded the role of hospitalists and nocturnists at Rush to better serve patients and payers in an environment that will reward value, not volume. To that end, the division has implemented several initiatives designed to improve safety, quality and, ultimately, patient care. To date, the division's efforts have netted significant cost savings by improving the patient experience of care and reducing the average length of stay.

NEW ATTENDING DIRECTED SERVICE. The service, developed to decompress the volume on the Internal Medicine teaching service, has been a success. On several units, a hospitalist is consistently on hand to coordinate inpatient care and collaborate with advanced practice providers.

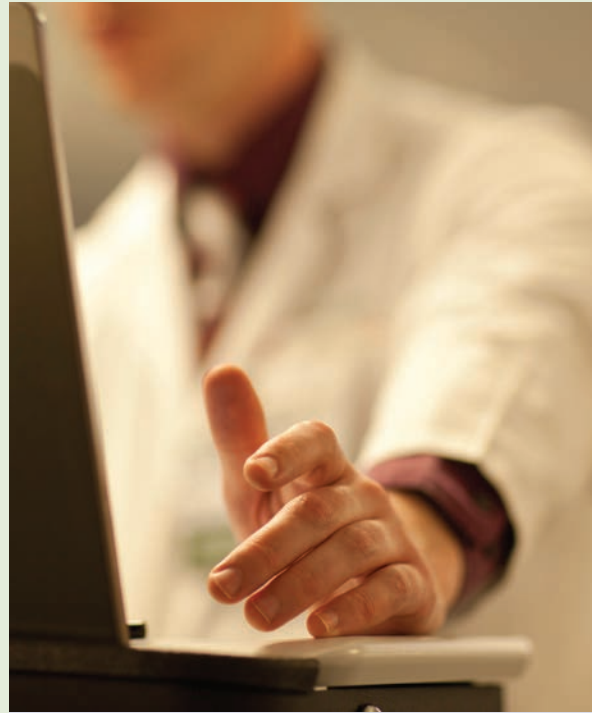
SAFETY AND QUALITY IMPROVEMENT EFFORTS. The division is leading projects to improve handoffs between day shift and night shift house staff, reduce unnecessary transfusions and recognize early signs of sepsis.

REDUCING READMISSIONS. Hospitalists on each unit are collaborating with nurse care coordinators and social workers to identify patients at high risk for readmission and develop patient-centered discharge plans.

EDUCATION AND RESEARCH. Hospitalists and nocturnists are actively involved in research and education at Rush.

- Hospitalists serve as core faculty and mentors for internal medicine residents working on quality improvement projects. Together, they work on initiatives to improve transitions of care, reduce hospital-acquired infections, improve medication safety and deliver value-based care.
- **Amir Jaffer, MD, MBA**, chief of the Division of Hospital Medicine, directs an annual Perioperative Medicine Summit, co-sponsored by the Society of Perioperative Assessment and Quality Improvement and the Cleveland Clinic.
- The division is involved in one NIH-funded trial that is studying genomically dosed warfarin regimens for the prevention of venous thromboembolism after major joint replacement surgery.

NEW SECTION OF GLOBAL HEALTH. Led by **Stephanie Wang, MD**, residents, hospitalists and other providers travel to Haiti and the Dominican Republic several times a year to deliver hands-on care and training. Additionally, the section offers a new, one-year global health fellowship that includes five months of service in Haiti. The fellowship provides opportunities to treat underserved populations and learn about infectious disease, social medicine and other areas.



Hospitalists at Rush are helping to improve clinical and financial outcomes across the medical center.



A new global health fellowship provides five months of hands-on training with patients in Haiti.

National Reputation Draws Fellows and Funding

The Division of Infectious Diseases at Rush, directed by **Gordon Trenholme, MD**, the James Lowenstine Professor of Internal Medicine, has been a cornerstone of the Department of Internal Medicine for decades. Over the years, the division has provided leadership to the institution through faculty like **Larry Goodman, MD**, CEO of Rush University Medical Center, and **Stuart Levin, MD**, chairman emeritus of the Department of Internal Medicine.

In addition to outstanding leadership, the division is known for its excellence in clinical care, education and research.

CLINICAL EXPERTISE. At Rush, patients benefit from the breadth of services for transplant infectious diseases, fungal diseases, tropical diseases, orthopedic infections, general infectious disease and HIV.

LARGEST FELLOWSHIP IN THE MIDWEST. Each year, the division accepts five fellows in its joint program with Cook County Health and Hospital System. Fellows treat patients at the Ruth M. Rothstein CORE Center, a freestanding HIV treatment center developed by Rush and Cook County Health and Hospitals System.

The division also organizes the largest subspecialty conference in Chicago, drawing approximately 70 infectious diseases specialists each week.

AN EPICENTER FOR ID RESEARCH. Rush is home to one of five infection prevention epicenters funded by the Centers for Disease Control and Prevention (**Robert A. Weinstein, MD**, Principal Investigator). In the epicenter program, physician-researchers like **Mary Hayden, MD**, an ID physician and director of the clinical microbiology laboratory, investigate strategies to prevent health care-associated infections and the acquisition of multi-drug resistant (MDR) organisms.

The division also runs an active **AIDS Clinical Trials Unit (ACTU)** under the direction of **Beverly Sha, MD**, and is a site for International Maternal, Pediatric, Adolescent AIDS Clinical Trials (IMPAACT), which is run by **Mariam Aziz, MD**.

The IMPAACT Network is a cooperative group of investigators focused on evaluating potential therapies for HIV infection and its related symptoms in infants, children, adolescents and pregnant women, including interventions for prevention of mother-to-child transmission. Both programs are funded by the NIH.

GUIDANCE FOR JUNIOR FACULTY. The division supports young investigators, who benefit from mentorship by senior faculty.

- **Kyle Popovich, MD, MS**, is studying the epidemiology of community-associated methicillin-resistant *Staphylococcus aureus* (CA-MRSA) using whole genome sequencing and phylogenetic analysis, thanks to support from a K award from the NIH.
- **Michael Lin, MD, MPH**, is the principal investigator of the REALM project, a CDC-supported surveillance network for monitoring multidrug-resistant organisms in intensive care units and long-term acute care hospitals in Chicago.
- **Aimee Hodowanec, MD**, was awarded a research grant by the Department of Internal Medicine's Executive Committee on Research (ECOR) to investigate ribonuclease 7 expression in the urinary tract of renal transplant recipients.



Beverly Sha, MD, leads the AIDS Clinical Trials Unit (ACTU) at Rush.



Kyle Popovich, MD, MS, received a K award from the NIH to study how community-associated MRSA spreads in non-health care settings.

A Legacy of Discovery and Specialized Care

For decades, nephrologists at Rush have advanced our understanding of kidney disease and transformed how clinicians care for patients here and abroad.

Today, that legacy — combined with a reputation for clinical excellence — has earned Rush a place among the nation's top 50 nephrology programs, according to *U.S. News & World Report*. Rush is home to specialized clinics for kidney transplant patients, as well as individuals with diabetic kidney disease, glomerular diseases, renal stones and anemia due to kidney disease.

Education also is a strength, and division faculty have earned eight teaching awards from the Department of Internal Medicine. Since 1973, 105 nephrology fellows have trained at Rush.



Vineet Gupta, PhD, (left) and Jochen Reiser, MD, PhD, (right) are studying novel therapies for kidney diseases in the Department of Internal Medicine's new Drug Discovery Center.

A LEGACY OF INNOVATION. Some key discoveries at Rush:

- **Robert Kark, FRCP, FACP, and Robert Muehrcke, MD,** helped unlock the pathogenesis of several forms of kidney disease.
- Percutaneous renal biopsy was developed at Rush.
- The Collaborative Study Group, led by **Edmund Lewis, MD,** discovered that captopril and irbesartan could delay kidney failure in diabetes.

PIONEERING RESEARCH CONTINUES. Today, the division maintains a highly active, basic science research program, backed by 12 NIH grants. Among the highlights:

- **Jochen Reiser, MD, PhD, and Vineet Gupta, PhD,** director of the Department of Internal Medicine's new Drug Discovery Center, are investigating the permeability factor that causes focal segmental glomerulosclerosis (FSGS) and are discovering new treatments for various proteinuric kidney diseases.
- **Stephen Korbet, MD,** the Lester and Muriel Anixter Professor of Nephrology and director, Division of Nephrology and Nephrology Transplantation, has collaborated with NIH researchers to understand the genetic abnormalities that lead to the development of FSGS. Through this collaboration, investigators hope to better understand why African Americans have a higher risk of FSGS and renal disease.
- The Collaborative Study Group is testing pyridorin to slow the rate of progression of type 2 diabetic nephropathy.
- **Steve Mangos, PhD,** has developed genetic and environmental models of renal disease using fast-growing zebrafish to test promising new agents.
- Researchers in the Division of Nephrology are partnering with Chinese scientists at Peking University First Hospital on studies focused on kidney disease.

Applying Life-Saving Technologies and New Treatments

The Division of Pulmonary and Critical Care Medicine, led by **Robert Balk, MD**, the J. Bailey Carter, MD, Professor of Medicine, has an excellent clinical and academic reputation and a highly sought-after fellowship training program.

OUTSTANDING CLINICAL CARE. The division provides highly specialized care in several comprehensive subspecialty clinics, including the following:

- Interstitial lung disease clinic
- Pulmonary nodule clinic
- Pulmonary hypertension clinic
- Difficult-to-treat asthma clinic, in partnership with otolaryngology and immunology
- Adult cystic fibrosis clinic, which is accredited by the Cystic Fibrosis Foundation

Rush also maintains a full-service pulmonary function lab at the main campus and an outpatient pulmonary rehab program at Rush Oak Park Hospital.

MODERN, PATIENT-CENTERED ICUS. Rush's new Tower includes 112 critical care beds in the medical intensive care unit (MICU), surgical intensive care unit (SICU), neurosciences intensive care unit (NSICU) and critical care unit (CCU). Intensivists at Rush are experts in the use of extracorporeal membrane oxygenation (ECMO), cooling therapies and other life-saving technologies.

Rush is a leader in ICU transfers in Chicago and is home to the city's only night intensivist program.

A GROWING FACULTY. The division recently added new faculty with expertise in interventional pulmonary medicine, simulation training and basic research.

RESEARCH OPPORTUNITIES FOR FELLOWS. With mentorship from faculty, fellows at Rush are working on projects studying the biology of sepsis, pulmonary hypertension, asthma, critical care ultrasonography and other topics. Fellows also are involved in basic science projects with pharmacology faculty as well as sleep medicine studies with the Department of Behavioral Sciences.

FACULTY RESEARCH. The division is leading a variety of investigations in pulmonary and critical care.

- **Omar Lateef, DO**, is leading a study to test interventions to reduce noise and other disruptions in the ICUs.
- **Mark Yoder, MD**, has developed a registry of pulmonary fibrosis patients that researchers can query to locate subjects for potential clinical trials. In another project, he plans to identify biomarkers of pulmonary fibrosis with basic science researchers in the Department of Pharmacology.



Omar Lateef, DO, (left) and Robert Balk, MD, the J. Bailey Carter, MD, Professor of Medicine and director, Division of Pulmonary and Critical Care Medicine, (right) have helped bring life-saving technology to the medical intensive care unit (MICU) and other ICUs at Rush.

Rush Pioneers Advances in OA and Lupus

For decades, the Division of Rheumatology, led by **Joel Block, MD**, the Willard L. Wood, MD, Professor of Rheumatology, has been known for its expertise in osteoarthritis (OA) and cartilage biology. More recently, the division also has earned recognition for expertise in inflammatory and immunological diseases like rheumatoid arthritis (RA) and lupus.

CLINICAL EXCELLENCE. Faculty from the division provide patient-focused care through a number of specialized centers and programs that include the following:

- Rush Osteoporosis Center
- Rush Connective Tissue Disease Clinic
- Rush Lupus Clinic

A RANGE OF MENTORS. The division's 23-person core faculty offers fellows opportunities to learn from a broad range of experts with distinct areas of interest.

JOURNAL OF CLINICAL RHEUMATOLOGY SERIES.

Each month, the division invites a visiting professor to lecture at Rush. These lectures are edited and published as a review series in the *Journal*. Fellows meet with the guest lecturer and may choose to co-author the review article for the *Journal*.

PIONEERING RESEARCH CONTINUES. Underpinning Rush's expertise in OA and inflammatory arthritis is a strong research program, dedicated to uncovering important advances that could transform patient care.

- With funding from the NIH, **Anne-Marie Malfait, MD, PhD**, director of the Laboratory for Translational

Research in Osteoarthritis, has uncovered that the chemokine called MCP-1 and its receptor, known as CCR2, are central to the development of OA pain.

- **Meenakshi Jolly, MD, MS**, director of the Rush Lupus Clinic, developed the first disease-specific patient-reported outcomes (PRO) tools for systemic lupus erythematosus (SLE) called LupusPRO.
- **Najia Shakoor, MD**, has developed a "mobility shoe" that mimics walking barefoot and reduces knee loading in patients with OA.
- Using NIH-funded wound-healing studies as a model for OA, **Anna Plaas, PhD**, is investigating the stimuli that cause cells that are involved in degenerative arthritis to scar and change their phenotype over time.
- **Alison Finnegan, PhD**, is studying different pathways in RA using animal models with proteoglycan-induced arthritis. Her work has been funded for the past 10 years by the NIH.
- **Ted Pincus, MD**, is a pioneer in the field of patient-reported outcomes. He developed the standard assessment form for RA that is used on all five continents and is an official quality measure adopted by CMS.



Joel Block, MD, (left) and Anne-Marie Malfait, MD, PhD, director of the Laboratory for Translational Research in Osteoarthritis, (right) discuss research at Rush to understand pain pathways in OA.



Najia Shakoor, MD, has designed a shoe that is easier on knee joints.



To learn more about the Department of Internal Medicine at Rush, visit **internalmedicine.rush.edu**.

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Rush is a not-for-profit health care, education and research enterprise comprising Rush University Medical Center, Rush University, Rush Oak Park Hospital and Rush Health.

PLEASE NOTE: All physicians featured in this publication are on the medical faculty of Rush University Medical Center. Some of the physicians featured are in private practice and, as independent practitioners, are not employees or agents of Rush University Medical Center.



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