

MD/PhD

A dual degree program of the
**COLLEGE OF GRADUATE STUDIES
AND NORTON COLLEGE OF MEDICINE**



UPSTATE
MEDICAL UNIVERSITY

SYRACUSE, NY

WWW.UPSTATE.EDU/MDPHD

MISSION STATEMENT

Our mission is to build a diverse community of physician scientist leaders by combining exceptional clinical training with outstanding research mentorship. We value humility, intellectual curiosity, and interpersonal connection and support the personal and professional development of our trainees to prepare them for careers as independent physician scientists.



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OUR LEADER

MESSAGE FROM DIRECTOR

Our MD/PhD program lays a robust foundation to help you build a career as an independent physician scientist. We have created a culture of inquiry in which curiosity and critical thinking skills are allowed to flourish. You will receive an excellent foundation in the sciences that you will apply in caring for the Central New York community. You will also receive personalized mentorship to develop your communication skills and critical thinking skills to create a body of work that will contribute to the scientific community. Your experiences will prepare you to pursue excellent residency training opportunities and a long career as a physician scientist.

— **Amit Dhamoon, MD, PhD**



*The director of Upstate Medical University's MD/PhD program, **Amit Dhamoon, MD, PhD**, brings a wealth of experience in the lab and the exam room to his position.*

Raised in Syracuse, N.Y., Dhamoon earned his BA in Biology at Williams College in Massachusetts. He returned to Syracuse, working in a biochemistry lab and teaching biology, before entering Upstate Medical University's MD/PhD program, from which he graduated in 2007.

In addition to his role as director of the MD/PhD program, Dhamoon is an associate professor of Medicine at Upstate and a clinical associate professor at the University of Rochester Medical Center.

ADVISEMENT, COMMUNITY AND CULTURE

Advising students and tracking progress is essential for student success throughout the dynamic years of MD/PhD training. Administration prioritizes relationship-development and maintaining a keen awareness of student needs. Our program fosters a close-knit community. We value our time together in both educational and social spaces. An MD/PhD Grand Rounds course meets weekly and commences with a "family meal."

There are workshops, seminars, social events and other opportunities for MD/PhD students to gather, keeping our community strong. Our program coordinator, Andrea Cifonelli, is a reliant and physical presence for students. She ensures seamless transitions between the College of Medicine and the College of Graduate Studies. Connecting with colleagues and/or meeting to discuss program questions or concerns can be as simple as tea in Andrea's office. Learn more by e-mailing Andrea at cifonela@upstate.edu.



OUR RESEARCH FOCUS

Upstate has strong basic, translational and clinical research portfolios that are concentrated within five basic science departments and thirteen clinically oriented departments.

Our researchers have diverse expertise and share a common goal: to better understand the human body and diseases. Most of the basic science research at SUNY Upstate is conducted through the College of Graduate Studies giving students a breadth of opportunities to perform cutting-edge research in a wide range of areas with ready collaborations when new expertise is needed.

STATE-OF-THE-ART FACILITIES

Upstate investigators have at their disposal beautiful and functional laboratory space that is equipped with advanced instrumentation. The space is located in three dedicated research buildings – Weiskotten Hall, the Institute for Human Performance and our new flagship, the Neuroscience Research Building (NRB). The NRB brings together neuroscience researchers from the departments of Neuroscience and Physiology, Ophthalmology, Psychiatry, Neurosurgery and Anesthesiology to work on important



Upstate Golisano Children's Hospital

problems in neurodevelopment, neuro-oncology, neuronal stem cells, physiological basis of behavior, psychiatric genetics and vision.

POWERFUL CORE FACILITIES

Performing cutting edge research requires access to powerful techniques and instrumentation. Upstate has research cores that provide faculty and students with the latest technologies to advance their research programs. Capabilities within our cores include whole genome sequencing and analysis, proteomics and mass-spectrometry, confocal and two-photon imaging, super-resolution microscopy (STED), an 800MHz NMR, cryo-electron microscopy, flow cytometry, and in vivo computed tomography.

RESEARCH OPPORTUNITIES

No University will put more emphasis as Upstate on your career development, whether your interests lie in academia, industry or using your degrees to develop a sustainable career in a related field. Upstate trains tomorrow's scientists by working on today's biomedical problems, and transforming students from consumers of information to producers of knowledge.

Scientists at Upstate rely on well-established core research facilities and a growing inventory of state-of-the-art resources and equipment, including:

- Proteomics
- Flow Cytometry
- DNA Sequencing
- Microarray
- Musculoskeletal
- Magnetic Resonance Imaging
- Humanized SCIP Mouse & Stem Cell Processing
- Confocal and Two-Photon Imaging
- Clinical Research Unit
- In Vivo Computed Tomography
- Center for Research and Evaluation
- X-ray Diffraction
- Laboratory Animal Resources
- Bone Densitometry
- 800 MHz Nuclear Magnetic Resonance Spectrometer

STUDENT SUCCESS

These MD/PhD students have recently received multi-year research grants from multiple organizations such as National Institute of Health and American Health Association among others, totaling more than \$400,000.



RANA ARNAV

Arnav Rana, a student in his fourth year of Upstate Medical University's MD/PhD program, is looking at how mitochondria, the so-called powerhouse of the cell, may contribute to heart disease, the No. 1 killer around the world.

The American Heart Association is funding his effort to uncover the role of mitochondria in heart failure — and confirming that his different approach to the question is worth pursuing.

Rana's investigation looks at how certain proteins within the cell can build up over time, instead of being absorbed by the mitochondria. Cells produce more than 1,000 proteins that must transfer into the mitochondria, but if some aren't transferred, they can build up inside the cell cytosol, the fluid that fills much of the cell's volume.

GARGI MISHRA

Gargi Mishra, an MD/PhD student at Upstate Medical University, has been awarded an American Heart Association



Predocutorial Fellowship to help fund her studies of the impact of the dysfunction of mitochondria.

Mishra was chosen by the AHA on the strength of her proposal to study how mitochondrial dysfunction can contribute to heart disease. While the mitochondria require about 1,500 different

proteins to function, they must import them to fuel the body's organs.

"If import is halted, perhaps by a protein getting clogged in a transport channel, mitochondria cannot function properly," Mishra explained. "This phenomenon is like a clogged sink causing a flooded kitchen."

Mishra plans on using yeast to mimic the process and try to prevent or reverse protein clogging. She's hoping a better understanding of the basic science behind mitochondrial dysfunction can lead to future drug and therapeutic discoveries.



AKSHAY PATEL

To continue his research into Systemic Lupus Erythematosus, Akshay Patel, an MD/PhD student, has been awarded a Ruth L. Kirschstein National Research Service Award (NRSA) Individual Fellowship for Students at Institutions Without

NIH-Funded Institutional Predocutorial Dual-Degree Training Programs (Parent F30).

Known as SLE or Lupus, the disease has an array of symptoms from rashes to fatigue and pain to organ damage. It affects women far more than it does men, often in their childbearing years. (Singer and actress Selena Gomez was diagnosed a decade ago and increased public awareness when its effects required her to get a kidney transplant in 2017.)

Patel's two-year funding will allow him to continue his work with model mice, discerning the role played by a specific enzyme that is associated with the onset and worsening of lupus. Patel is focused on the effect lupus has on the liver, what he called "the most metabolically active organ in the body."

PROGRAM STRUCTURE

YEAR 1	Summer Research Rotation	First-Year Basic Science Medical School Classes		
YEAR 2	Summer Research Rotation	Second Year Basic Science Medical School Classes	USMLE STEP I	
YEARS 3-6	Grant Writing	Qualifying Exam	Dissertation Work	Defend Thesis
YEARS 7-8	Clinical Clerkships	Apply to Residency	USMLE STEP II	Graduation

OUR STUDENTS

Students by Program

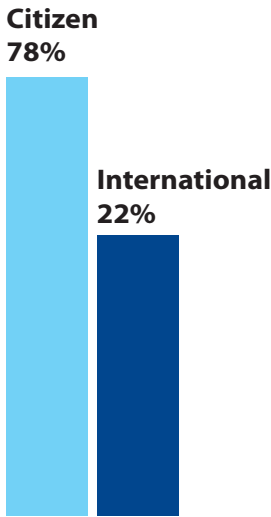
Medicine (MD-MDCN)	20
Undeclared (PHD-0000)	1
Anatomy & Cellular Bio (PHD-CBIO)	2
Biochemistry & Molecular Bio (PHD-MBIO)	8
Microbiology & Immunology (PHD-MIMM)	2
Neuroscience-PHD-NEUP	4
Pharmacology-PHD-PHAR	1
GRAND TOTAL	38

Eighteen of the 34 MD/PhD students are currently in PhD year of the program. Students in PHD-0000 have not declared a lab. This is generally done at the end of the second year of medical school.

Gender Composition



Citizenship Composition



ALUMNI SUCCESS

BRINGING CLINICAL AND LAB EXPERIENCE TO THE BEDSIDE

Adam Blanden had a goal when he applied to the College of Graduate Studies. "I got into this business because I wanted to create new medicine, to be in rooms with sick people, understand them, and then create answers where there were none."

Having graduated with an MD/PhD, he is now doing that. As a neurology resident at Upstate Medical University, he gets to work directly with patients, bringing his research experience to the bedside. That research focused on a protein that, when stable, helps prevent cancer in humans.

It also means bringing together two mindsets. "The way researchers look at knowledge and the way clinicians look at knowledge is different. Take the concept of a differential diagnosis, the cornerstone of diagnosis in medicine — you make a list of all possible diagnoses a patient may have based on the information gathered up to that point, put them in order from most to least likely, and then go about differentiating between the possible diagnoses with a testing plan. This is a closed model of knowledge, based on the assumption that you can list all possible diseases a patient can have."

"But this concept is anathema to the scientist — it's based on the assumption that our knowledge is comprehensive enough to list all possibilities. In the lab, we are acutely aware that most of the knowledge in the world is unknown, and most of the things we don't know, we don't even know that we don't know them yet."

"Because of the time I spend as a scientist," Blanden said, "it's much easier for me to identify knowledge gaps and act in areas of uncertainty — like when patients don't conform to the guidelines — and to understand how to use new evidence when it comes out to modify my practice."



Adam Blanden, MD, PhD student

Blanden cautions that the MD/PhD path is arduous. It will require commitment to the lab and to clinical work. To avoid being distracted by one or the other, "stay open to opportunities as they arise, but set actionable goals and accomplish them one step at a time."

He offers this advice: "If you want to be a well-educated physician, go and do that. If you want to be a scientist who works on medical problems, go do that. There are all sorts of ways you can make a career and a contribution."

"But if you want to be at the bedside, connect with humans and truly understand them, and then change the way we do things, MD/PhD just might be for you."

OUR GRADUATES

RECENT MD/PHD GRADUATES HAVE GONE TO:

Barnes-Jewish Hospital

Duke University

Johns Hopkins PSTP

Massachusetts General Hospital

Mt. Sinai Medical Center

Ohio State University

Temple University

UC San Francisco

University of Chicago

University of Michigan

University of Pittsburgh

University of Rochester

University of Virginia

University of Wisconsin

Washington University (St. Louis)

Weill Cornell Medical Center

Yale University

ADMISSIONS

Admission to the MD/PhD program is highly competitive. Students motivated by the love of discovery, dedication to research and desire to improve the human condition are encouraged to apply.

Competitive applicants will participate in virtual interviews with members of the MD/PhD and College of Medicine admissions committees.

HOW TO APPLY

MD/PhD applicants must apply through the AMCAS system. For more information visit www.aamc.org.

In addition to the AMCAS MD application, each MD/PhD applicant must submit the following documents:

- College of Medicine Supplemental Application. (This will be sent to you after we receive your verified AMCAS application.) Be sure to check the box marked MD/PhD.
- Three Letters of Recommendation from people familiar with your academic record and potential for investigative research.
- Personal Statement describing your reasons for wanting to enter the MD/PhD program. Include your research interests and plans for the future.

INTERNATIONAL STUDENTS

Applications are accepted from foreign citizens who have completed at least 90 credit hours of course work in the United States or Canada at an accredited institution. All else being equal, priority will be given to candidates who are US citizens or permanent residents. However, non-US residents with a strong record of academic research achievement are encouraged to apply.

ADMISSIONS REQUIREMENTS

- Bachelor's degree or equivalent
- Completion of the following subjects
(all courses except English must include a lab)
- General Biology I & II
- General Chemistry I & II
- Organic Chemistry I
- Biochemistry
- General Physics I & II
- Writing/Composition
- English elective
- Statistics (3 hrs)
- Knowledge of mathematics (preferably statistics or calculus)
- Medical College Admission Test (MCAT)

ADMISSIONS ADVISING

Pre-advisement appointments are available in person or by Zoom to help you apply to any of our programs. Visit engage.upstate.edu/portal/tanner to set up an appointment.

APPLICATION DEADLINE

- 1 AMCAS: The AMCAS application must be submitted by October 1.
- 2 All other application materials including the three letters of recommendation and the Supplemental application are due by November 1, no exceptions.

FUNDING

All MD/PhD students receive a full tuition waiver and a competitive 12-month stipend as part of the Graduate Student Employee Union (GSEU). Please visit our website at www.upstate.edu/mdphd for up-to date costs and fees.

MD/PhD PROGRAM OFFICE

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