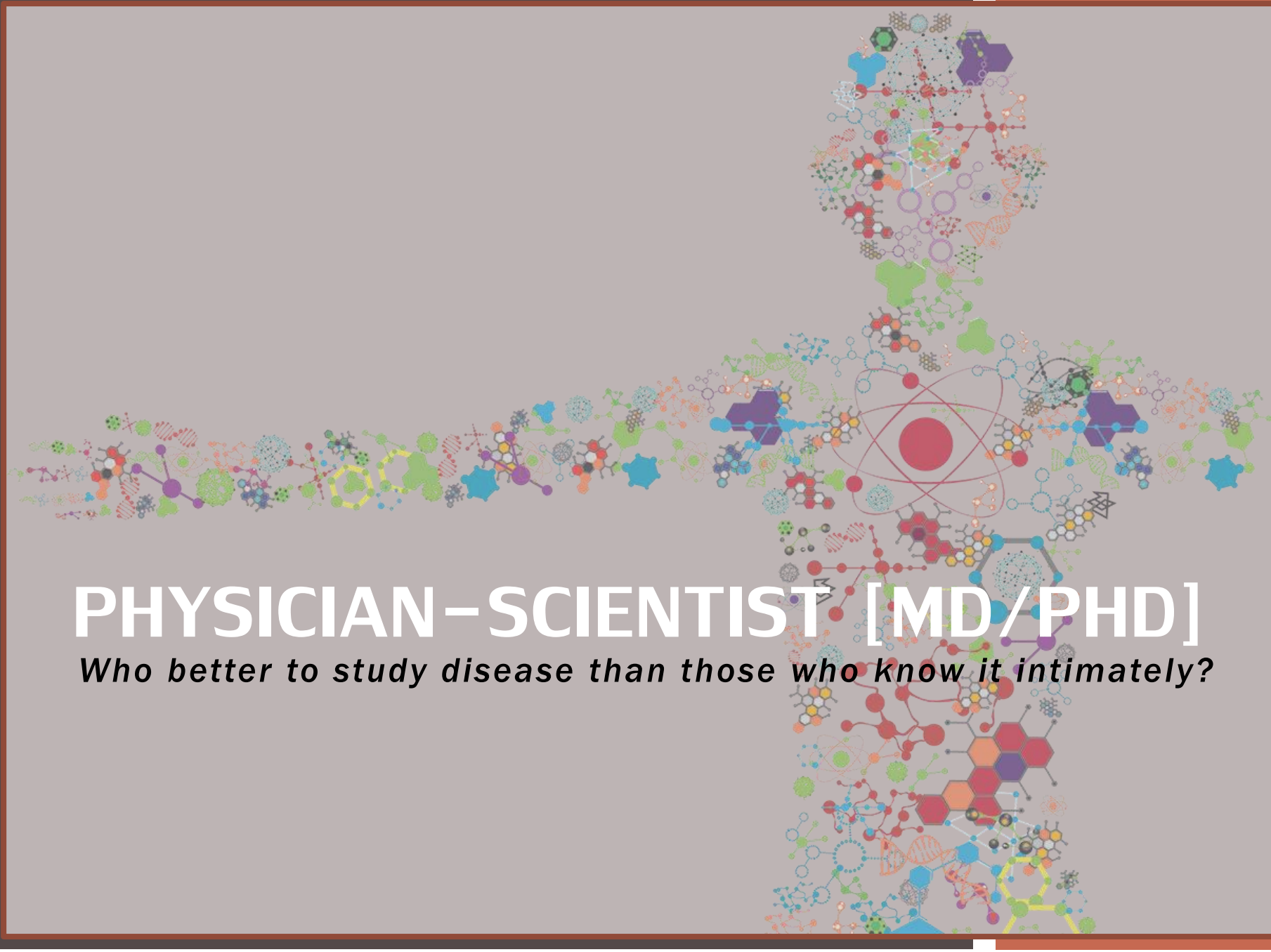
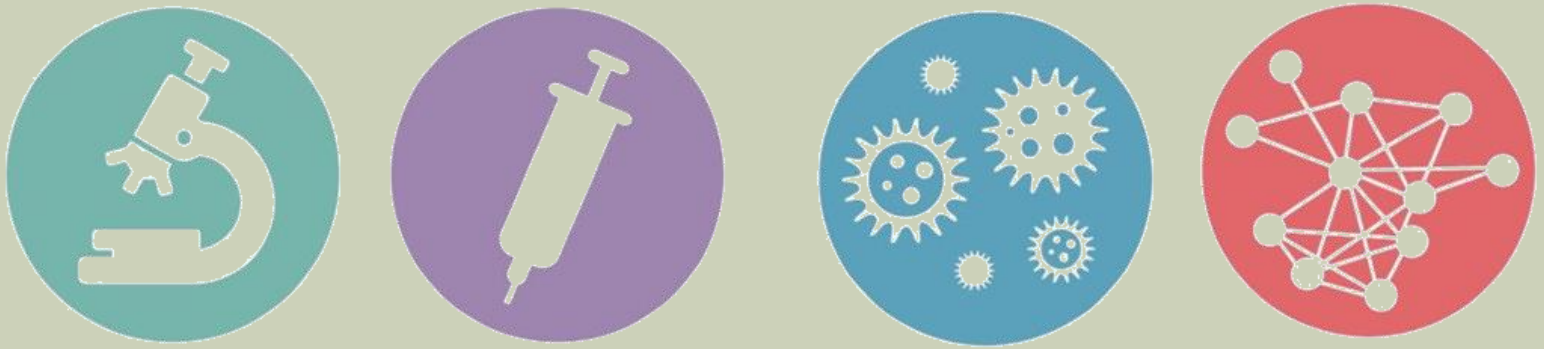


PHYSICIAN-SCIENTIST [MD/PHD]

Who better to study disease than those who know it intimately?

WHAT IS A PHYSICIAN SCIENTIST?

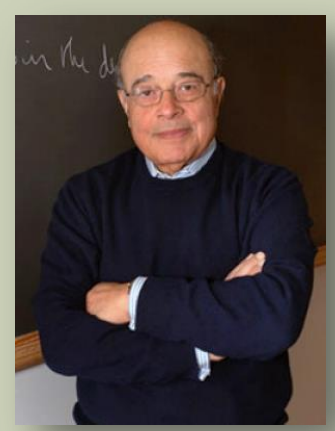
- A physician scientist is a unique clinician who is part of a small cadre of physicians who usually work in academic health science centers and have a high impact on health care through discovery, translational and clinical research, and clinical practice. A physician scientist in Pathology and Laboratory Medicine is a laboratory physician who is trained in both scientific biomedical investigation and in pathology and/or laboratory medicine, often with clinical subspecialty training.
- On one hand, the physician scientist brings the rigors of scientific investigation into the patient care arena and on the other, the physician scientist's contact with disease brings clinically relevant questions into the research arena to drive investigations into pathogenesis, prevention, diagnosis, prognosis, and treatment of disease.



asip.org/CareerPath/

MEET ADEL MAHMOUD, MD, PHD

PHYSICIAN. SCIENTIST. PROFESSOR. MENTOR.



- Princeton University Lecturer with rank of Professor in Molecular Biology and Public Policy, Woodrow Wilson School
- MD from the University of Cairo in 1963
- PhD from the University of London, School of Hygiene and Tropical Medicine in 1971
- Elected to membership of the American Society for Clinical Investigation in 1978, the Association of American Physicians in 1980 and the Institute of Medicine of the National Academy of Sciences in 1987.
- Received the Bailey K. Ashford Award of the American Society of Tropical Medicine and Hygiene in 1983, and the Squibb Award of the Infectious Diseases Society of America in 1984.
- Fellow of the American College of Physicians and a member of the Expert Advisory Panel on Parasitic Diseases of the World Health Organization.
- Served on the National Advisory Allergy and Infectious Diseases Council and is a past president of the Central Society for Clinical Research and the International Society for Infectious Diseases.
- Currently serving as a member of the National Science Advisory Board for Biosecurity and Committee on Scientific Communications and National Security (CSCANS) of the National Academy of Sciences
- Research- global health: infectious disease; burden of illness; expanding threat; vaccines and control strategies

Research focus, selected publications, honors and awards… it's all in the details!

THE MD/PHD

What is it…

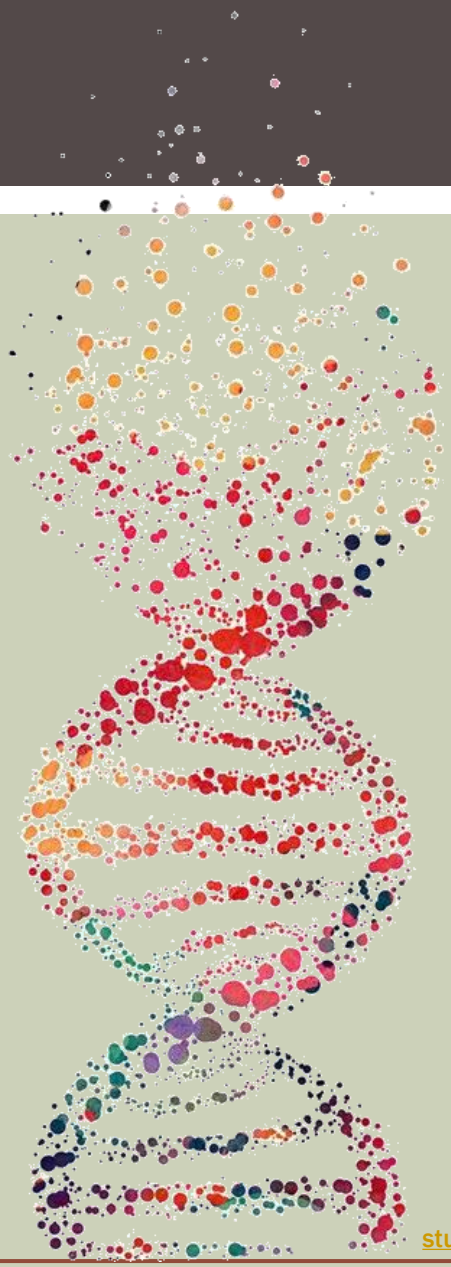
- MD/PhD programs provide training in both medicine and research. They are specifically designed for those who want to become research physicians, also known as physician-investigators or physician-scientists. Graduates of MD/PhD programs often go on to become faculty members at medical schools, universities and research institutes.
- Regardless of where they eventually work, MD/PhD candidates are being prepared for careers in which they will spend most of their time doing research, in addition to caring for patients. The MD/PhD dual career is busy, challenging, rewarding, and offers opportunities to do good for many people by advancing knowledge, developing new treatments for diseases, and pushing back the boundaries of the unknown.

The history…

- MD/PhD training was a natural outcome of the 'integrated' medical school curriculum established by Western Reserve University School of Medicine in the mid 1950s under the leadership of Joseph T. Wearn, MD, Professor of Medicine and Dean of the SOM. This novel curriculum encouraged combined MD/PhD training and included: 1) Basic science and clinical teaching that interfaced and coordinated throughout the 4-year MD program; 2) 'Elective' and unscheduled time reserved during the first two years of medical school for students to pursue their own interests; 3) Completion of a research project was a requirement for the MD degree; 4) Basic science and clinical faculty cooperated enthusiastically to make the integrated curriculum a success.

students-residents.aamc.org/choosing-medical-career/careers-medical-research/md-phd-dual-degree-training/

WHY PURSUE AN MD/PHD?

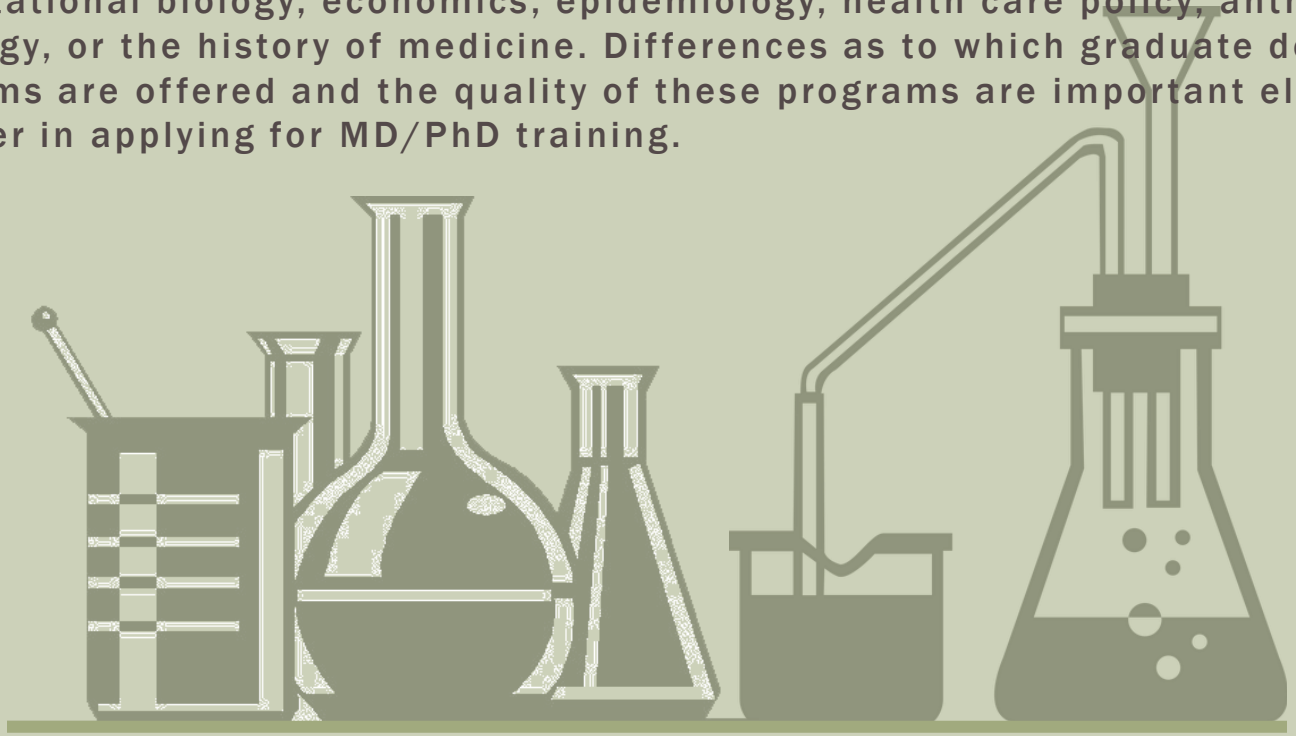


- You can experience the passion of solving a patient's medical struggles while pursuing research that may define the mechanism of that patient's disease and may ultimately translate into a clinical cure for the disease.
- MD-PhD trainees are research scientists who solve mechanisms underlying disease, combined with their passion to treat patients in a clinical setting.
- MD-PhD training efficiently integrates the scientific and medical education of the physician-scientist.
- During the PhD training years MD-PhD students take the coursework and formal training in research methodology that are important for the development of the research scientist.
- Most MD-PhD programs provide trainees a stipend and tuition scholarships. This financial support recognizes the time that a student must spend in training for the MD-PhD career. The extent of financial support varies among programs and may only support U.S. citizens and permanent residents.

students-residents.aamc.org/choosing-medical-career/article/why-pursue-md-phd/

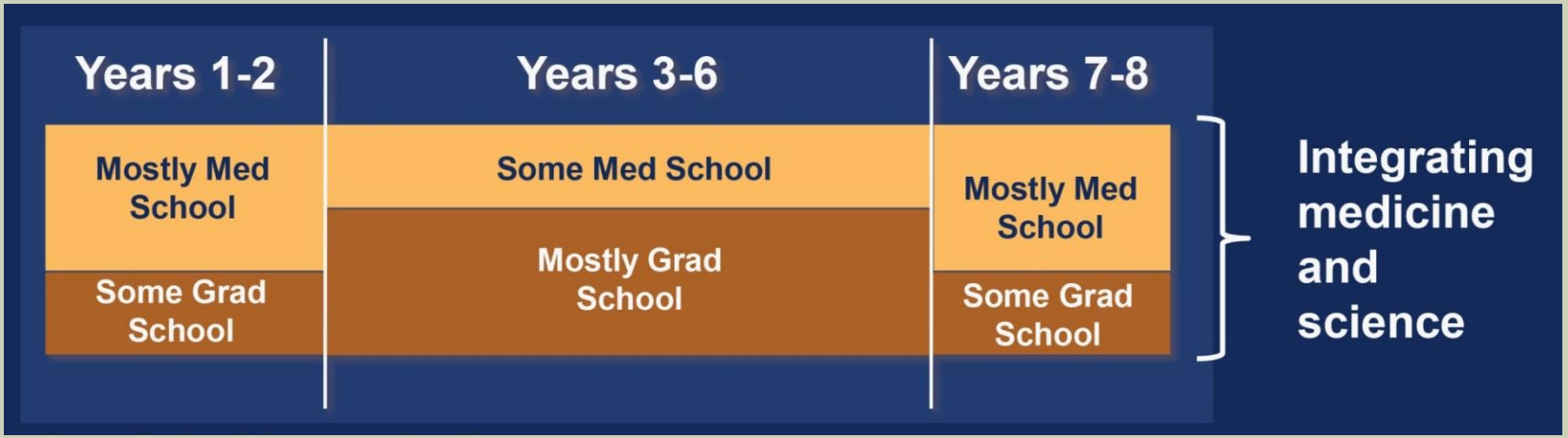
AREAS OF RESEARCH INTEREST FOR MD/PHD

- Most MD/PhD candidates earn their PhD in biomedical laboratory disciplines such as cell biology, biochemistry, genetics, immunology, pharmacology, physiology, neuroscience, or biomedical engineering. The names of departments and graduate programs vary from school to school. At some schools, MD/PhD trainees can also do their graduate work outside of the laboratory disciplines in fields such as computational biology, economics, epidemiology, health care policy, anthropology, sociology, or the history of medicine. Differences as to which graduate degree programs are offered and the quality of these programs are important elements to consider in applying for MD/PhD training.



sciencemag.org/careers/2011/06/questions-and-answers-pursuing-md-phd

MD/PHD CURRICULUM IS A CONTINUUM



- Preclinical (years 1-2)
  - Medical sciences and explore research opportunities (lab rotations)
- Research (years 3-6) Complete PhD Degree
  - Conduct thesis research with opportunity for clinical experiences
- Clinical (5-7 or 6-8) Complete MD Degree
  - Clinical clerkships
  - Additional research experiences
  - Each MD/PhD program offers unique research opportunities
- The PhD is awarded in a wide variety of disciplines

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WHERE THE TIGER MD/PHDS ARE

- 8 Columbia University College of Physicians and Surgeons
- 5 Harvard Medical School
- 4 Icahn School of Medicine at Mt. Sinai
- 4 David Geffen School of Medicine at UCLA
- 4 Perelman School of Medicine at the University of Pennsylvania
- 3 Stanford University School of Medicine
- 3 Yale School of Medicine

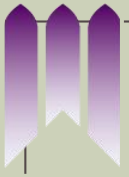
EXAMPLES OF PRINCETON ALUMNI IN MD/PHD PROGRAMS

BAYLOR
Neuroscience

CHICAGO-PRITZKER
History of Medicine

COLUMBIA
Neurobiology & Behavior

HARVARD/MIT/OXFORD
Chemical Biology



NORTHWESTERN
Biomedical Engineering

PENN
Anthropology

PITT
Clinical & Translational Science

UCLA/CALTECH
Bioengineering

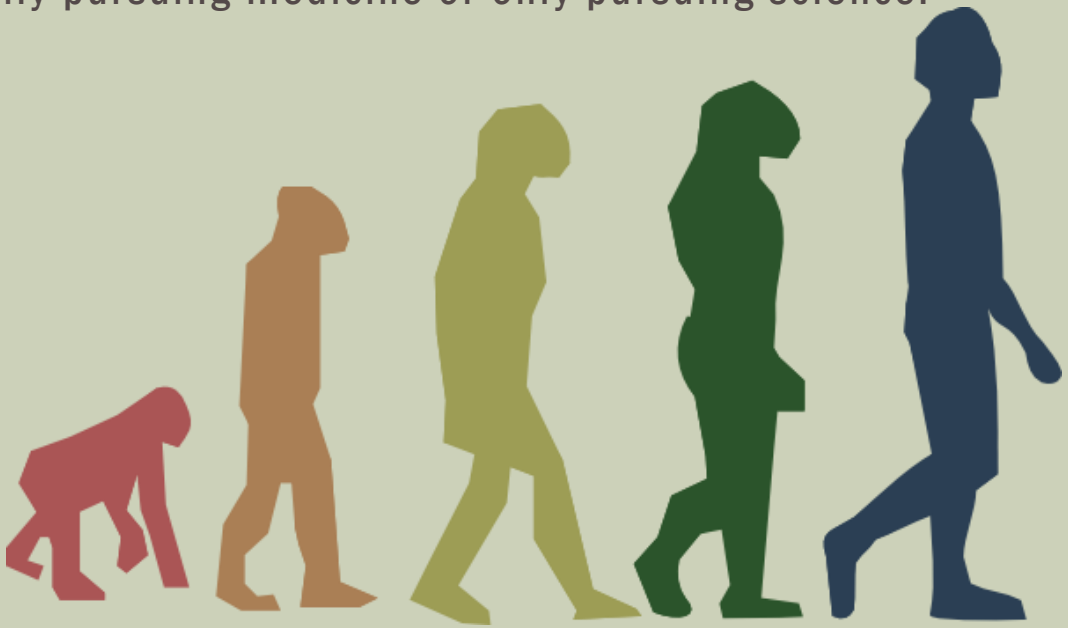
UNIVERSITY OF UTAH
Bioengineering

YALE
Neuroscience

Additional schools where Princeton alums are pursuing the MD/PhD include Case Western, Cornell, Duke, Emory, Hofstra, Illinois, Johns Hopkins, Keck USC, Miami, Michigan, Mt. Sinai, NYU, Ohio State, Penn State, Rochester, Stanford, Tufts, UCSD, UNC, UVA, Vanderbilt, Wash U

FINDING THE RIGHT FIT

- MD/PhD programs are specifically designed for those who want to become research physicians, also known as physician-scientists. Graduates of MD/PhD programs often go on to become faculty members at medical schools, universities, and research institutes such as the National Institutes of Health. MD/PhD candidates are being prepared for careers in which they will spend most of their time doing research in addition to caring for patients. It is critical that applicants have a passion for doing both — most MD/PhD graduates feel strongly that they would not be fulfilled by only pursuing medicine or only pursuing science.



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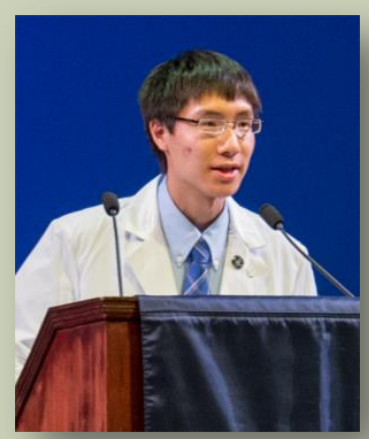
KEVIN ZHANG'S SUCCESS THROUGH APSA



Kevin Zhang '16

I learned about the American Physician Scientists Association in my junior year of college when I attended the fall regional meeting at the Icahn School of Medicine. I enjoyed hearing about the many diverse research questions tackled by the attending physician scientists—such exposure was scarce at Princeton University due to its lack of a medical school. The workshop on MD/PhD programs led by Dr. Skip Brass, director of the University of Pennsylvania's MSTP, was particularly useful to me as I thought about my future as a physician scientist. The regional meeting motivated me to start an APSA local chapter at Princeton.

The APSA local chapter gave Princeton students access to a vast set of educational and networking resources. The local chapter invited physician scientists from several neighboring medical schools for dinner discussions on physician scientist careers and MD/PhD program admissions. With a travel grant from APSA, our chapter was also able to send four students to the 2015 Annual Meeting. The Annual Meeting, with its many keynote speakers and workshops, showed me how valuable APSA can be, and together with the other APSA events that I participated in, solidified my decision to apply to MD/PhD programs. I am now a first year in the University of Pennsylvania's MSTP and am proud to be one of Penn's institutional representatives, through which I hope to continue expanding APSA's reach to budding physician scientists.

FOR ADDITIONAL INFORMATION

- AAMC MD-PhD Dual Degree Training: students-residents.aamc.org/choosing-medical-career/careers-medical-research/md-phd-dual-degree-training/
- Workshops for Prospective PhD and MD-PhD Applicants: students-residents.aamc.org/choosing-medical-career/article/workshops-prospective-mdphd-applicants/
- MD-PhD: Is it Right for Me? aamc-orange.global.ssl.fastly.net/production/media/filer_public/db/ca/dbca84bc-47d2-480d-8269-1e4e9da38476/mdphd_isitrightforme.pdf
- AAMC List of MD/PhD Programs By State: students-residents.aamc.org/applying-medical-school/article/mdphd-degree-programs-state/
- Summer Undergrad Research Sponsored by MD/PhD Schools: aamc.org/members/great/169782/mdphdsummerprograms.html
- National Institutes of Health MSTP Overview: nigms.nih.gov/Training/InstPredoc/PredocOverview-MSTP.htm
- American Physician Scientist Association: physicianscientists.org/