

MD-PhD Training and Careers: A Guide for Potential Applicants, Current Trainees, and Advisors

Association of American Medical Colleges' Group on Graduate Research, Education, and Training (GREAT Group) MD-PhD Section

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I Introduction

This document was designed as a resource to provide information and insight on the most commonly asked (or should be asked) questions regarding MD-PhD career paths and training. It is hoped that this resource will allow both students and career counselors to be more prepared for each of their purposes. For students, the information contained here will allow you to be an educated investigator when exploring this career option, allowing you to ask better questions and make more informed decisions. Advisors, yours is most often the first career advice students receive, and the quality of that content is of the utmost importance. We hope this information will enable you reach your constituency in a more enlightened way. Finally, for current MD-PhD students, we have included a list of potential funding sources.

This document was developed by the AAMC GREAT Group's MD-PhD Section Communications Committee, which is comprised of faculty and administrators from MD-PhD programs around the country. The members of this committee have together spoken to and advised thousands of students pondering or embracing this career path. The committee was developed with the mission of increasing the visibility of MD-PhD training and to improve the resources available to do so. Its members are dedicated toward this purpose and welcome your contact and input.

II MD-PhD Programs

Over 100 medical schools offer formal MD-PhD training opportunities. A national list of MD-PhD Programs is maintained by the AAMC. It can be accessed at:

<http://www.aamc.org/research/dbr/mdphd/programs.htm>

III Information for Prospective Applicants

A. MD-PhD CAREER PATHS

1) Who is it for?

MD-PhD programs provide training in both medicine and research. They are specifically designed for men and women 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 such as the NIH. Regardless of where they eventually end up, MD-PhD trainees are being prepared for careers in which they will spend most of their time doing research, not just caring for patients. It is a busy, challenging and hugely rewarding career that offers opportunities to do good for many people by advancing knowledge, developing new treatments for diseases and pushing back the boundaries of the unknown.

2) MD-PhD training from a historical perspective.

Forty years ago and more, advances in the science of human health and disease were often made by physicians who became interested in a problem and set about solving it. With advancement in the practices of biological science starting in the 1960s and the institutionalization of research by NIH, the training required to do effective research became more complex. Similarly, medical practice and health care delivery have grown in complexity, with increased training requirements. Medical school by itself does not provide training in how to do research. Thus, while it is still possible to learn how to do research by doing an extended postdoctoral fellowship (often at NIH) after a clinical residency, this path has become less practical: the total time is not necessarily shorter, the costs (especially medical school tuition) are likely to be much higher, and the coursework and formal training in research methodology that are part of a good graduate program are missed. If you are ready to make the commitment before starting medical school, MD-PhD programs offer many advantages.

3) Why get a PhD with an MD?

An important but easily overlooked benefit is the way MD-PhD training organizes the experimental and clinical thinking of the physician-scientist. The effect of the synergy achieved means that a physician-scientist recognizes new ways that clinical care or the goal of understanding disease mechanisms will benefit from laboratory research and is equipped to mount the appropriate effort. Likewise the synergy achieved in dual-degree training causes the physician-scientist to see how the results of laboratory discoveries and insights can be converted into clinically significant outcomes.

A practical benefit is that MD and PhD training costs are generally covered by the program's funds. In addition, most MD-PhD programs pay the students a stipend during the training years. The need for physician-scientists is great if the achievements of basic science laboratories are to be translated into active clinical practice. The financial pressures on MD-only graduates are so great, however, that few newly-minted physicians choose to spend the time necessary to obtain research training after medical school. The financial support for those willing to undertake MD-PhD training recognizes the additional time that a student must spend in training for this career. The details of this support vary widely and need to be determined on a case-by-case basis. For example, some programs will only support US citizens and permanent residents.

Importantly, in dual degree training, the graduate degree is equivalent to a PhD only degree. Recent studies have shown that the MD-PhD physician scientist is more successful in developing research programs that are nationally funded than either the PhD or MD scientist, attesting to the quality of students pursuing the dual degree and the training that these students obtain (*JAMA*. 2007;297:2496-2501).

4) How can I tell if I'm right for this kind of program?

This is a difficult question to answer in any broadly significant way since individual ambitions and life history can play such important roles in the answer. One feature, however, that seems common to all committed MD-PhD applicants is a depth of passion for treating today's patients as a physician and tomorrow's patients as a research scientist uncovering the mechanisms underlying disease. The career is inspiring but also filled with challenges and frustrations. Patients don't always get well and experiments don't always succeed. The passion to solve a patient's struggles and to crack the code of a disease's cause is the factor that carries the physician-scientist through the challenges.

5) Areas of research interest for MD-PhD training.

Most MD-PhD students receive their PhD in biomedical laboratory disciplines such as cell biology, biochemistry, genetics, immunology, pharmacology, neuroscience, and biomedical engineering. The names of departments and graduate programs vary from school to school. At some schools, MD-PhD trainees 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 in which graduate degree programs are offered and the quality of these programs are important elements to consider in applying for MD-PhD training.

6) Careers of the MD-PhD Physician-Scientist.

According to a recent study from the National Association of MD-PhD Programs about 75% of MD-PhD graduates nationally are in academic medicine or pharmaceutical company positions that make use of their interests both in patient care and research. An MD-PhD physician-scientist is typically a faculty member at an academic medical center who spends 70-80% of their time conducting research, though this can vary with specialty. Their research may be lab-based, translational or clinical. The remaining time is often divided among clinical service, teaching, and administrative activities. Thus, most MD-PhD graduates pursue a career where most of their time is spent on research. This research is typically conducted at academic medical centers, research institutions like the NIH or in the pharmaceutical/biotech industry. With career advancement, many MD-PhD graduates ascend to significant leadership roles in academic medical centers, industry or private organizations such as the American Cancer Society, reflecting their broad experience in health care and research.

B. MD-PHD EDUCATIONAL TRAINING

1) Dual Degree Curricula.

While curricula vary, the educational courses and topics presented to medical school students are similar among MD-PhD programs, since students must pass Step I and Step II of the United States Medical Learning Examination (USMLE). In contrast, graduate school activities are more varied, since graduate curricula and research opportunities differ by faculty expertise within a program. Thus, research experiences obtained during graduate school training are one of the differences among MD-PhD programs. Applicants are encouraged to survey the graduate faculty to identify programs with research topics of interest to the candidate. Identifying several interesting research opportunities is an important factor in identifying a compatible program. However, applicants should note that their research interests may change over the course of training as new medical and research topics are encountered during didactic course work and clinical experiences.

Different programs have adopted a variety of approaches to integrate medical and graduate curricula for MD-PhD training. The overall goal is to reduce total training time. The typical track is often termed the “2-3-2” or “2-4-2” track reflecting the number of years that a student participates in the three sections of MD-PhD training. In most programs, trainees master basic science courses, followed by an intense period of PhD research, and completion of the thesis. Clinical training is often the final component of the program—a feature dictated by the need to be prepared for clinical residencies. There are many variations on this general approach. For example, some programs offer significant integration between graduate school and medical school courses in years 1 and 2. The degree of clinical involvement during the basic science phase of training also varies among programs, as does the integration of clinical experiences during PhD training. The structure and flexibility of training curricula is another factor which applicants should consider when choosing a program, recognizing that “one track does not fit all”.

In addition to integration of curriculum components, most programs engage students in MD-PhD specific activities to enrich their training experience. These activities often include an annual retreat, Research in Progress sessions where trainees present their research, seminar series devoted to research and career development, and specific courses designed for the MD-PhD trainee. Information about research opportunities, curricula, and trainee activities can be ascertained from program websites, contact with Program Administrators, or visits during the application process.

2) Length of Training.

Most MD-PhD students complete the requirement for the dual degrees within 7 to 8 years. Some students complete the program in 6 years, while others may take 10 years (or more). While this initially may seem like a long time commitment, applicants must consider that they are completing academic requirements for two professional degrees to become a physician-scientist. The variation in time to complete the dual degree is due to the time required to complete PhD requirements, since one cannot predict the progress of research, or the amount of time needed to develop into an independent investigator, the primary goal of PhD training. The skills obtained during PhD training are invaluable and will prepare you for a career as a leader of a research group in academic medicine. Note that the average time to complete a biomedical PhD in the U.S. is about 6 years. Thus, if pursued independently, obtaining a dual

degree would take about 10 years. By integrating the didactic components of training, dual degree students can complete the process in < 10 years.

3) Career Path for the MD-PhD Graduate.

The career of each MD-PhD graduate is unique based upon research and clinical interests, but follows the general path:

MD-PhD Training: 7-8 years

Specialty and Subspecialty Clinical and Research Training (Residency/Fellowship): 3-7 Years

Most MD-PhD graduates pursue residency and fellowship training and find that their MD-PhD training makes them particularly attractive to residency programs at top academic institutions. In the past, MD-PhD graduates traditionally entered residency programs in medicine, pediatrics or pathology. However, the clinical specialty choices of current graduates are more diverse, with many graduates pursuing residency training in neurology, psychiatry, radiology, radiation oncology and even surgery and surgical specialties.

It is important to note that there are a growing number of “research residency programs” that have been specially developed to foster the career development of physician-scientists.

Listings of such residency opportunities can be accessed at a site

[\[http://www.physicianscientists.org/Training_Programs/Residency.html\]](http://www.physicianscientists.org/Training_Programs/Residency.html) maintained by the American Physician Scientists Association (APSA). After completing their specialty clinical training (e.g., in medicine or pediatrics), most physician-scientists pursue subspecialty clinical training (e.g., cardiology or hematology-oncology) and postdoctoral research that is typically arranged in a manner that combines protected research time with intensive clinical training. A number of residency programs around the country offer highly structured programs in which research is fully integrated into the clinical training.

These programs differ in their overall structure, but they all offer the following: (i) shortened residency (specialty) training; in general, the integrated programs allow trainees to shorten their residency by one year, depending on the field of specialty, (ii) integrated research and clinical training; programs usually offer mentoring for trainees to choose a lab early in their training process, so they can embark on their research right away when they start full time in the lab, (iii) guaranteed subspecialty fellowship position in the trainee’s desired field; this is not offered at all institutions, and (iv) special financial support; a few combined programs also offer support both towards salary (with supplements) and research. MD-PhD graduates are encouraged to apply to these integrated postgraduate programs, since they provide a unique opportunity to conduct structured and well-mentored research during residency and fellowship.

It may be thirteen or more years from the time you graduate from college to the time you secure your first academic faculty position. Thus, you should thoroughly explore whether combining biomedical research and clinical practice is the right path for you. Successful MD-PhD trainees recognize that this is a long process and that it is important to view these years as time for personal growth as well. Note that the MD-PhD graduate is unique within medical education, representing about 3% of the entire graduating medical school class in the United States. In 2006, there were over 16,000 MD graduates, with about 500 receiving the PhD degree as well.

4) Financial Support.

In an effort to reduce future financial burdens, most programs support trainees with a stipend and tuition scholarship during medical school and graduate school training. However, there are variations on the amount or length of time that students are supported. For example, some programs will limit the total numbers of years that stipend and tuition are provided. Programs may also provide some support for travel to scientific conferences or research expenses. Information on support from specific programs can be found on the program's website or by contacting the program administrator. Trainees also have an opportunity to pursue individual fellowships from private sources and from a number of NIH Institutes as F30/F31 NRSA pre-doctoral fellowships. These opportunities are listed at the end of this document.

5) MSTP versus Non-MSTP Funded MD-PhD Programs

MD-PhD training programs are designed to train physician-scientists and represent a significant investment of resources by the medical school. The NIH uses the term "MSTP" to refer to schools that have been competitively awarded special training funds to help support MD-PhD candidates. There are over 100 MD-PhD programs [<http://www.aamc.org/research/dbr/mdphd/programs.htm>], 42 of which are currently funded by the NIH [<http://www.nigms.nih.gov/Training/InstPredoc/PredocInst-MSTP.htm>].

C. APPLYING TO MD-PhD PROGRAMS

1) Factors to Consider When Applying and Selecting an MD-PhD Training Program

Although the overall goals of MD-PhD training are the same, the approach to training and the environment for training vary substantially between programs. Some of these differences, such as geographic region or size of the school will help guide selection of programs to apply to, while others such as the attitude of faculty and students or the physical proximity of laboratories and hospitals can only be appreciated by visiting an institution. Because matriculates will spend 7 to 8 years in training, it is highly advisable to apply to and interview at multiple institutions. While there is no magic number, it is not uncommon for students to apply to 8 or more programs.

Choosing a program is a very individualized process. Suggestions for consideration in this process include: program size; the graduate training disciplines offered and range of faculty interests; the medical school curriculum including the clinical components and how they are integrated with graduate training; perceived competitiveness of an institution; personal interactions among students and faculty, including faculty accessibility; program leadership and administration; success of previous trainees; and geographic location.

2) Applying MD-PhD versus MD Only

The majority of MD-PhD programs will consider applications from internal MD students and many will consider applications from current PhD students early in training. Information for many programs can be viewed in **Table 1** at the end of this document. This mechanism offers an opportunity for students who recognize their commitment to dual degree training after starting single-track programs. However, at most institutions the number of slots for such students is limited and these applications may be considered together with the full pool of

applicants for that year. In most cases it is therefore advisable to apply for MD-PhD training as soon as one is convinced that this is the proper path to pursue.

On the flip side, for most schools participating in AMCAS, the MD application is completed as part of the MD-PhD application. Thus many schools allow a student to indicate whether they wish to be considered for MD-only admission if the MD-PhD application is not successful. It should be noted that schools differ greatly in how admission's committees function. In some cases the MD-PhD committee is entirely separate and makes decisions independent of the medical school admissions committee. Thus a student interested in pursuing an MD at a particular institution, regardless of their MD-PhD status, is advised to make their wishes clear by following up as the process proceeds.

3) Factors Considered by MD-PhD Admissions Committees

Specific prerequisites for applying to MD-PhD programs include college coursework required for medical school admissions, which can be accessed at individual institution websites or through the AAMC Medical School Admissions Requirements Publication (MSAR) [<http://www.aamc.org/students/applying/msar.htm>]. It is worth noting that successful medical school and MD-PhD applicants have their undergraduate majors in many different fields and are not restricted to the sciences. Although only US citizen or permanent resident applicants can be supported by the predoctoral MSTP federal grants, a number of institutions will consider foreign MD-PhD applicants [Table 1].

Applicants are expected to have demonstrated academic excellence in their undergraduate coursework; the median GPA for students entering MD-PhD programs in 2007 was 3.7. However, this number varies between institutions and the range of accepted GPAs is often quite broad. Admissions committees consider the undergraduate institution and the difficulty of coursework undertaken in evaluating the GPA. The median combined MCAT score for 2007 entering MD-PhD students was 34. Again, there is a significant range in scores between institutions. In general, GPA and MCAT scores must be competitive with successful medical school applicants at a given institution. In addition to the MCAT, some institutions and graduate programs require GRE scores for MD-PhD applicants. Information on GRE requirements is available for those programs that completed our MD-PhD Section Survey [Table 1].

By far the most important factor in selecting MD-PhD applicants is *evidence of passion for research*. This translates to one or more substantial and substantive research experiences where a student works on their own project with input into how the work is accomplished. Successful applicants are those who understand what they are getting into. This can take many forms—an honors research thesis, recurring summer experiences, and full-time research experience after graduation. Indeed, a significant number of MD-PhD applicants have spent one or more years doing post-graduate research in order to verify their desire for a career in research.

Similarly, MD-PhD applicants are generally expected to have some experience in the clinical realm such as shadowing, volunteer work, or specific training (e.g. EMT). Such experience conveys to the admissions committee that the applicant has worked to assess their capacity for providing healthcare.

Finally, in considering other activities, evidence of leadership, independence, serving others, and breadth are all taken into consideration.

4) Application Process

Nearly all MD-PhD Programs participate in the AMCAS application process [<http://www.aamc.org/students/amcas>]. Students designate themselves as Combined MD-PhD Training Applicants and complete two additional essays in the AMCAS form: one related to why they are interested in MD-PhD training and the other highlighting their significant research experiences. Many schools require individual secondary applications and all schools require letters of recommendation. Applicants are encouraged to make sure that one or more of these letters is from a research mentor who can speak to the applicant's abilities and commitment to research. Details about the specific number of required letters, secondary applications, submission of transcripts and fees will be found at the school's website.

5) Interview Process

Programs vary widely in how interviews are conducted and applicants are advised to check program websites for more information. MD-PhD Admissions Committees typically consist of a mixture of physician-scientists and basic scientists. Although the degree of involvement varies substantially, the MD Admissions Committee, which typically is comprised of clinical and medical teaching faculty may also have a major stake in the MD-PhD Admissions process. Thus candidates will be expected to talk science as well as convey their clinical experiences.

6) Status Notification and Final Decisions

As program admissions committees come to decisions about applicants they will be notified of their status. Applicants are asked to acknowledge acceptances within a defined period of time and are allowed to hold more than one acceptance consistent with AMCAS policies. Most programs will also place a number of applicants on waitlist status, in anticipation of changes in their roster that occur as students make final decisions and commit to one institution. Accepted applicants are encouraged to take advantage of "Revisit" opportunities and to be punctual in notifying schools of withdrawal once decided. A set of AAMC "Traffic Rules" provides guidance, but communication between accepted students and institutions is required for this process to be effective. See <http://www.aamc.org/students/applying/policies/applicants.htm> for more information.

IV Information for Current MD-PhD Trainees

1) Funding Opportunities

Although most MD-PhD programs offer substantial support for their students, there are additional resources available for supporting MD-PhD trainees. Most take the form of competitive applications submitted by the trainee and their research mentor. Programs are likely to differ considerably in their expectations of trainees regarding such resources, however the student should consider several benefits of applying. First, you are engaging in the process of grant writing, which is a skill that you will need to acquire. Second, the process will help to focus your research project. Finally, if your application is successful you will have the satisfaction of carrying part of your own weight through the training process. Potential MD-PhD trainee funding opportunities are listed below.

2) Research Residency Opportunities

Listings of research residency opportunities can be accessed at a site maintained by the American Physician Scientists Association (APSA):

[\[http://www.physicianscientists.org/Training_Programs/Residency.html\]](http://www.physicianscientists.org/Training_Programs/Residency.html)

POTENTIAL FUNDING SOURCES FOR MD-PhD STUDENTS

Please visit the websites for deadlines, qualifications, and funding applications.

Two categories of possible funding sources for MD-PhD students are listed below: private, non-federal sources and federal sources. Students are encouraged to check with their MSTP Administrator and Graduate Program Administrator to be sure funding policies are followed and to apply for funding appropriate for your scientific discipline.

Both lists are appropriate sources for students who are supported by non-federal funds or who are attending non-MSTP funded programs.

MSTP-funded students may or may not be able to use either source. Some institutions allow students to receive an F30 or F31 while they are in graduate school and not supported by the MSTP training grant.

- **LIST A (private, non-federal funds)** is for students who are paid from MSTP grants and are unable to apply for an F30 or F31, but who wish to have additional support during their PhD training years (e.g., lab supplies, books, conferences, etc.).
- **LIST B (federal sources)** is for students who are paid from MSTP grants AND whose institutions DO offer the option of applying for F30 or F31 during their graduate training.
 - Students who are paid from an MSTP training grant may not receive F30 or F31 grants that would pay them at the same time they receive MSTP funds.
 - In some institutions, if a student is awarded an F30 or F31, they must be terminated from the MSTP grant and the total months of support from the MSTP grant must be deducted from the F30 or F31 award.

LIST A

The following list of sources can be used by

- Students who are supported by MSTP grants and whose institutions **DO NOT** allow them to apply for an F30 or F31 during graduate school.
- Students who are supported by other non-federal sources.

American Association of University Women

<http://www.aauw.org/> or <http://www.aauw.org/ef/specialawards.cfm>

American Cancer Society

http://www.cancer.org/docroot/RES/RES_5_1.asp?sitearea=RES

American Chemical Society, Division of Analytical Chemistry: Pfizer Graduate Travel Awards in Analytical Chemistry

http://www.acs-analytical.dug.edu/Pfizer_Award_Description.html

American Diabetes Association

www.diabetes.org or <http://www.diabetes.org/diabetes-research/research-grant-application-forms/ADA-grant-opportunities/ADA-current-grant-opportunities.jsp>

American Federation for Aging Research Scholarship

<http://www.afar.org/grants.html> – Applications accepted annually in December.

American Heart Association Regional Affiliates Predoctoral Fellowship

<http://www.americanheart.org> or <http://www.americanheart.org/presenter.jhtml?identifier=9713>

American Physiological Society

<http://www.the-aps.org/> or www.the-aps.org/awards/other.htm

American Society for Microbiology Robert Watkins Graduate Fellowship for minorities

<http://www.asm.org/Education/index.asp?bid=6278>

American Society for Pharmacology and Experimental Therapeutics

http://www.aspet.org/public/awards/awards_fellowships.html

Boston University Women in Science

<http://www.bu.edu/chemistry/buwic/resources/fellowship/>

Columbia University - list of internal and external funding opportunities

http://cpmcnet.columbia.edu/dept/neurobeh/nb_phd_fellowship.html

Community of Science Funding Opportunities Database

<http://fundingopps2.cos.com/>

Cornell University Graduate Fellowship Notebook

<http://cuinfo.cornell.edu/Student/GRFN/>

Ford Foundation Dissertation Diversity Fellowships

<http://www7.nationalacademies.org/fordfellowships/forddiss.html>

Fulbright Program Institute of International Education for studies abroad

<http://www.iie.org>

Howard Hughes Medical Institute Medical Fellows Program

<http://www.hhmi.org/grants/>

Josephine de Karman Predoctoral Fellowship

<http://www.dekarman.org/Qualifications.aspx>

L'Oreal Foundation Women in Science Predoctoral Fellowships

http://www.lorealusa.com/en_us/ Applications accepted annually in October.

NASA Individual Predoctoral Fellowship

<http://education.nasa.gov/edprograms/fellowgrants/index.html>

NATO Predoctoral Fellowship With Partner Nations

<http://www.nato.int/science/>

Paul and Daisy Soros Fellowship for New Americans

www.pdsoros.org

Proposal Central

<https://v2.ramscompany.com/default.asp>

ProposalCENTRAL is an e-grantmaking website shared by many government, non-profit, and private grant-making organizations. Over twenty thousand applicants and reviewers interact electronically with the grant-makers that are members of ProposalCENTRAL.

Sarnoff Cardiovascular Research Foundation Fellowship

<http://www.sarnoffendowment.org/fellowship.shtml>

UNCF•Merck Graduate Science Research Dissertation Fellowships

<http://www.uncf.org/merck/>

LIST B

The following list of sources can be used by

- Students who are supported by MSTP grants and whose institutions *offer the option of applying for an F30 or F31* during graduate school.
- Students who are supported by other non-federal sources.

NIH Predoctoral Fellowship Awards for Students with Disabilities (F31)

<http://grants.nih.gov/grants/guide/pa-files/PA-00-068.html>

Ruth L. Kirschstein National Research Service Awards for Individual Predoctoral Fellows (F31)

<http://grants2.nih.gov/grants/guide/pa-file/PA-07-002.html>

Participating Organizations

National Institutes of Health (NIH), (<http://www.nih.gov/>)

Components of Participating Organizations

National Institute on Aging (NIA), <http://www.nia.nih.gov>

National Institute on Alcohol Abuse and Alcoholism (NIAAA), <http://www.niaaa.nih.gov>

National Institute of Biomedical Imaging and Bioengineering (NIBIB),

<http://www.nibib.nih.gov>

National Institute on Deafness and Other Communication Disorders (NIDCD),

<http://www.nidcd.nih.gov>

National Institute on Drug Abuse (NIDA), <http://www.nida.nih.gov>

National Institute of Mental Health (NIMH), <http://www.nimh.nih.gov>

National Institute of Neurological Disorders and Stroke (NINDS),

<http://www.ninds.nih.gov>

Office of Dietary Supplements (ODS), <http://ods.od.nih.gov>

Ruth L. Kirschstein National Research Service Awards for Individual Predoctoral MD-PhD Fellows (F30) <http://grants2.nih.gov/grants/guide/pa-files/PA-05-151.html>

Participating Organizations

National Institutes of Health (NIH), (<http://www.nih.gov/>)

Components of Participating Organizations

National Institute on Aging (NIA/NIH), (<http://www.nia.nih.gov/>)

National Institute on Alcohol Abuse and Alcoholism (NIAAA/NIH),

(<http://www.niaaa.nih.gov>)

National Institute on Deafness and Other Communication Disorders (NIDCD/NIH),

(<http://www.nidcd.nih.gov>)

National Institute on Drug Abuse (NIDA/NIH), (<http://www.nida.nih.gov>)

National Institute of Environmental Health Sciences (NIEHS/NIH),

(<http://www.niehs.nih.gov>)

National Institute of Mental Health (NIMH/NIH), (<http://www.nimh.nih.gov>)

National Institute of Neurological Disorders and Stroke (NINDS/NIH),

(<http://www.ninds.nih.gov>)

Office of Dietary Supplements (ODS/NIH), (<http://ods.od.nih.gov>)

Ruth L. Kirschstein National Research Service Awards for Individual Predoctoral Fellowships (F31) to Promote Diversity in Health-Related Research

<http://grants.nih.gov/grants/guide/pa-files/PA-06-481.htm/>

Participating Organization

National Institutes of Health (NIH), (<http://www.nih.gov/>)

Agency for Healthcare Research and Quality (AHRQ), (<http://www.ahrq.gov>)

Components of Participating Organizations

National Cancer Institute (NCI), (<http://www.nci.nih.gov/>)

National Center for Complementary and Alternative Medicine (NCCAM), (<http://www.nccam.nih.gov/>)

National Center for Research Resources (NCRR), (<http://www.ncrr.nih.gov/>)

National Eye Institute (NEI), (<http://www.nei.nih.gov/>)

National Heart, Lung, and Blood Institute (NHLBI), (<http://www.nhlbi.nih.gov>)

National Human Genome Research Institute (NHGRI), (<http://www.nhgri.nih.gov/>)

National Institute on Aging (NIA), (<http://www.nia.nih.gov/>)

National Institute on Alcohol Abuse and Alcoholism (NIAAA), (<http://www.niaaa.nih.gov/>)

National Institute of Allergy and Infectious Diseases (NIAID), (<http://www.niaid.nih.gov/>)

National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS), (<http://www.niams.nih.gov/>)

National Institute of Biomedical Imaging and Bioengineering (NIBIB), (<http://www.nibib.nih.gov/>)

National Institute of Child Health and Human Development (NICHD), (<http://www.nichd.nih.gov/>)

National Institute on Deafness and Other Communication Disorders (NIDCD), (<http://www.nidcd.nih.gov/>)

National Institute of Dental and Craniofacial Research (NIDCR), (<http://www.nidcr.nih.gov/>)

National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), (<http://www.niddk.nih.gov/>)

National Institute on Drug Abuse (NIDA), (<http://www.nida.nih.gov/>)

National Institute of Environmental Health Sciences (NIEHS), (<http://www.niehs.nih.gov/>)

National Institute of General Medical Sciences (NIGMS), (<http://www.nigms.nih.gov/>)

National Institute of Mental Health (NIMH), (<http://www.nimh.nih.gov/>)

National Institute of Neurological Disorders and Stroke (NINDS), (<http://www.ninds.nih.gov/>)

National Institute of Nursing Research (NINR), (<http://www.ninr.nih.gov/>)

Office of Dietary Supplements (ODS), (<http://www.ods.od.nih.gov>)

Ruth L. Kirschstein NRSA Program for NIGMS MARC Predoctoral Fellowships (F31) (for minority groups underrepresented in the biomedical and behavioral sciences)

<http://grants2.nih.gov/grants/guide/pa-files/PAR-03-114.html>

V. Additional Resources

U.S. Medical School MD - PhD Programs

<http://www.aamc.org/research/dbr/mdphd/programs.htm>

Medical Scientist Training Program Overview (NIGMS)

<http://www.nigms.nih.gov/Training/InstPredoc/PredocOverview-MSTP.htm>

AAMC: Careers in Medical Research

<http://www.aamc.org/students/considering/research.htm>

MD-PhD Careers (Science Magazine)

http://sciencecareers.sciencemag.org/career_development/previous_issues/articles/2590/md_phd_careers_feature_index/

MD-PhD Directors Association

<http://www.aamc.org/research/dbr/mdphd/start.htm>

American Physician Scientists Association (Student Group)

<http://www.physicianscientists.org/>

Table 1. Summary of MD-PhD Programs and Policies.

The table on the following page contains data compiled from a survey of institutions conducted by the MD-PhD Section Communications Committee of the AAMC GREAT Group in 2007. Column headings correspond to specific questions asked in the survey as follows:

Is your program funded by an MSTP training grant?

Are your MD-PhD positions fully funded, partially funded, or both? (inclusive of stipend and tuition and regardless of funding source)

Do you accept applications from internal MD students?

Do you accept applications from internal PhD students?

Do you accept transfer students from other programs?

Does your program admit non-US citizens?

Do you require GRE scores?

Do you require lab rotations in the summer preceding medical school?

Does your program participate in the NIH Graduate Partnership Program (GPP)?

These data are intended as guidelines and are subject to change or revision. Prospective applicants should confirm information about application policies with individual institutions. Note that some institutions did not provide answers to all questions and are recorded as blanks.

Table 1. Summary of MD-PhD Programs and Policies*

Institution/Program	MSTP Funded?	Funding of Positions	Internal MD Students?	Internal PhD Students?	Transfer Students?	Non-U.S. Citizens?	GRE?	Summer Rotations?	NIH Graduate Partnership Program?
Albany Medical College	No	Fully funded	Yes	Yes	No	No	No	Optional	No
Albert Einstein College of Medicine of Yeshiva University	Yes	Fully funded	Yes	Yes	No	Yes	No	Required	No
Brown University	No	Partially funded	Yes	Yes	No	Yes	Yes	Optional	No
Case Western Reserve University	Yes	Fully funded	Yes	Yes	Yes	No	No		No
Columbia University	Yes	Fully funded	Yes	Yes	Yes	Yes	No	Optional	Yes
Duke University School of Medicine	Yes	Fully funded	Yes	No	No	No	No	Not offered	No
Emory University	Yes	Fully funded	Yes	Yes	Yes	Yes	No	Optional	Yes
Georgetown University	No	Both fully and partially	Yes	Yes	Yes	No	No	Optional	Yes
Harvard Medical school	Yes	Fully funded	Yes	No	No	Yes	No	Required	Yes
Indiana University	No	Fully funded	Yes	No	Yes	Yes	No	Required	No
Johns Hopkins University School of Medicine	Yes	Fully funded	Yes	Yes	No	Yes	No	Optional	Yes
Mayo Clinic	Yes	Fully funded	Yes	Yes	No	Yes	No	Required	No
Medical College of Georgia	No	Fully funded	Yes	No	No	Yes	No	Not offered	No
Medical College of Wisconsin	No	Fully funded	Yes	Yes	Yes	Yes	No	Required	No
Medical University of South Carolina	Yes	Fully funded	Yes	Yes	Yes	Yes	No	Required	No
Mount Sinai School of Medicine	Yes	Fully funded	Yes	Yes	Yes	Yes	No	Required	Yes
Northwestern University	Yes	Fully funded	Yes	Yes	Yes	Yes	No	Required	No
NYU School of Medicine	Yes	Fully funded	Yes	Yes	Yes	No	No	Required	No
Ohio State University MD/PhD Program	No	Fully funded	Yes	Yes	No	No	No	Required	No
Oregon Health & Science University	Yes	Fully funded	Yes	Yes	Yes	No	No	Optional	Yes
Penn State College of Medicine	No	Fully funded	Yes	Yes	Yes	Yes	No	Required	Yes
Rosalind Franklin University of Medicine and Science	No	Fully funded	Yes	No	No	Yes	No	Optional	No
Saint Louis University School of Medicine	No	Fully funded	Yes	Yes	No	No	No	Required	No
Stanford	Yes	Fully funded	Yes	No	No	No	No	Optional	No
Stony Brook University	Yes	Fully funded	Yes	Yes	Yes	Yes	No	Required	Yes
SUNY Upstate Medical University	No	Fully funded	Yes	Yes	Yes	Yes	No	Optional	No
SUNY-Downstate	No	Fully funded	Yes	No	No	No		Optional	
Texas A&M University System-HSC College of Medicine	No	Both fully and partially	Yes	Yes	Yes	Yes	No	Required	No
The University of Chicago	Yes	Fully funded	Yes	Yes	Yes	Yes	No	Not offered	Yes

Institution/Program	MSTP Funded?	Funding of Positions	Internal MD Students?	Internal PhD Students?	Transfer Students?	Non-U.S. Citizens?	GRE?	Summer Rotations?	NIH Graduate Partnership Program?
Tufts University School of Medicine	Yes	Fully funded	Yes	Yes	No	Yes	No	Optional	
Tulane University School of Medicine	No	Partially funded	No	No	Yes	Yes	No	Optional	No
UCHSC	Yes	Fully funded	Yes	No	Yes	No	No	Optional	Yes
UCLA-Caltech	Yes	Fully funded	Yes	Yes	No	No	No	Optional	Yes
UMDNJ RWJMS/Rutgers/Princeton	No	Fully funded	Yes	Yes	No	No	No	Optional	No
University of Alabama at Birmingham	Yes	Fully funded	Yes	No	Yes	No	No	Optional	Yes
University of Arizona	No	Both fully and partially	Yes	Yes	Yes	No	No	Optional	No
University of Arkansas for Medical Sciences	No	Partially funded	Yes	No	Yes	No	No	Optional	No
University of California, Irvine	Yes	Fully funded	Yes	Yes	No	No	No	Optional	No
University of California, San Diego	Yes	Fully funded	Yes	Yes	No	No	No	Optional	No
University of California, San Francisco	Yes	Fully funded	Yes	No	No	No	No	Optional	No
University of Cincinnati, College of Medicine	Yes	Fully funded	Yes	Yes	Yes	Yes	No	Required	Yes
University of Connecticut	Yes	Fully funded	Yes	Yes	No	Yes	No	Optional	No
University of Illinois at Chicago	Yes	Fully funded	Yes	Yes	No	No	No	Required	No
University of Illinois College of Medicine at Urbana-Champaign	No	Fully funded	Yes	Yes	No	No	No	Optional	No
University of Iowa Carver College of Medicine	Yes	Fully funded	Yes	No	Yes	No	No	Optional	No
University of Kansas Medical Center	No	Fully funded	Yes	Yes	No	No	No	Required	No
University of Maryland School of Medicine	No	Fully funded	Yes	Yes	Yes	Yes	No	Optional	No
University of Massachusetts Medical School	No	Fully funded	Yes	No	Yes	No	No	Optional	No
University of Miami	No	Both fully and partially	Yes	No	No	Yes	No	Optional	No
University of Michigan	Yes	Fully funded	Yes	Yes	No	No	No	Optional	No
University of Minnesota	Yes	Fully funded	Yes	Yes	No	Yes	No	Required	Yes
University of Nebraska Medical Center	No	Fully funded	Yes	No	No	No	No	Required	No
University of North Carolina at Chapel Hill	Yes	Fully funded	Yes	No	No	No	No	Optional	Yes
University of Pennsylvania	Yes	Fully funded	Yes	Yes	No	Yes	No	Optional	No
University of Pittsburgh	Yes	Fully funded	Yes	No	No	No	No	Required	No
University of Rochester	Yes	Fully funded	Yes	Yes	No	No	No	Optional	No

Institution/Program	MSTP Funded?	Funding of Positions	Internal MD Students?	Internal PhD Students?	Transfer Students?	Non-U.S. Citizens?	GRE?	Summer Rotations?	NIH Graduate Partnership Program?
University of Southern California	No	Fully funded	Yes	Yes	No	No	No	Optional	
University of Texas Health Science Center at Houston and MD Anderson Cancer Center	No	Fully funded	Yes	Yes	Yes	Yes	No	Required	No
University of Texas Medical Branch Galveston	No	Fully funded	Yes	Yes	No	Yes	No	Optional	No
University of Texas Southwestern Medical Center at Dallas	Yes	Fully funded	Yes	Yes	No	Yes	No	Required	Yes
University of Utah	No	Fully funded	Yes	Yes	No	No	No	Required	No
University of Vermont	No	Fully funded	Yes	No	No	Yes	No	Optional	No
University of Washington	Yes	Fully funded	Yes	Yes	No	No	No	Required	No
University of Wisconsin School of Medicine and Public Health	Yes	Fully funded	Yes	Yes	No	No	No	Optional	Yes
UTMB/UT-Austin Dual Degree MD/PhD	No	Partially funded	Yes	Yes	Yes	No	No	Required	No
Vanderbilt University School of Medicine	Yes	Fully funded	Yes	Yes	Yes	Yes	No	Required	Yes
Virginia Commonwealth University	No	Fully funded	Yes	No	Yes	No	No	Required	No
Washington University	Yes	Fully funded	Yes	Yes	Yes	Yes	No	Optional	Yes
Wayne State University	No	Fully funded	No	No	No	No	No	Required	No
Weill Cornell/Rockefeller/Sloan-Kettering Tri-Institutional MD-PhD Program	Yes	Fully funded	Yes	No	Yes	Yes	No	Required	No

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