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The Future of Physician-Scientists—Demise or Opportunity?

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Physician-scientists are physicians who conduct biomedical research as their primary professional activity. Their research is often focused on the pathophysiologic mechanisms that elucidate strategies for diagnosis, prevention, and treatment of diseases. Some physician-scientists perform research that involves direct patient contact. Other physician-scientists perform bench research aimed at understanding the basic mechanisms of normal biological processes. As a consequence of their work, physician-scientists significantly contribute to the advancement of medical knowledge and frequently find themselves making discoveries through translating exciting new findings from the laboratory to the practice of medicine. Such advances are extremely valuable not only in delivering patient care but in providing the foundation for evidenced-based medical training. Hence, many physician-scientists are valuable teachers to medical students and convey a deep appreciation for the importance of science in medicine. Finally, armed with the wealth of new information derived from the recently completed human genome project, physician-scientists are particularly suited to bridge the knowledge gap between clinicians and basic scientists.

Despite the exciting features of a career as a physician-scientist, the proportion of physicians choosing this career path has been steadily declining in the last 2 decades. In 2003, the percentage of physicians engaged in research as their major professional activity was a mere 1.8%, a decrease from 4.6% in 1985.¹ This decline is due to the combined effect of an increase in the total number of physicians in the workforce and a decrease in the total number of physician-scientists. Many experts have attempted to understand the reasons for this decline. A primary factor that is cited frequently relates to financial underpinnings. It is well-recognized that a majority of students accumulate substantial debts upon graduation from medical school. There is also an increasing salary gap between practicing and research physicians. Another potential deterrent for a physician to choose a research career is the extra time spent in training to acquire the necessary investigative skills. This is reflected by the gradual increase in age in which a physician-scientist obtains his or her first independent research grant from the National Institutes of Health (NIH). In 2003, the average age of an MD or MD/PhD receiving their first independent NIH grant stood at 44. The recent decline in the funding rate of NIH grants is likely to make an already critical situation worse. Last, as many academic health centers come under financial constraints as a result of reduced reimbursement for clinical services, physician-scientists are asked to perform more clinical duties, thus further impairing their scientific productivity.

Does this mean that physician-scientists are facing extinction? The adversity that an individual faces in choosing a career as a physician-scientist and the trend that such a career path is being selected by fewer physicians are not lost by major organizations, which are doing more than ever before to reverse this trend. The NIH, for example, initiated several Loan Repayment Programs in 2002 to help physician-researchers overcome the debt obstacle. The total funding of the popular K08 Mentored Scientist Award has steadily been increasing with a respectable success rate of approximately 40% in recent years.¹ Likewise, the number of applications for the patient-oriented K23 Mentored Career Award has also been increasing. The newly launched NIH Roadmap for Medical Research, which is intended to accelerate the pace of life science discovery from the bench to practice, offers a great opportunity for physician-scientists to participate. Many private foundations and societies have also provided excellent opportunities

in which resources can be applied for to fund both basic and translational research. In this year's annual meeting of the American Society for Clinical Investigation, for example, numerous physician trainees, many of whom currently hold a K08 or K23 award, were invited to present their scientific findings to the membership. Another encouraging trend is noted in a small but gradual increase in the percentage of medical students showing a significant interest in research as a career activity in the last few years. This is attributed in part to the effort of many medical schools to integrate basic and clinical curricula that permit time for students to have a significant experience in research.

In the recent newsletter by American Gastroenterological Association (AGA) Institute President, Mark Donowitz, entitled "Physician Investigator," he rightly noted 2 key hurdles that physician-scientists must overcome; and, as a consequence, such hurdles result in 2 of the most vulnerable periods in their careers. The first vulnerability is the transition from a mentored (K-type) award to obtaining the first R01 grant, which is a benchmark of achievement for physician-scientists because it delineates their independence from their mentors. The second hurdle that may engender even more vulnerability for the physician-scientist in his or her career is the renewal of the first R01 grant application, or the ability to obtain a second R01 grant. These issues for many physician-scientists usually come at a time when promotion and tenure are typically determined. Furthermore, most physician-scientists at this point in their careers may have family considerations that translate into significant financial concerns. Thus, following a long period of training, the rigors of obtaining the first R01, when combined with personal financial pressures, make the second hurdle a greater vulnerability to the physician-scientist's career. As the major organization in gastroenterology, the AGA Institute has made available mechanisms by which bridge resources can be provided to the investigators during these critical periods. The NIH has also implemented a process with which to expedite the review process of grants from young investigators to minimize a prolonged funding gap for these individuals. The recent establishment of a National Commission on Digestive Diseases is also likely to provide a sounding board for digestive disease-related investigation.

Thus, despite the obstacles, not all is lost for a career as a physician-scientist. In fact, abundant opportunities exist that can help shape such a career. In this post-genomic era, physician scientists are needed more than ever to interpret results derived from complex experiments and to translate such findings into clinical practice. As I see it, a career as a physician-scientist is indeed an enviable profession that is not only rewarding, but richly benefits the society in which we live. Nonetheless, to prevent this endangered species from extinction, the concerted effort of academic medical institutions, government, industry, foundations, and society as a whole in recognizing the importance of these individuals and supporting such careers is absolutely essential. The public must be made aware of the importance of the physician-scientist to our society, including what he or she does and how his or her work impacts clinical medicine. Only then can a pipeline of physician-scientists be guaranteed that will ensure the dynamic flow of information from the laboratory to the clinic, and back.

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