V. Training And Manpower

30. M.D. Training

Summary

A variety of institutional pressures make life exceedingly difficult for pediatric urologists contemplating a research career. We recommend new training mechanisms that would allow those with a strong commitment to immerse themselves in research under the mentorship of scientific leaders in the field.

A Scarcity of Research Opportunities

During the last decade, funds for supporting urology training have progressively dwindled—while reimbursements to hospitals have been greatly decreased and managed care has reduced clinical revenues to academic departments, departmental administrative costs to support residency and fellowship training programs have greatly increased. Historically, many urology training programs offered 1 year of basic research training during residency training. This often was funded by the hospital or, in rare cases, endowments within urology departments. However, during the last decade, the overwhelming majority of urology training programs have been transformed from 6- to 5-year training programs in which the maximum amount of time that can be allocated to basic research is only 6 months. As a result, many program directors, considering a 6-month exposure to the laboratory too short, even as it limits needed clinical experience, have decided to abandon a research experience altogether. While most would agree that a research experience is important for trainees, it might not represent the optimal resource allocation in the present environment, where the overwhelming majority of urology trainees seek private practice opportunities and may not be motivated to take full advantage of the research experience.

Medical School Research Training

Since the overwhelming majority of individuals who ultimately pursue academic careers are from the minority who complete subspecialty training, the focus of a program to foster research should be on this group, beginning at the medical school level. Pediatric urologists at academic institutions need to actively seek out students interested in a summer research experience or an additional year in a pediatric urology laboratory that would provide a sound foundation and exposure to their field. Funds that would facilitate this research training would be well justified, as a superb mentoring experience with scientific leaders in pediatric urology will attract individuals with a true interest in basic research to enter the field. It is envisaged that these individuals then will seek urology programs with a research year, further enhancing their interest in basic science.

Fellowship Training

At present, the entire burden for supporting fellowship trainees falls on the department or fellowship program. While the return on investment in clinical training is readily apparent, there are no revenues derived from a research experience to defray costs. Further complicating matters is the fact that, with their pressing clinical responsibilities, pediatric urology fellows are at a decided disadvantage in competing for the funds to support a research program. Although a small subset of urology fellows does successfully compete for AFUD scholarships, the number of

these awards is inadequate[1]. Currently, the NIH does fund pediatric urology fellows with 2- or 3-year training grants, but only a limited number of pediatric urology programs currently have these. (The new NIH guidelines that reduce to 50 percent the required time commitment for the K08 and R21 grants will be very helpful.)

Incentives

During the past decade, manpower in pediatric urology has changed in response to the ever-changing health care environment. There has been an increase in pediatric urologic positions, but at the same time, a decrease in some years in those seeking pediatric urology fellowships. The decline is related in part to the emergence of new lucrative subspecialties attracting the best and the brightest trainees. We suggest that program directors or affiliate hospitals might consider financial incentives for individuals entering pediatric urology, especially since, in the academic setting, these individuals often serve the underprivileged and the poorly insured, while at the same time trying to build clinical practices and establish themselves as basic science investigators.

Recommendations

- Pediatric urologists at academic institutions should focus on attracting medical students interested in a summer research experience or an additional year in a pediatric urology laboratory committed to providing a sound foundation in research, while exposing students to the field. Allocated funds for these medical students could be provided.
- One- or 2-year research funding should be widely offered for pediatric urology fellowship training programs. This should be a mentored experience with the goal of providing a strong foundation in the scientific method and exposure to competitive, high-level research.
- The timetable for grant applications should be synchronized with the match for pediatric urology fellowships.
- To ensure a pool of high-quality individuals to meet the needs of pediatric urology, new strategies are needed to attract individuals in medical school as residents to pediatric urology.

[1] One of the reasons fellows do not apply for the AFUD scholarship is that the notification of some of the matching fellowship training program is after deadline for submission of an AFUD grant—the timetable for grant applications needs to be adjusted to meet the match for pediatric urology fellowships.

31. Ph.D. Training

Summary

The participation of Ph.D. investigators in research with direct applications to pediatric urology is inadequate. We discuss some cultural barriers to this participation and advocate training programs to support graduate students studying research problems centered on urologic disease with urologists participating as advisors. Postdoctoral programs in urology research also are recommended.

The Ph.D. degrees relevant to biomedical research usually are obtained after the successful completion of an undergraduate science major, followed by course work and extensive independent research in a specialized area as a graduate student. Following the defense of a thesis before a panel of senior faculty, graduates typically go on to postdoctoral positions of varied intellectual independence prior to obtaining positions as scientists in academia or industry. Postdoctoral training is a critical element of the Ph.D. career path. The most promising Ph.D. graduates typically seek out postgraduate training in leading laboratories, ones that routinely publish papers in high-impact journals such as *Cell*, *Nature*, and *Science*. With their technical knowledge, and scientific training, Ph.D.s are an essential component of any biomedical research program that aspires to national competitiveness and research productivity. Without their participation at the postdoctoral, staff scientist, and faculty levels, it is unlikely that most urologists would be able to assemble research teams of sufficient quality to conduct research at the highest level. Partly because of the emergence of industry as an attractive career option for young Ph.D.s, the percentage of Ph.D.s with faculty career potential willing to commit to a career path in academics may be declining.

Opportunities and Obstacles in Pediatric Urology

Although historically underfunded, pediatric urology presents some very favorable opportunities to those in research: urological diseases are rich with unexplored territory and clinical urology programs at major teaching centers reside within a "scientist-rich" environment; programs in large cities are generally located near some of the finest laboratories in the world. Furthermore, NIH is actively seeking meritorious applications in areas in urology where it has recognized specific needs. This might offer major advantages to those contemplating urology research compared to those in fields such as cardiovascular research and neuroscience, where competition for grants can be fierce and award decisions arbitrary.

Training and Recruitment

Unfortunately, for cultural reasons, urology is at present poorly positioned to compete for the best scientists. Senior academic leaders in urology frequently have little understanding of the modern research process or the unique aspects of the Ph.D. career path in comparison to that of the academic surgeon. In marked contrast to the situation in medicine, the field does not reward urologists who concentrate on research. Research-focused urologists frequently are criticized by their peers for not generating "their share" of clinical dollars. The field does not host a single basic science journal of sufficient impact factor to attract quality, cutting-edge research papers. For these reasons, Ph.D. scientists who encounter an academic urologist with whom they might consider collaborating on scientific grounds, might be put off or otherwise conclude that such a collaboration would not be a productive or enlightening endeavor.

Most Ph.D. training programs do not produce scientists who are prepared for research in urology. Their expertise generally is highly focused to certain model systems and methods of analysis. Their ability or tendency to read outside of their

own discipline may also be limited. Most are not familiar with problems inherent to clinical research.

Infrastructural Recommendations

To retain excellent scientists in urology at all levels, urology research needs to be structured along the lines of mature research programs in areas with historically strong research (e.g., neurology, endocrinology, and pathology). Although the questions addressed in a urology department's research labs should be restricted to those with some relevance to important questions in the field, this should be approached with a broad-minded view of what is in fact topical. The "culture" of the research lab in urology needs to be one of openness, fun, egalitarianism, and a willingness to try out new ideas. The laboratory should not be organized according to a hierarchical or dogmatic structure; this has no resemblance to the environment in which most Ph.D.s were trained. It is in an atmosphere where new approaches and research questions are encouraged, and ideas flow freely that conceptual breakthroughs are likely to occur. Familiarity and intimacy with one or more research areas, combined with appropriate mentoring and attention to career path from superiors, will foster professional commitment and will grow the field.

- Active participation of urologists in Ph.D. training programs, either as collaborators on projects or as "clinical-partner" mentors, would increase the familiarity of young scientists with urological problems and make them aware of potential research opportunities in urology.
- We propose training programs for graduate students studying basic research problems centered on urologic disease. Urologists could participate in these programs and could help in the recruitment of students.
- NIH should sponsor training programs for M.D.s to do urology-focused research before or during their urology residency (preferably for 2-year duration).
- Urologists and urology researchers should be poised to attract Ph.D.s fresh out of their graduate training into their research programs.
- Postdoctoral programs in urology research are needed. These might entail a mechanism to recruit graduate students prior to their completion of their Ph.D.

32. Collaborative Programs

Summary

We underscore the importance of collaboration between basic scientists and clinicians in pediatric urology research. If the number of collaborative projects is to grow, novel funding mechanisms may be needed to address the unique demands of the clinician scientist struggling to fulfill dual roles as well as those of the basic scientist as she or he attempts to maintain funding within, or in collaboration with, a clinical department.

The nature of modern productive research is such that there is little role for the individual scientist. While this may be unfortunate, it is obvious that real progress in understanding diseases relevant to pediatric urology, and in developing novel diagnostic and therapeutic methods, will come from the concerted application of conceptual frameworks and methodologies from molecular biology, genetics, and cellular physiology, coupled with clinical insight. Collaboration by those with diverse expertise is essential; each team member brings a unique and critically important perspective, and intellectual insights beyond the initial grasp of any one individual may be attained. The role of the clinician in this collaboration is becoming increasingly strained: as basic science advances, it requires specialized knowledge and training, making it more difficult for clinicians to participate,

even as their participation becomes essential as translational possibilities emerge.

Support of Collaborative Research Involving the Clinician and Basic Scientist

Training

A basic exposure to research experience and methods should remain an essential part of urological training, and this can be extended into the fellowship years of pediatric urology. Conversely, exposure of basic researchers to those who have clinical training and interests is also vital. Research support from NIH should therefore encourage and foster the development of collaborative efforts in pediatric urology related research through support of both Ph.D. as well as M.D. training tracks, with situationally appropriate mechanisms. The duration and constraints of the support should recognize the different needs, time demands, and roles of members of the team.

Establishing and maintaining laboratories

In relatively young fields of research such as pediatric urology, there is a strong need to support the initiation of viable research programs at more institutions than currently include them in their portfolios. The development of new laboratories should be in the context of a collaborative effort, perhaps as off-shoots of established laboratories. NIH-sponsored initiatives that support the early work of a young clinician scientist or basic scientist in pediatric urology departments with mentorship from an established investigator might foster these new programs. Novel mechanisms of funding that encourage developing collaborative projects between basic scientists and clinician scientists would serve to assist in such new programs, as well as fostering the maintenance of such laboratories.

An ongoing challenge to pediatric urological research has been how to perpetuate productive research efforts as both clinician scientists and basic scientists strive to ensure grant funding in an environment of shrinking clinical support. NIH should consider as a priority the need to develop funding mechanisms that recognize the unique demands of the clinician scientist as she or he struggles to fulfill dual roles as well as those of the basic scientist as she or he attempts to maintain funding within, or in collaboration with, a clinical department. Funding mechanisms that permit less commitment of research time to participate in collaborative research should be considered. Mechanisms that permit research training of physicians also are advised. Recognition of the value of basic scientists in translational fields is equally important.

Priorities

The development of collaborative efforts in pediatric urology-related research should be fostered through support of Ph.D. and M.D. training tracks with situationally appropriate mechanisms.

- Novel mechanisms of funding that encourage collaborative projects between basic scientists should be considered: the clinician-scientist should be supported in such ways as to facilitate protecting time from clinical demands without placing unrealistic financial demands on the clinician or the clinical department.
- The basic scientist collaborating in pediatric urology research should have funding to support development of his or her laboratory, particularly through graduate and postdoctoral students, collaboration with other basic scientists, and involvement with the basic science community.

Department of Health and Human Services
National Institutes of Health
National Institute of Diabetes & Digestive & Kidney Diseases

NIH Publication No. 06-5879
February 2006