Association of American Universities
Response to Request for Information (RFI): Input into the Deliberations of the Advisory Committee to the NIH Director Working Group on the Future Biomedical Research Workforce
Notice Number: NOT-OD-11-106
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We appreciate the opportunity to provide input to the Working Group on the Future Biomedical Research Workforce. The Association of American Universities (AAU) represents 59 leading public and private U.S. research universities which collectively receive nearly 60 percent of National Institutes of Health (NIH) extramural funds. As such, we are greatly interested in the efforts of the Working Group and commend NIH for undertaking this thoughtful evaluation of future workforce needs.

We agree with the widely held view that the structure of the current biomedical workforce is unsustainable. This is particularly true in the current fiscal environment. In addition to the simple reality of constrained research budgets, the biomedical research enterprise has come under pressure from the boom-and-bust effects of stimulus spending, the increasing uncertainty surrounding the passage of annual appropriations bills, and the larger economic downturn, which has put tremendous financial strain on research institutions. With this context in mind, we offer comments on the specific areas addressed by the Request for Information (RFI):

The effect of changes in NIH policies on investigators, grantee institutions, and the broader research enterprise: While AAU strongly supports the Working Group's charge and applauds NIH for taking a serious look at how best to manage the biomedical research workforce, it also must be acknowledged that trying to "fix" the workforce model retroactively could have unintended consequences in other areas of the university research enterprise.

For example, there has been recent discussion in a number of venues about the appropriate level of salary support for investigators on NIH grants. While assertions have been made that many biomedical scientists are receiving the majority of their salaries from federal grants, data from the Association of American Medical Colleges[1] and others[2] suggest that this is not the case and

[1] https://www.aamc.org/download/170836/data/aibvol11_no1.pdf
[2] http://www.acdponline.org/Surveys.htm

that institutions themselves provide much of the salary support for their faculty. However, NIH grants are indeed an important source of salary support, and policies related to NIH salary support could have significant and adverse financial implications for research universities. One public institution, which did not wish to be identified, examined the financial impact of a 50-percent salary cap (or 50 percent of NIH salary cap for those above it) on its medical school faculty. Although only a small portion (11%) of faculty had 80 percent or more of their salary supported on grants, the cost of such a cap to the institution was estimated to be $23 million. At a time when universities, particularly public institutions, are struggling to maintain research programs in an era of austerity and significant reductions in state support, $23 million in new costs would be very difficult to absorb.

As former AAU President Robert Berdahl stated in remarks[3] presented to the American Academy of Arts and Sciences ARISE II Committee[4], "the health of the nation's biomedical enterprise and our ability to sustain it is intricately tied to the health of the entire research university enterprise." It is our hope that the Working Group is alert to this reality as you consider questions such as what constitutes a fair sharing of salary support between universities and NIH, and how we make needed changes in the workforce model without imposing undue burden on either the agency or the universities.

Balance between supply and demand: The doubling of the NIH budget between 1998 and 2003 was a prudent, opportunistic, and visionary investment for a number of reasons: the life sciences were undergoing a revolution towards molecular biology and genomics that presented countless scientific opportunities; our nation was in a financial position to invest significant public resources in an agency that was held in universal high esteem and whose activities offered opportunities for improved health and health care; and the U.S. was uniquely positioned to establish unquestioned global leadership, attracting the best and the brightest from around the world to our research institutions. Although the doubling campaign is now considered a cohesive event, those who lived through it know that the nature of annual federal appropriations made it impossible to predict with certainty that the next installment would follow in any given year. This made it very difficult to consider proactively, or plan strategically, for the scientific and financial impacts of an era of rapid growth on the biomedical research workforce.

As a consequence, we find ourselves with a biomedical workforce in which training is not based on a sustainable model that essentially seeks to supply new researchers to fill new or opening senior research positions. Instead, we have a model that produces a supply of trainees with little regard to demand and seeks to match that supply to the current research workload. It is no secret that graduate students and postdoctoral researchers, under the supervision of faculty Principal Investigators, perform a considerable portion of the research activities at our institutions. However, until recently, when flat or reduced NIH budgets made it an unavoidable fact of life, it

[3] http://www.aau.edu/assets/0/78/152/748/704286b0-917c-4024-8b43-314301c8b521.pdf
[4] http://www.amacad.org/projects/fundingNEW.aspx

did seem to be somewhat of a secret to the large numbers of people entering the graduate pipeline, choosing postdoctoral positions, or coming to the U.S. from other nations in pursuit of opportunities that there might not be adequate faculty positions available for them to fill. Indeed, with the doubling of NIH funding, so many new students entered the pipeline that they vastly outnumbered current and future faculty openings. The data were not well-publicized, there was little information available about other career options for those with biomedical research doctorates, and academic mentors, for the most part, did not convey the reality of employment opportunities or the increasing competition for federal grants. Most individuals entering doctoral degree programs during the doubling era typically did so with the full expectation that there was an academic research position waiting at the other end. While we now live with the consequences of this deceptive optimism, it is worth noting that there was an upside: an extraordinary level of research productivity and development of incredible talent, as the best and the brightest flocked to U.S. biomedical laboratories. Hence, we should recognize that policies that reduce the workforce might come at some cost to research productivity.

While the increasing age of receipt of the first R01 award to age 42[5] and the growing pool of postdoctoral researchers[6] raise legitimate questions about whether our nation is training too many doctoral level scientists, a closer look at the data makes these difficult questions to answer. Unemployment rates among doctoral degree holders in the life sciences and health sciences are extremely low, less than two percent, according to the most recent data.[7] This alone makes it hard to argue we are producing too many Ph.D.s. But the initial data published from the 2008 Survey of Doctoral Recipients indicates that less than one-third (26%) of life and health science doctoral degree holders are employed in academic research settings.[8] This is despite the fact that academic research is reportedly still the first career choice of science graduate students and postdocs.[9] The stated goal of NIH-supported training is to produce independent investigators eligible and able to obtain NIH research awards. If that is, in fact, the workforce development objective of such training, one could argue that these programs are not entirely succeeding.

Therefore, perhaps the better approach is not to try to manage supply and demand, but rather to manage expectations and redefine the measures of "success." NIH, research institutions, and faculty involved in training share in the responsibility to provide students and postdoctoral trainees with realistic assessments of future employment prospects, through provision of accurate data on employment placement, award competition, and career opportunities. All stakeholders in the biomedical research community need to work together to eliminate the stigma that any career outcome other than an R01-funded academic investigator represents failure. While it may not be NIH's role specifically to create programs that train students and postdocs for non-research or non-clinical careers, the agency should ensure flexibility in training mechanisms to allow

[5] http://www.amacad.org/AriseFolder/ariseReport.pdf
[6] http://www.nsf.gov/statistics/nsf11311/content.cfm?pub_id=4072&id=2
[7] http://www.nsf.gov/statistics/infbrief/nsf11308/
[8] *Ibid*
[9] http://www.nature.com/news/2011/110420/full/472276a.html

trainees to explore non-traditional careers or gain additional skills and experiences. One example might be adjusting the payback policy on National Research Service Awards (NRSAs) to expand beyond engagement in research. In addition, to provide a future foundation for evaluating the supply and demand question, NIH must find a way to capture information about career outcomes on all of the trainees it supports, regardless of funding mechanism.

Characteristics of PhD training in biomedical research: Doctoral training is of great interest to AAU, as our institutions collectively award more than half of all doctoral degrees nationwide. As a general principle, AAU believes there is a strong federal interest in ensuring that enough of our most talented college graduates go on to earn doctoral degrees. If they do not, the country's innovative capacity and economic competitiveness will be weakened. Like the federal investment in basic research, the federal investment in doctoral education fills a critical gap that neither states nor industry can fill. Talented students who receive doctoral degrees are a highly mobile national resource, and state governments often are reluctant to invest in fellowships for students who might not remain in their state. Similarly, corporations may find doctoral fellowships difficult to justify when they cannot be certain that a student will join the company after attaining the degree. Furthermore, industrial support of training programs in the wake of NIH's new rules on conflicts of interest might prove difficult for universities to manage.

However, working toward a sustainable research enterprise will require rethinking of training models. This includes improving undergraduate STEM education and evaluating graduate training, as well as considering our metrics for success and appropriate funding models. Our institutions should evaluate their graduate curriculum to ensure that it equips students with the knowledge and skills needed for a broad array of postdoctoral careers they might wish to pursue. Moreover, the graduate curriculum should balance breadth and depth with the need to minimize time-to-degree. Data showing a decrease in the number of biomedical scientists employed in traditional, tenure-track academic research institutions raises a host of questions about how to better align graduate education and funding with current employment prospects.[10] Can we better model the larger job marketplace to account for non-traditional career options for biomedical doctorates in industry, policy, teaching, or law? How can we adjust our training programs to better prepare trainees for a larger vision of career success, and what are the appropriate roles for NIH and universities in developing these multidisciplinary graduate programs? How do we equip our graduate students for the jobs that are available, including those outside of universities, without sacrificing the quality of their exposure to basic research? These are some of the fundamental questions universities must ask and answer.

Finally, NIH has spent a great deal of energy brainstorming ways to increase multidisciplinary collaboration in ways that align with current scientific opportunities and spawn innovative thinking. In considering the workforce and training mechanisms, the Working Group should

[10] http://www.faseb.org/Policy-and-Government-Affairs/Data-Compilations/Education-and-Employment-of-Scientists.aspx

examine similar questions: how can we best develop training programs that spur collaboration as well as inter- and multidisciplinary interactions?

Ratio of PhD students and postdoctoral fellows on training grants to those supported by research grants: AAU supports a serious examination by the Working Group of the impact of shifting graduate students and postdocs from R01 research grants onto training mechanisms, such as training grants, K awards, or NRSA fellowships, as recently recommended by the NRC Committee to Study the National Needs for Biomedical, Behavioral, and Clinical Research Personnel. However, while this seems to be a commonsense policy change, we urge the Working Group to consider its full implications. For one, foreign trainees make up a large portion of the biomedical research workforce, but are ineligible for training awards like the NRSA. If we want to continue to attract the world's best talent, we need to continue to find ways to support their training and participation in the research enterprise.

For another, what are the cost implications of such a shift? While the NRC recommends that shifting of research to training awards be accompanied by an adjustment from the current indirect cost cap on training awards to the negotiated rate applied to research grants, it also acknowledges the adverse impact this would have on NIH's resources during a time of flat or reduced budgets. The alternative is equally unpalatable, placing an untenable burden on research universities during a time when many are also facing significant financial challenges.

Graduate students involved in teaching and research are students, not employees; the principal purpose of their teaching and research activities is to learn how to teach and conduct research. Therefore, mandating that some form of training requirements be included in research grants regarding support for trainees, such as the generation of an Individual Development Plan or similar career guidance, or teaching responsible conduct of research, would be reasonable and appropriate.

Length of postdoctoral training: The sustainability of the nation's research effort ultimately depends on our ability to recruit the best students at our colleges and universities to careers in science and provide them with the means to pursue their interests. As a result of the weak economy, senior faculty are postponing retirement. Many universities have had to reduce faculty lines and are not hiring. Combined with the recruitment of postdoctoral fellows, particularly from other nations, we have created a system in which the postdoctoral period has morphed from a training stage to a lengthening period of limbo until the attainment of the first faculty position. This creates alarming statistics such as the rising of the average age of a first-time R01 grant to 42 years old. It is essential that funding agencies develop programs that will support young researchers and keep them in the academy. We applaud NIH's pilot efforts to try to address this issue, such as the New Innovator Award, Early Independence Award, and Pathway to Independence Award.

Possibilities for professional/staff scientist positions and the level of training required for such positions (e.g., PhD or MSc degrees): The Working Group's efforts are raising critical questions about the way we conduct biomedical research. What types of research positions do we need (and will we need) in the modern biomedical research enterprise? Do we need doctoral-level scientists to conduct the everyday laboratory activity that is necessary to answer every research question? Would we be better served by a cadre of professional scientists at the master's level? How can universities and NIH work together to provide incentives for the creation and design of these graduate programs? Would shifting away from the doctorate as the only standard in research degrees allow for a more permanent technician or research scientist position that would relieve the competitive pressure of our bottom-heavy workforce? These are complex questions whose answers could result in a radical shift in everyday life in the laboratory. Proposed policy changes are going to have to be carefully evaluated for their impact on the innovativeness of our scientific enterprise as well as their financial impact on the agency and the extramural research community.

Issues related to the attractiveness of biomedical research careers (e.g. salary, working conditions, availability of research funding): Those who successfully pursue careers in scientific research do so for the love of the science and its possibilities for society. Even under the worse of circumstances, those driven to solve the next question in the continuing quest for knowledge are unlikely to be detracted from their passionate pursuit. However, the lengthened training period, the relatively low stipend levels, the increased competition for grant funding and faculty positions, and the increasing administrative and compliance burden associated with federally-funded research substantially damper our ability to maximize the potential of talented researchers. One of the simplest solutions to these circumstances would be steady, sustainable, and predictable increases to the NIH budget. In the current economic climate, however, that seems unlikely. Reducing the administrative and compliance burden associated with research would be an alternative means of alleviating some of these pressures, as would the management of expectations described earlier.

Finally, although the primary focus of this group is not on workforce diversity, attracting women and underrepresented minorities to biomedical research, and retaining them, is inextricably linked with workforce issues and career options for scientists. The simple truth is that as long as the research career trajectory involves a long period of uncertain and low-paying employment followed by a long period of intense competition with uncertain outcomes, it will be difficult to attract talented individuals who have an array of other opportunities. This is particularly true for those who may face other socioeconomic obstacles or family responsibilities, and to whom more stable, higher paying, or less demanding career pathways may be more appealing. To increase the diversity of the workforce, a better understanding and consideration of the needs of those we are trying to attract and retain is important.

Sustainability is an appealing career trait, and a thoughtful, strategic retooling of our workforce pathways may do more to solve the diversity crisis in biomedical research than any discrete programmatic investment.

Conclusion: While many of our responses urge caution and consideration of consequences in the broadest possible context, we do not mean to imply that the status quo should be supported. As painful as it will be, the current prospects for a flat or declining NIH budget, and the greater awareness of the realities of a biomedical research career path, are likely to lead to a natural atrophy of the workforce. While the challenge will be preventing this from harming the enterprise as a whole and nurturing the next generation of innovative minds, there is also unprecedented opportunity to rethink the way we do business in a way we did not do prior to the doubling of the NIH budget. AAU looks forward to engaging with the Working Group and NIH in developing a vision for a sustainable biomedical workforce.