A Response to the NIH RFI "Optimizing Funding Policies and Other Strategies"

Gary S. McDowell[1]

[1]Center for Regenerative and Developmental Biology and Department of Biology, Tufts University

April 17, 2023

Abstract

This document contains my comments to the National Institutes of Health Request for Information on "Optimizing Funding Policies and Other Strategies to Improve the Impact and Sustainability of Biomedical Research", as submitted on May 11th 2015.

the WINNOWER

SCIENCE AND SOCIETY

A Response to the NIH RFI "Optimizing Funding Policies and Other Strategies"

GARY S. MCDOWELL [1]

1. Center for Regenerative and Developmental Biology and Department of Biology, Tufts University

ABSTRACT

This document contains my comments to the National Institutes of Health Request for Information on “Optimizing Funding Policies and Other Strategies to Improve the Impact and Sustainability of Biomedical Research”, as submitted on May 11th 2015.

CORRESPONDENCE:
garymcdow@gmail.com

DATE RECEIVED:
June 10, 2015

DOI:
10.15200/winn.143136.63273

ARCHIVED:
May 11, 2015

KEYWORDS:
funding, nih, policy, biomedical research, rfi

CITATION:
Gary S. McDowell, A Response to the NIH RFI "Optimizing Funding Policies and Other Strategies", *The Winnower* 2:e143136.63273 , 2015 , DOI: 10.15200/winn.143136.63273

Below are the comments I submitted to the National Institutes of Health (NIH) Request for Information (RFI) NOT-OD-15-084, “Optimizing Funding Policies and Other Strategies to Improve the Impact and Sustainability of Biomedical Research.” Comments are due by May 17th and can be submitted on the web at http://grants.nih.gov/grants/rfi/rfi.cfm?ID=42.

Other RFI responses have been published by Vaibhav Pai (Pai, 2015), Jessica Polka (Polka, 2015), and Sergey Kryazhimskiy (Kryazhimskiy, 2015) which have also influenced aspects of my comments below.

COMMENT 1

Key issues that currently limit the impact of NIH’s funding for biomedical research and challenge the sustainability of the biomedical research enterprise. We welcome responses that explain why these issues are of high importance.

The impact of NIH’s funding is severely affected by the hyper-competition caused by too little funding for too large a pool of investigators, and in particular the competition of early career researchers at junior faculty and postdoctoral researcher levels. The percentage of biomedical PhDs holding tenure-track appointments was estimated in 2010 to be 10.6 % (table 3-18 in the 2014 NSF Science and Engineering Indicators) and is estimated to have declined yet further, whilst the number of biomedical postdoctoral researchers continues to increase (Figure 5, NIH 2012 Biomedical Research Working Group Report). The levels of competition are by far exceeding the level required for selection for the best science and scientists, and are instead resulting in a decrease in the time available for original thinking, creativity and enjoyment of the collaborative scientific experience (Alberts et al., 2014). Faculty are spending 42% of their time carrying out bureaucratic tasks and not focusing on research (Schneider et al., 2014). The desire to remain in a biomedical research career is declining over time spent in academic research (Sauermann and Roach, 2012) and this effect is particularly acute for under-represented minorities and women (Gibbs Jr. et al., 2014) and extends also to faculty at academic medical centers (Pololi et al., 2012). Investigators are therefore spending more time carrying out bureaucratic tasks using excessively complex grant-application mechanisms and are unable to devote time to creative thought, whilst their postdoctoral researchers and postgraduate students are

competing in an increasingly expanding pool for recognition in a constant field of tenure-track faculty jobs with a diminishing desire to progress in academia. The current progression of these trends is unsustainable.

COMMENT 2

Ideas about adjusting current funding policies to ensure both continued impact and sustainability of the NIH-supported research enterprise. We welcome responses that point to specific strengths or weaknesses in current policies and suggest how we can build on or improve them.

The mission of the NIH is to seek fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to enhance health, lengthen life, and reduce illness and disability (http://www.nih.gov/about/mission.htm). There has been some discussion that this does not include responsibility for training the biomedical workforce. The NIH does, however, provide training fellowships and awards such as NRSA Research Training Grants. But the NIH also allows graduate student and postdoc salaries to be charged to R01 grant mechanisms, which are explicitly not for training and yet are being used to support trainees, and this number has increased dramatically whilst the number on federal training grants has remained constant (Figures 2 and 4, NIH 2012 Biomedical Research Working Group Report). This not only contradicts the idea that the NIH should not be responsible for training, but also creates a system with different categories of trainees and is causing much of the instability in the biomedical workforce, by providing a mechanism whereby R01s become a mechanism for acquiring cheap labor. Therefore it would be most fitting with the NIH's mission to remove the possibility of funding trainees from research grants. It would seem most responsible to move all stipends for students and postdocs onto training grants, as they are explicitly defined as "trainees", and prevent their stipends from being part of a research grant mechanism. Many voices across the biomedical research system and at all levels are calling for this (McDowell et al., 2014; Bourne, 2013; Alberts et al., 2014).

COMMENT 3

Ideas for new policies, strategies, and other approaches that would increase the impact and sustainability of NIH-funded biomedical research.

The NIH should consider the proposals outlined above in removing "trainees" from research grants, placing them exclusively under T, F and K-style training award mechanisms, and also implementing independently-funded staff scientist positions, in a manner that is currently being piloted by the NCI (Kaiser, 2015), or instead encouraging the use of indirect costs by institutions to fund staff scientist positions. The number of postdocs and graduate students in "training" should also be limited. Referring to these researchers as "trainees" assumes that the experience is of benefit in future employment. Evidence to support that this is the case is scarce, especially as an increasing percentage of trainees go on to non-research-related careers, and as the unemployment rate of recent biomedical PhD holders has reached 4.7% (see page 48 in the FASEB Report, Sustaining Discovery in Biological and Medical Sciences), above the national average for BS holders.

The NIH should also consider incentivizing greater sharing of resources through shared research facilities, public repositories and increased access for the taxpayer to publicly funded research through open-access mechanisms. Negative results publication should also be explored, and greater collaboration ensuring reproducibility of data should be ensured, whilst also making clear to policy makers that reproducibility in science is not a redundant measure, but necessary to ensure that replicable data can be used as the basis for further research.

NIH funding policies should be driven by data on the relative efficiency of given practices. For example, data suggests that smaller labs are more efficient in terms of the number of publications produced per dollar invested (Wadman, 2010). At a minimum, the NIH must evaluate the productivity of PIs scaled to the size of their resources (personnel and dollar numbers). Efficiency could also be improved by

simplifying guidelines for grant submission, to reduce administrative burden. Faculty are spending 42% of their time carrying out bureaucratic tasks and not focusing on research (Schneider, 2013). Finally, while the ability to make financial commitments is inherently limited by annual federal budget appropriations, longer-term funding would increase the stability of research enterprise and the NIH should work with policy-makers and other stakeholders to advocate for greater stability in funding federal research.

COMMENT 4

Any other issues that respondents feel are relevant.

The decreasing desire of biomedical early career researchers to stay within academia (Sauermann and Roach, 2012; Gibbs Jr. et al., 2014) is a clear indicator that faculty positions are becoming undesirable due to the administrative and competitive burdens that early career researchers receive and as hypercompetition increases, the best and brightest in science will question their decision to remain in science, whilst their peers at similar levels of education may be earning more, or simply receiving retirement contributions, before the age of 40, as the age of attainment of the first R01 is pushed ever higher (Rockey, 2012). The decreasing joy in biomedical research is clearly evident to all within the system, and was commented on at length by faculty at all levels at the recent Future of Biosciences Graduate and Postdoctoral Training national meeting at the University of Michigan. The effects of the current system on diversity and young investigators will have clear implications on the biomedical research system, as diversity increases creative thought (Phillips, 2014) and younger investigators are more innovative (Callaway, 2014), and the negative effects that hypercompetition is having on the desire of a young, diverse workforce to progress in biomedical research will also have negative effects on the sustainability of the scientific endeavor.

ACKNOWLEDGEMENTS

Thanks to Jessica Polka, Vaibhav Pai, Kearney Gunsalus, Jonathan Jackson, Erica Walsh and Sergey Kryazhimskiy for helpful discussions.

REFERENCES

Alberts, B., Kirschner, M. W., Tilghman, S. and Varmus, H. (2014). Rescuing US biomedical research from its systemic flaws. *PNAS* 111 (16): 5773-5777. doi: 10.1073/pnas.1404402111.

Bourne, H. R. (2013). Point of view: A fair deal for PhD students and postdocs.*eLife* 2:e01139 doi: 10.7554/eLife.01139.

Callaway, E. 2015. "Young scientists go for fresh ideas." *Nature* 518 (7539):283-4. doi: 10.1038/518283a.

Federation of American Societies for Experimental Biology (FASEB) (2015).Sustaining Discovery in Biological and Medical Sciences: A Discussion Framework. FASEB.

Gibbs Jr., K. D., McGready, J., Bennett, J. C., and Griffin, K. (2014). Biomedical Science Ph.D. Career Interest Patterns by Race/Ethnicity and Gender. *PLoS One* 9 (12):e114736. doi: 10.1371/journal.pone.0114736.

Kaiser, J. (2015). Cancer institute plans new award for staff scientists. *Science* doi: 10.1126/science.aab0327

Kryazhimskiy, S. (2015). How to improve sustainability of biomedical research? *Thoughts for Breakfast*.

McDowell, G. S., Gunsalus, K. T. W., MacKellar, D. C. *et al.* (2015). Shaping the Future of Research: a perspective from junior scientists *F1000Research* 3:291. doi:10.12688/f1000research.5878.2

National Science Foundation (2014). Survey of Graduate Students and Postdoctorates in Science and Engineering, Fall 2012. \nNational Center for Science and Engineering Statistics.

National Institutes of Health (2012). Biomedical Research Workforce Working Group Report.

National Institutes of Health (2015). Request for Information (RFI): Optimizing Funding Policies and Other Strategies to Imp\nrove the Impact and Sustainability of Biomedical Research.

Pai, V. P. (2015). A response to NIH request for information on optimizing funding policies and other strategies to improve the impact and sustainability of biomedical research. *The Winnower* 2:e143135.51381. doi: 10.15200/winn.143135.51381

Phillips, K. W. (2014). How Diversity Makes Us Smarter. *Scientific American* 311(4)

Polka, J. (2015). Response to NIH RFI "Optimizing Funding Policies and Other Strategies". *The Winnower*

Pololi, L. H., Krupat, E., Civian, J. T., Ash, A. S. and Brennan, R. T. (2012).Why are a quarter of faculty considering leaving academic medicine? A study of their perceptions of institutional culture and intentions to leave at 26 representative U.S. medical schools. *Acad Med.* 87(7):859-69. doi: 10.1097/ACM.0b013e3182582b18.

Rockey, S. (2012). Our Commitment to Supporting the Next Generation. Rock Talk, NIH Extramural News.

Sauermann, H. and Roach, M. (2012). Science PhD career preferences: levels, changes, and advisor encouragement." *PLoS One* 7 (5):e36307. doi: 10.1371/journal.pone.0036307.

Schneider, S. L. *et al.* (2014). 2012 Faculty Workload Survey Research Report. Federal Demonstration Partnership.

Wadman, M. (2010). Study says middle sized labs do best. *Nature* 468, 356-357. doi:10.1038/468356a