

The Future of Research Symposium: Facilitating Postdoctoral Involvement in the Future of Science

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Abstract

The scientific enterprise is facing a series of challenges that will directly impact the careers of postdocs both presently and in the future. A growing body of literature and correspondence highlights the concerns that are felt by many senior researchers and policy-makers in the academic and wider research community. However, the involvement of postdoctoral researchers in this discussion has so far been minimal and isolated. A symposium is being organized in Boston October 2-3, 2014, which aims to give postdoctoral researchers an opportunity to express their concerns, discuss the issues that scientific research is currently facing, and come together to present to the wider research community a united voice on our views of the action required to promote the scientific endeavor.

Keywords: academia, career development, postdoctoral mentoring, science policy, symposium

The Growing Voice

There has been a steady increase in publications addressing the landscape of scientific research with a growing perception that there is the need for radical, and in some cases urgent, change. Awareness of the challenges facing scientists are even being reported in popular media, most recently in NPR publications on scientists who have tried and failed to accomplish their dreams of academic positions (Harris, 2014a) and on the lack of academic jobs for trainees (Harris, 2014b).

Rescuing US biomedical research from its systemic flaws

Recently, the most strongly worded and prominent academic piece has been *Rescuing US biomedical research from its systemic flaws* (Alberts et al. 2014), written by four eminent academics from across the United States. The authors contend that the current course of biomedical research is no longer sustainable, based as it is on the premise that the research system will continue to expand. The growth of

the biomedical research endeavor over the last 60 years has slowed and the current political climate, exemplified by sequestration in 2013, is even heralding a reversal in the funding that the United States Congress grants towards scientific research. In particular the expansion of academic biomedical research has not been uniform throughout the structure of academic research: there are too many trainee scientists (postgraduate and postdoctoral researchers) carrying out the bulk of scientific research, compared to the number of academic positions they may ultimately be aiming for in their career progression. The authors state that this has resulted in a situation where healthy competition for scientific resources has developed into "hypercompetition". For example, only 10% of grant applications are successful compared to 30% in recent times, due to ever-increasing applications and ever-decreasing funding. This results in applications that are "safer" and less creative, and an ever-increasing reliance on "translational research", focusing purely on curing disease (or the promise of doing so) rather than studying the underlying problems of biology purely for their own sake.

Publication has also become increasingly competitive, with the goal of publishing in “high-impact journals” outweighing the goals of publishing careful and considered work, which is reproducible.

The authors make specific recommendations of changes that should be made to how the biomedical research enterprise should be undertaken. These include changes to make scientific funding more stable and predictable, whilst still being subject to change, but the authors are keen to point out that simply pouring more money into the system will not fix other inherent problems. Funding trainees using only specified fellowships and training grants, and not using research grants, is suggested to give a degree of regulation of how many trainees will be maintained in the system. Additionally, training scientists for other scientific career paths is encouraged, so that even when not enough academic positions are available for all trainees, taxpayer money is not wasted in training young scientists only to have them leave science altogether. There are many “alternative careers” that allow trainees to use their education in science to further the scientific endeavor. In particular, the creation of staff scientist positions, giving permanent positions to laboratory researchers, is suggested to ensure retention of a skilled scientific workforce.

In summary, an environment of ever-increasing research funding over the last 50 years has led to an ever-expanding research enterprise. A large workforce of trainee scientists, in the form of both graduate students and postdoctoral researchers, has accumulated, providing a cheap and industrious supply of labor. However, in times of recent economic hardship and changing political realities, the number of positions available in academia (towards which postdoctoral researchers have been directed) has not increased in the same way. The result is a hyper-competitive environment that generates incorrect metrics for measuring the success of a scientist and funding their research.

This most recent piece is perhaps the highest profile call to arms, following on from the National Institutes of Health (NIH) *Biomedical Research Workforce Working Group Report* from which it draws many of its recommendations.

NIH Biomedical Research Workforce Working Group Report

The working group was directed to develop a model for building a sustainable research structure and make recommendations on changes to be made. With regards to postdoctoral researchers, attention was brought to the lack of data available on postdoctoral researchers, due to the collection of titles they are grouped under. In particular they noted the high number of postdocs funded through research grants and a significant number of postdoctoral researchers in training for 5-8 years. Importantly, those who are training longer are more likely to get tenure-track positions.

Specific recommendations made by the working group for action the NIH should take include:

- Reducing the number of researchers paid through research grants rather than training grants;
- Improvement in training, which the working group found was severely lacking;
- Giving postdoctoral researchers the same benefits as other employees at an institution;
- Doubling the number of Pathway to Independence K99/R00 training awards.

These recommendations were made to the NIH in 2012.

Further discussions on the structure of research

Several publications by Henry Bourne in eLife (Bourne, 2013a, 2013b) also directly address the frustrations often felt by trainee scientists (Bourne, 2013c).

A recipe for mediocrity and disaster, in five axioms describes five principles that are felt by the author to be illustrative of problems inherent to the structure of biomedical research. Here there is again the argument against ever-growing expansion pointed out by Alberts et al., but also discussion of who has a voice, and should have a voice, in directing the scientific enterprise. In particular there is the concept that instruction should come from above, and not from below: Bourne feels this to be untrue, in the example of the NIH taking direction from PIs and institutions. Postdoctoral researchers should consider this with regards to their own united voice.

In *The Writing on the Wall*, Bourne focuses on the role of Principal Investigators (PIs), institutions and the NIH. In particular he is critical of the *NIH Biomedical Research Workforce Working Group Report* for its failure to identify problems with the reliance of institutions on “soft money” (grant-funded) faculty salaries, research grant-funded trainee salaries and the large number of postdoctoral researchers occupying, as he calls it, the “holding tank”. He then goes on to discuss how we might move away from the use of research grants to pay the salaries of scientists, with institutions and funding bodies stepping up to help with PI and trainee salaries respectively.

Finally, in *Point of view: A fair deal for PhD students and postdocs*, Bourne focuses on aspects of PhD and postdoc training that he feels should be changed. He argues for a decrease in the number of PhD students and the length of time their PhD programs take; the separation of research grants and PhD funding; and the installation of a system whereby after 2 years PhD candidates can leave with a Masters or continue in their PhD studies. In terms of “draining the postdoc holding tank”, he calls for a change in the view of postdoctoral researchers as “trainees” to “employees”, with changes also in salary; a 5-year limit to being a postdoc, regulated by eligibility for NIH training funds in particular and a change in the structure of

biomedical research to adjust the number of postdocs in the system. There is also discussion about the numbers of non-US citizens who are postdoctoral researchers in the US, and suggests there is a need to limit the number of international postdoctoral researchers by attracting only the best, but also ensuring those brought to the US are also eligible for NIH training grants (the K99/R00 being the only training grant that does not require citizenship or permanent residency).

Bourne and his prolific literature on the subject of postdoctoral issues illustrate but one example of a growing number of established academics calling for a change in the structure of the scientific endeavor. In Bourne’s case there is a particular focus on the US, but many of these issues are just as applicable internationally across the scientific community.

Scientific societies and the call for action

The concern expressed by many high profile academics illustrates the need for action. Scientific societies have also been playing a role in developing a more united voice for the scientific community, for example the American Society for Biochemistry and Molecular Biology (ASBMB) has published a white paper, *Toward a Sustainable Biomedical Enterprise*, in which they set out the important questions on training and funding that need to be figured out. In particular they note the requirement for all major stakeholders in the scientific enterprise: industry; academia; and government, in the participation of this discussion.

There is also another group in academia whose voice needs to be heard; and that is of the trainees themselves.

The role of Postdoctoral Researchers

Postdoctoral researchers must give voice to their concerns in addition to more senior and established parties. The National Postdoctoral Association (NPA) has published an *Agenda For*

Change in which they highlight the need for institutions to address the needs for researchers set out in *NPA Recommended Policies and Practices*. In addition to this, some postdocs have been adding their opinions to the literature, discussing funding (Jahn, 2014) and training (Rivera-Mariani, 2012). But there has been little coherent organization of postdocs themselves in advocating for their future and the necessary changes in policy required (Miller, 2012), despite a call-to-arms to do so (Marquez, 2014; Vaught, 2014).

Postdoctoral researchers can often fall into the trap of overwhelming pessimism; that there is too much competition and too little lack of opportunity (Gloria and Steinhardt, 2013). This can be further compounded for postdoctoral researchers from under-represented minorities or groups. For example, recent publications have demonstrated the role of striking gender disparities in academic positions, with more female K99/R00 recipients than males beginning their independent careers at less research intensive institutions (Berg, J., 2014). Gender is included as an inherent property in the likelihood of reaching the status of PI (van Dijk et al., 2014, *PI Predictor*).

However if things are to change then the onus is on postdoctoral researchers to make their voices heard.

It is for this reason that a group of Boston Postdoctoral Associations (PDAs) have banded together to form a Pan-PDA Council for the Boston area, to share resources, ideas and strengthen their voice. Through this collaboration, the Future of Research Symposium (futureofresearch.org) has arisen. This event marks the first coming-together of postdocs in a conference setting to uniquely discuss issues pertinent to the future of the scientific endeavor. As organizers of this gathering we wish to draw the attention of the postdoctoral community to this event, to invite attendance or the replication of events like it nationally and internationally.

The Future of Research (FOR) Symposium

The FOR Symposium will be held at Boston University, October 2-3, 2014. In attendance there will be concerned scientists and policy-makers, including a video message from Senator Elizabeth Warren, a keynote address from Henry Bourne, and panel discussions featuring academics such as Marc Kirschner. Through these sessions it is hoped that concerns from many participants at different levels of academic research will be voiced and discussed, and give rise to even further discussion.

Participants will have the opportunity to give further voice to their concerns through a variety of workshops focusing on important themes relevant to how trainee scientists work, and how they will work in the future.

There are a number of general themes to be covered by the workshops:

Metrics of success

Is the way that we measure publication, funding and tenure appropriate, fair and productive? Do we reward certain approaches to science, and penalize others? Do we ignore teaching in evaluating the performance of researchers? Does this also extend to the success with which scientists communicate their work to students, each other and the public at large?

The structure of funding

How stable is the funding situation (primarily focusing on the US) and how tenable is it in the current political climate? Do we face a shift in primarily government-funded research to more private or philanthropic financing? Should there be a change to how funding is awarded in relation to training PhDs and postdocs?

The structure of training

There is a fundamental question as to how graduates and postdoctoral researchers should

be trained, and whether the current system should be completely redesigned, or merely adjusted to diversify the career paths of trainee scientists. Is there too much focus on a career in academia and not enough on “alternative” careers? In fact, could it not be argued, as many do, that academia is now the alternative career? Are PhDs programs in the US too long?

The structure and sustainability of the workforce

Do we have too many PhDs and postdocs? Should lab sizes be limited? Should we train more staff scientists and research associates and establish permanent, non-PI scientific positions?

In addition to these many issues, we also want to keep the issues of efficiency and competitiveness in our minds when discussing all factors. For example, is it possible that a significant amount of funding is wasted by deliberate or unknowing competition? Can the scientific enterprise be improved by greater sharing of data earlier than in the traditional publication process?

Hopes and aspirations

It is the hope of the symposium organizers that there will be a fruitful discussion on these key subjects and that a consensus opinion can be reached on the points that postdoctoral researchers feel most strongly about. These opinions will then form the basis of a strategic response to the community.

It is also hoped that this will elicit a response not only from postdoctoral researchers in the Boston area, but also further afield, both nationally and internationally. Opinions and feedback are welcome from all trainee scientists at the contact addresses above and through the online resources below. We also hope that this will inspire the generation of data relating to postdoctoral researchers, which at the moment is sorely lacking (Miller, 2011; Mudrak, 2011; Cheung, 2012).

There is also an expectation that this will inspire other postdoctoral associations and groups in

other regions or countries to hold their own symposia (Barbier and Damron, 2013), engage within their own community, and drive their own career aspirations. The future of the scientific endeavor needs the help of all those concerned, not least from those who will define the future of research.

Conflict of Interest Disclosure

GSM, KK and JP are all organizers of the Future of Research symposium.

Further online information

Register and/or sign up for updates at futureofresearch.org

Follow @FORsymp on twitter.

Like our Facebook page:

<https://www.facebook.com/futureofresearch>

Join our LinkedIn group:

https://www.linkedin.com/groups/Future-Research-8153258?home=&gid=8153258&trk=anet_ug_h_m

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ASBMB white paper on building a Sustainable Biomedical Research Enterprise: http://www.asbmb.org/uploadedFiles/Advocacy/About_the_PAAC/SBRE%20Final_JMB%20.pdf

NPA Agenda for Change:

<http://www.nationalpostdoc.org/policy-22/institutional-policies/agenda-for-change>

NPA Recommended Policies and Practices:

<http://www.nationalpostdoc.org/recommendations>

NIH Biomedical Research Workforce Working Group Report:

http://acd.od.nih.gov/biomedical_research_wgr_eport.pdf

Suggested Further Reading and Materials

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AAAS data and charts on funding for R&D:

<http://www.aaas.org/page/historical-rd-data>

NSF: National Center for Science and Engineering Statistics data:

<http://www.nsf.gov/statistics/data.cfm>

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