

This is the response of Gary McDowell, PhD, of Lightoller LLC, to the [Request for Information on the NIH Plan to Enhance Public Access to the Results of NIH-Supported Research](#).

Responses were provided to the following prompts.

1. How to best ensure equity in publication opportunities for NIH-supported investigators.

The NIH Public Access Plan aims to maintain the existing broad discretion for researchers and authors to choose how and where to publish their results. Consistent with current practice, the NIH Public Access Plan allows the submission of final published articles to PubMed Central (PMC) (in cases where a formal agreement is in place) to minimize the compliance burden on NIH-supported researchers and also maintains the flexibility of NIH-supported researchers to submit the final peer-reviewed manuscript. NIH seeks information on additional steps it might consider taking to ensure that proposed changes to implementation of the NIH Public Access Policy do not create new inequities in publishing opportunities or reinforce existing ones.

I would like to encourage NIH to reconsider the use of the word “maintain” when describing the “broad discretion for researchers and authors to choose how and where to publish their results”. I have the perspective that the current situation is somewhat restrictive, and could be expanded by NIH.

I think, in response to this, many will be thinking of the “right” of a researcher to publish in whatever magazine they wish; that right has always existed, and will continue to exist under the proposed changes. The question is who will pay for it. I am a taxpayer who currently is not guaranteed access to federally-funded research, that I need for my work, at the point of publication. I would therefore suggest to NIH that the burden can be removed, with a simultaneous introduction of more choices of how and what to publish, through greater incentives for using preprints. I would like to suggest greater recognition of preprints as a method for NIH to ensure compliance, to allow authors a choice of where to publish that extends beyond simply the requirement to publish in magazines.

One could make the argument that we could make an ecosystem for sharing research and data using preprints, perhaps on a federal server, which would serve perfectly well as a medium for evaluating researchers and remove the currently flawed reliance on Impact Factors and prestige, which have been shown to be biased and subjective. In such a world, academics could then pay to publish their research in magazines from their own pocket, if they so wished. Given that researchers already carry out peer review as voluntary labor, it’s not clear to me why the taxpayer needs to be paying so much money to publish a certain kind of research in magazines, just because that is what academics at universities and research institutions have decided is their preferred method for evaluation and promotion.

I believe that NIH is motivated to maximize the opportunities for communication of results by its grantees, and grantees should be motivated to ensure that as much data as possible can be shared with the wider community. The current system for communicating research outputs, relying on magazine articles to publish work, restricts what can be communicated. The use of these articles by the academic community, including by funders such as NIH, to evaluate a scientist and thus determine their career path, then incentivizes publishing only in a certain manner.

Much of the work that is carried out by researchers will, by its very nature, not be in the form of novel, positive data that can be formed into the narrative structure favored by magazine publishers. There is negative data that is collected; small experiments that don't fit into a larger narrative; and of course large datasets that may not easily be evaluated by a single team. Publishing this kind of work is not currently incentivized in the traditional academic environment and it means that much of the data funded by the taxpayer may remain within individual laboratories for the simple reason that the academic community has decided not to value this, even though it may be perfectly valid research. This may have effects, such as reducing the efficiency of biomedical research. For example, numerous labs across the country may be e.g. attempting to purify exactly the same troublesome protein, leading to potentially many laboratories trying out the same technique or experiment over and over again with no success - or, perhaps, simply taking longer to get to a successful outcome. All this is due to a lack of prior knowledge and information being published. The knowledge exists, maybe across multiple labs, but for some reason is not being shared despite the obvious efficiency it could produce for scientist and taxpayer alike. In addition, this system of only rewarding positive novel results also selects for (at best) luck, and (at worst) cherry-picking (or even outright falsifying) data, because a career is dependent not on the actual result, but a positive one. It is not designed to select for merit, as scientists cannot possibly predict whether their hypotheses will be correct all the time, and only a lucky few will chance upon the right problem to work on. Many very thorough and brilliant scientists may have been lost to academic research simply because they have not produced the particular kind of research being selected for in magazine article publishing.

I would like to provide some insights from my own experience of moving from the traditional academic environment to my consulting role. The work of a consultant is extremely similar to the work of an academic: I carry out research to solve a particular problem and am paid money by stakeholders to carry out that research (including for the taxpayer, on federally-funded research grants). The transition to this kind of work has been very simple given my previous academic experience.

There is one striking difference. When I communicate my results, my priority is to communicate all of my data and findings in a clear and concise manner to the stakeholders who paid for my work in order to help them solve a problem. This is in contrast to my previous experience as an NIH-funded postdoc.

If, as a consultant, I were to behave in the manner of a university academic, I would not write-up all of my analyses, but only those that I chose based on a narrative story of positive results. I

would then publish this in a magazine, in the form of an article written in a esoteric style according to the desires of the magazine. I would then tell the people who paid me that they have to pay to read that work in the magazine, and would complain loudly about my “academic freedom” if there were moves to make me do otherwise.

Obviously, I would not last long in the consulting business if I followed this model. This is, in part, why it is such a relief to have left the university environment and be able to do what I originally intended in science - work with people to solve challenging problems using research methods and data analysis. I am confident that there are many NIH-funded academics who feel the same way about their ability to communicate research.

The nature of my work is very similar to my time at universities; it is the incentives that are different. As a contractor I am not expected to publish magazine articles, as this is not a practice that is part of a consultant's work. In this way, I should note, publishing magazine articles is not an activity of all scientists - just a cultural practice followed by academics. However, I am also an academic, and as such I do see great value in sharing work through scholarly communication formats such as preprints, to allow for evaluation and improvement of the work as part of scholarly discourse. I am a firm believer in the principle of peer review, and in improvement of work through communicating knowledge through successive versions of analysis and interpretation, with updates as and when I receive feedback. The change of incentive structures, by operating in a slightly different system but performing very similar work, has allowed me to think in different ways about how to communicate ALL of our data and work.

It was always my goal through my academic training to make sure as much of my data that had been gathered and analyzed appropriately and methodically was released for someone else to use; but this was harder to do when I worked in an academic university environment because of the publication structure and incentives. It is easier now to release data and analyses freed from this restrictive structure, and I enjoy research and review processes more because of this freedom.

I believe it is in NIH's interest to prioritize incentivizing taxpayer-funded researchers to similarly communicate as much of the data and work that they achieved with NIH support as possible - even if it does not have a clear "big story" to go with it. I have always maintained that any small or strange result that doesn't fit into my story could be of use to someone else, my ignorance about the problems others work on should not determine what I think is fit, or not, to publish, if it is an experiment done well. It is not for me to determine what of my publicly-funded work could, or should, be of use to someone else.

As an academic consultant, I would love to see more public sharing of work by others in my community of contractors. But the current magazine publishing process is long and tedious and takes up valuable time that could be spent on other more important work, and it has little reward for those of us who are not assessed on our magazine-article publishing. Impact factor does not matter in my line of work; neither do tedious conversations about who needs what authorship where for their next career step, nor trying to fit your work into the restrictive structure of a

particular magazine. When working with my academic colleagues, it is always disappointing when we move from talking about our science, to talking about the magazine publishing process and the careerist motives and strategies needed.

I also want to add that in my line of research, there is a lot of focus on trying to involve more students in scholarly communication as a way of educating them about the scientific process, but also to work on increasing their sense of identity as scientists, and sense of belonging in the process - important factors in encouraging students to follow biomedical and scientific research pathways. But there is an active conversation about how it is hard to engage students in writing articles for magazines, because they (in my view, correctly) see the current form of magazine articles as esoteric and only for future career goals. They are not viewing magazine articles as a way to actually communicate science with others; and in many cases it seems that they are forming this impression not least because academics are reinforcing the idea that these magazine articles are credential-enhancing products, not a means for sharing results and advancing knowledge.

In all, I would urge NIH to incentivize and promote more innovative ways of sharing work, not least because the system with preprints is not without its difficulties. Carrying out peer review, or being part of peer review communities and providing feedback that will be incorporated into a work in development, still need work, support and innovation. I think there is great value to the general principles of scholarly communication, and of peer review, that need adapting and revising away from the focus of curation of magazine articles, and back towards ensuring validity and constant improvement of research.

2. Steps for improving equity in access and accessibility of publications.

Removal of the currently allowable 12-month embargo period for NIH-supported publications will improve access to these research products for all. As noted in the NIH Public Access Plan, NIH also plans to continue making articles available in human and machine-readable forms to support automated text processing. NIH will also seek ways to improve the accessibility of publications via assistive devices. NIH welcomes input on other steps that could be taken to improve equity in access to publications by diverse communities of users, including researchers, clinicians and public health officials, students and educators, and other members of the public.

As an American taxpayer and small business owner, the work I carry out supporting training and education of future generations of scientists, some of it federally-funded, is affected by my current inability to access newly-published federally-funded research legally. I am therefore extremely grateful for the removal of the current embargo.

I rely on federally-funded research to carry out my work. My work itself covers issues related to early career researchers, including their participation in and education about the communication of scientific research.

Tax dollars contributed by myself and other Americans are used by NIH-supported researchers to publish their work, and to fund institutional library subscriptions to access the work of others - at institutions that can afford to pay these subscriptions. Therefore the taxpayer currently pays for academics to publish their work, and then a privileged subset are able to gain access to the work of others. Meanwhile the taxpayer is left out in the cold.

I would encourage continued use of the system on PMC to allow access to articles. I do want to make clear that there are academics who have insisted that members of the public can always email corresponding authors for a copy of the manuscript; this is clearly not an appropriate recommendation as response rates are very poor, and of course there should be effort to ensure that the public can access the work they fund as easily as possible. I thank NIH for their work on this as a priority.

Under the current system, anyone who is *not* in one of the institutions that can afford subscriptions to journals currently faces barriers to timely access to this work. Access to federally-funded research is not extended to all who support its development. Patients, patient advocates, small-business owners - we are all excluded from reading and using this important work. In addition, access isn't even granted to all academic researchers and students. Access to specific magazines, in which scientists publish their articles, is dependent on the ability of a university to be able to pay the subscriptions. Not all institutions are able to afford subscriptions. There are therefore thousands of students and researchers at American institutions of higher education who cannot access work needed to carry out their research and education. Shockingly, the Nelson memo is a great win for education and research at American universities

themselves, and will allow greater access to those students, some of whom I have had occasion to work with.

I would ask NIH to require researchers to publish using a CC BY or less restrictive license. It is most useful for educational purposes if articles are not just free to read, but are truly open access. Free to read articles restrict the ability to work with the material in an authentic way, and is restrictive. For students and educators alike to make full use of research articles, it is important to ensure free and open licensing for articles and images.

3. Methods for monitoring evolving costs and impacts on affected communities.

NIH proposes to actively monitor trends in publication fees and policies to ensure that they remain reasonable and equitable. NIH seeks information on effective approaches for monitoring trends in publication fees and equity in publication opportunities.

I would encourage NIH to look into the [DocMaps Framework](https://docmaps.knowledgefutures.org) (<https://docmaps.knowledgefutures.org>), which I once worked on but am no longer affiliated with. This is a project by the Knowledge Futures Group to develop a community-endorsed framework for capturing valuable context about the processes used to create documents in a machine-readable way. Please see “[The DocMaps Framework for representing assertions on research products in an extensible, machine-readable, and discoverable format](https://www.biorxiv.org/content/10.1101/2021.07.13.452204v1)” (<https://www.biorxiv.org/content/10.1101/2021.07.13.452204v1>”). Policies and fees associated with articles could be examples of metrics mapped onto articles.

[Peer review and preprint policies are unclear at most major journals](https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0239518) (<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0239518>), and many of these policies affect equity in the magazine publishing world, which is an opaque and subjective process rife with bias. The Royal Society of Chemistry, for example, [released a report](https://www.chemistryworld.com/news/rsc-report-finds-publishing-pipeline-hinders-women/4010608.article) demonstrating that the process of publishing magazine articles is rife with bias against women, at every step of the process (<https://www.chemistryworld.com/news/rsc-report-finds-publishing-pipeline-hinders-women/4010608.article>).

There are a number of reasons NIH should be keeping a close eye, or supporting efforts to do so, on magazine publishers. For example, consider the role of early career researchers in peer review. In biomedicine it is common practice for a PI, as an invited reviewer, to pass a manuscript from a magazine on to graduate students and postdocs to carry out the review, sometimes under the guise of training, but often not reported to the magazine. We gathered data and published an analysis “[Co-reviewing and ghostwriting by early-career researchers in the peer review of manuscripts](https://elifesciences.org/articles/48425)” (<https://elifesciences.org/articles/48425>), showing that it was indeed common that ECRs would undertake review with no credit, and receiving no feedback, hence negating the claim that this is a “training exercise”. I will note that when my colleagues and I have been presenting or communicating about this work, a very common request from NIH-funded postdocs is that we move on to looking at the same phenomenon with NIH grants.

Ghostwriting is a form of plagiarism, and we have provided recommendations to multiple stakeholders, including magazines, about how to fix this problem, in “[How to bring peer review ghostwriters out of the dark](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8101444/)” (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8101444/>). However, I am disappointed to report that some magazines have doubled down against taking action to deal with this. In particular, there are efforts to require graduate students and postdocs to undertake training before being “allowed” to review, whereas someone with a faculty appointment does not have to undertake training. This very clear gatekeeping is likely to be

affected by the fact that the faculty population is much less diverse than the graduate student and postdoc populations, and it is sending a harmful message that reinforces that graduate students and postdocs are incompetent. The notion of “expertise” is highly subjective, and as such is likely to be affected by the typical biases we have come to know within academia.

This is just one example of a policy that I would encourage NIH to engage in tracking. As a taxpayer, I am very concerned about how effectively tax dollars are being spent at magazines to publish articles, not least because of the evidence for biased pools of peer reviewers, and subjective decisions by editors, that are gatekeeping the very resources used to help - or hinder - the career progress of early career researchers. For example, [eLife found](https://elifesciences.org/inside-elifesciences/958c61d1/early-career-reviewers-reflections-on-focused-inclusion-in-reviews-at-elifesciences) that interventions were needed to ensure that early career reviewers in the reviewer database were actually being used and selected by editors; even when we see ECRs being added to a reviewer database, it isn't enough, because editors can pick reviewers using subjective assessments (<https://elifesciences.org/inside-elifesciences/958c61d1/early-career-reviewers-reflections-on-focused-inclusion-in-reviews-at-elifesciences>). This isn't restricted to career stage - faculty peer review frequency also appears to vary with perceived institutional prestige. Just last week, I attended a national conference where a journal editor stated publicly that they do not “need” to check the reviewer database when receiving a submission - they “already have the names in their head”. Clearly such a limited and subjective pool of reviewers will give a limited perspective on academic works, and it's not a system that I'm very pleased to see the taxpayer supporting. I encourage NIH to signal that magazines need to have very good justifications for their high costs to the taxpayer. After attending the Peer Review Congress in 2022, I managed to come away with a lower opinion - and a much more evidence-based one - of magazines and their peer review processes than before. Their claims that they are providing value for money do not seem to stand up to much scrutiny - not least when one views their activities through the lens of equity.

I want to highlight that the NIH also has a working group on postdocs, and a key reason that researchers are stagnating in postdoctoral roles, and therefore a possible factor in why increasingly graduate students are choosing not to undertake an academic postdoc, is time taken for magazines to publish their articles. At this precise moment I myself am working on the second request for revisions, for a paper submitted 7 months ago. The major motivation for our group publishing this article in a magazine is because we need to support our graduate student author in their academic career aspirations. I mention this not only because this is actually a very normal timeline for the review process, that is somehow acceptable to the academic community. It is plainly ridiculous that people's careers are being held up not because of any training needs, but because of the inability of magazines to fulfill their role. This is costing the taxpayer money not only in the lengthy publishing process, but also because a significant number of these researchers are themselves supported by taxpayer funding, and are now stagnating longer than needed at the taxpayer's expense. This is a clear opportunity for NIH to recognize preprints from graduate students and postdocs for use in evaluation of productivity, as the length of time a magazine takes to publish its articles is out of the control of any individual early career researcher, and should not be a deciding factor in selection of future faculty.

With respect to preprints, I would encourage NIH to consider federal funding for a community preprint infrastructure. I would also like to take the opportunity to point out that as academic researchers already review each other's work for free, they could publish preprints on a federal government server and then review each other's work all for free, and this would save the taxpayer a lot of money. It would also come with the benefit of being able to publish various kinds of research, experiments, figures, data and metadata. It could therefore be less restrictive, and much cheaper, than the current magazine publishing model.

4. Early input on considerations to increase findability and transparency of research.

Section IV of the NIH Public Access Plan is a first step in developing the NIH's updated plan for persistent identifiers (PIDs) and metadata, which will be submitted to OSTP by December 31, 2024. NIH seeks suggestions on any specific issues that should be considered in efforts to improve use of PIDs and metadata, including information about experiences institutions and researchers have had with adoption of different identifiers.

NIH should require everyone to have an ORCID. I would like to point out that many foundations and other funders already require ORCIDs, and it is my understanding that ORCIDs provide the only feasible means of satisfying upcoming federal policies, and will likely be required of all agencies anyway. NIH should also require the use of ORCIDs by its funded institutions, to allow connection of institutional data with their researchers, funding and publications for NIH-funded research.

NIH should assign DOIs to grants to allow them to be citable products.

NIH should index all preprints, and not just those supported by NIH investigators.

I would encourage NIH to participate in, and ensure interoperability with, global initiatives and efforts in other countries.

Again, I would encourage NIH to look into the [DocMaps Framework](https://docmaps.knowledgefutures.org) (<https://docmaps.knowledgefutures.org>). This is a project by the Knowledge Futures Group to develop a community-endorsed framework for capturing valuable context about the processes used to create documents in a machine-readable way. Please see "[The DocMaps Framework for representing assertions on research products in an extensible, machine-readable, and discoverable format](https://www.biorxiv.org/content/10.1101/2021.07.13.452204v1)" (<https://www.biorxiv.org/content/10.1101/2021.07.13.452204v1>)".

Executive Summary

My name is Gary McDowell, and I am an American taxpayer and small business owner (Lightoller LLC, based in Chicago IL). I carry out work supporting training and education of future generations of scientists.

I rely on federally-funded research to carry out my work. My work itself covers issues related to early career researchers, including their participation in and education about the communication of scientific research.

I am currently unable to access newly-published federally-funded research legally.

Tax dollars contributed by myself and other Americans are used by NIH-supported researchers to publish their work, and to fund their institutional library subscriptions to access the work of others. Therefore the taxpayer currently pays for academics to both publish their work, and gain access to the work of others.

But anyone who is *not* in one of these institutions currently faces barriers to timely access to this work. Access to federally-funded research is not extended to all who support its development. Patients, patient advocates, small-business owners are all excluded from reading and using this important work. In addition, access isn't even granted to all academic researchers. Access to specific magazines, in which scientists publish their articles, is dependent on the ability of a university to be able to pay the subscriptions. There are therefore **thousands of students and researchers at American institutions of higher education** who cannot access work needed to carry out their research and education.

I was therefore thrilled by [the Nelson memo](#), "Ensuring Free, Immediate, and Equitable Access to Federally Funded Research", and thank NIH for the opportunity to give feedback. I hope to provide NIH with my perspective as a scientist outside a traditional academic institution.

My hope is that NIH can take steps to consider prioritizing access to science through consideration of the following general themes:

- Communication of science is currently focused on use of magazine articles to advance the careers of academic scientists - this is affecting the content, quality, and efficiency of sharing NIH-funded results.
- Currently not all valid experimental data/research outputs funded by NIH are communicated by grantees as standard; there is an incentive to share only positive, novel results by magazine publishers.
- Prioritize equitable access of products

Ultimately, access to the taxpayers like myself who use this research, and close alignment of research output with NIH's mission and goals, should be the priority. The financial needs of those should not.

Please prioritize the science, not who is asking for money

What is at stake in much of the discourse about open access to publications is who gets money, and who is likely to lose money, and how. I would like to lay out my position and urge NIH to consider the view of those with no financial stake or clout in this game.

The people losing out right now are the people who do not have the money to buy into the system, but indeed many of whom have paid twice over for some university academics to publish, and then to get access to, magazine articles. Some of us (in positions like myself) do not have lobbying organizations like scientific societies; and others who do, in theory, are not represented well by those societies as they tend to be from less wealthy institutions that are less likely to be represented by the faculty running these societies.

As many publishers have made very clear in public fora, particularly in the NIH listening session on April 12th, their financial models depend upon this current system, and they believe NIH should be beholden to **them** to support their current business model.

Much ire in academia is directed towards for-profit publishers. I do not particularly blame for-profit publishers for their role in this system: university-based academics have made it a cultural norm to use magazine articles to evaluate academic research, and it's only natural that businesses would come in and occupy a niche that university-based academics have so willingly provided them in this ecosystem. This is a problem entirely of academia's own creation; we could all be doing this ourselves for free, rather than unpaid for someone making money from our labor.

Instead, I would like to draw particular attention to non-profit scientific societies who generate income through running magazines. Many scientific societies rely on the income of the journals they run to maintain their business models because paid membership of societies has been falling over time. They are therefore particularly financially motivated in this debate. They may point to their diversity efforts in particular as a reason the *status quo* should continue to support them; but frankly I cannot believe the intentions of a society around diversity efforts are genuine when they are pushing to maintain a financial model that excludes many American students from getting access to federally-funded research. Bringing more people from different backgrounds to society conferences does not seem a sufficient boon to justify excluding those same people from access to federally-funded research. It's not just people like me who struggle to access this work. I work with projects engaging middle-, high-school and undergraduate and graduate students in research, many at minority-serving institutions, who are also denied access to the literature they need for their research simply because they aren't at a university that can afford to pay the necessary magazine subscriptions. No travel award to a society conference can justify such exclusion.

As a taxpayer, I do not view the business models of scientific societies, or indeed any publisher, as a priority for tax dollars. I urge NIH to take the same position.

Publishing magazine articles is an *academic* activity, not a *scientific* activity

Publishing articles in magazines is not an essential *scientific* practice. Rather, it is a *cultural* practice exercised by academics working at universities and research institutions.

I would argue that the point of publishing magazine articles is not to communicate scientific results so much as to signal the production of results. It is to demonstrate productivity and advance careers, while also providing financial support to publishers (both for-profit publishing companies and non-profit scientific societies).

Most scientists in the U.S. don't work at academic institutions; and a lot of scientists working outside academic institutions are not communicating their science in this way. Why? It's not because we're not doing science. Communicating your research is an incredibly important part of any scientist's job. It's that the priorities are different, and I put it to NIH to consider whether the priorities of the current academic practice of publishing work in magazines aligns with its missions and goals, and whether there are ways to move forward to prioritize sharing science and ensuring its validity over

Let me give a concrete personal example. Since 2019, I have worked as a consultant doing freelance research. The work of a consultant is extremely similar to the work of an academic: I carry out research to solve a particular problem and am paid money by stakeholders to carry out that research (including for the taxpayer, on federally-funded research grants). The transition to this kind of work has been very simple given my previous academic experience.

There is one striking difference. When I communicate my results, my priority - as it was when I was an academic working at a university - is to communicate all of my data and findings in a clear and concise manner to the stakeholders who paid for my work. The difference is that this is actually quite difficult to do when working at a university, and much easier as a consultant.

If I were to behave as a consultant the way a university academic currently behaves, I would be picking only the positive data to publish - if I actually publish any, depending on whether I was able to correctly predict a set of positive-result-producing experiments. I would then publish this in a particular magazine through an article which was written in a style suited to a niche audience of my colleagues. I would then tell the people who paid me that they have to pay to read that work in the magazine.

Obviously, I would not last long in the consulting business if I followed this model. And I didn't last too long working at universities under the incentive to communicate my science in this way, and it was always a struggle to do so.

NIH incentivizes these behaviors through its current system of evaluation and reward. I believe that we should be selecting for federally-funded scientists who follow a strong commitment to publish research in the following ways:

- **Prioritizing timely communication of all research carried out using federal dollars.**

- **Communicating work in a manner that is clear and intelligible beyond their immediate professorial colleagues**
- **Prioritizing communicating underlying data,**

Magazine article publishing isn't so much what you know as who you know

Magazine articles prioritize "importance" and "impact" in demonstrably flawed ways

This is because magazines that publish scientific research are interested not primarily interested in publishing *valid* experimental results so much as "*impactful*" results - that is, results that are entirely novel, entirely positive and are likely to be referred to in other magazine articles, increasing their metrics of citation.

"Impact" and "Validity" are different things. A piece of scientific research may be very well done and entirely valid, but of very little importance. Validity is a more objective concept than importance, which is subjective. For example, I would like to think that my graduate research, investigating a particular biochemical phenomenon using frogs, is valid; but I would be the first to admit that, in the grand scheme of things, it's not hugely "important".

NIH recognizes this phenomenon - it is the underpinning of the development of the "[Relative Citation Ratio](#)". The method uses citation rates to measure "influence" at the article level: the logic follows that while my biochemical frog papers may not be of global importance, perhaps they are of great importance within research about the biochemical phenomenon (or, indeed, about frogs).

But citation has all sorts of problems, because at heart it depends on network effects. This is well-described in the literature (e.g. [Citation bias and other determinants of citation in biomedical research: findings from six citation networks](#)) and I can give a very clear personal example.

When I was a graduate student, I was an author on two papers coming out of our lab at about the same time in the same journal - *Development*. It was decided that two people would be "joint-first" authors on both papers. But that one would be *named* first on one paper, and one *first* on another (this is not a unique practice by any means, but an illustration of the kind of silliness that has arisen because of the use of magazine articles to determine careers).

It was noted at the time that it was unfortunate for *one* of the authors, because we knew one of the papers was going to be cited much more than the other. And the reason was because of the presence of a "big name" - Marc Kirschner, of Harvard Medical School - on only *one of the papers*. I was explicitly told in 2011 that this was going to be the case, and it turns out to be exactly right.

["Post-translational modification of Ngn2 differentially affects transcription of distinct targets to regulate the balance between progenitor maintenance and differentiation"](#) has, according to Web of Science, 61 citations, and according to Crossref, 75¹.

¹ I should note here that it is not actually clear how many citations any journal article actually has because of all the different ways of indexing them, and so different databases give different numbers.

[“Cell cycle-regulated multi-site phosphorylation of Neurogenin 2 coordinates cell cycling with differentiation during neurogenesis”](#) meanwhile has 119 (Web of Science) or 137 (Crossref).

A change in citations by a factor of two, and as a second author on both, I will attest that the only substantial difference between the two papers is the presence or absence of Marc Kirschner. Not only is this disappointing - **we knew this would phenomenon would occur at the time.**

This is how university-based academics are judging how good a scientist is².

And besides from all these issues of citations; this doesn't actually tell us whether, or indeed actually depend upon, the validity of the work.

It is amazing to hear the level of entitlement that seems to exist among some academic researchers, who are given the privilege of working on a taxpayer-funded research grant awarded to their institution. And it has always intrigued me that funding agencies would allow a minority of the scientists in the U.S. to dictate terms on what they will share, and when, with those who support and need access to their work.

² This is before even raising the term “Impact Factor”, which is a measure of how important university-based magazines find a particular magazine, which they erroneously translate into a measure of quality.

This situation is having a direct impact on NIH's own workforce - the current postdoc working group at the NIH is encountering the issue that the postdoc is not a training position, but a holding position until you can get enough of these magazine articles to signify that you are going to be "productive", in the terms that academics recognize productivity, for career progression.

I want to particularly encourage a move to preprints. The current magazine article-model focuses on sharing only novel, positive data that is likely to be highly cited. Much of the data that does not fit this goes unpublished. I believe all data should be shared from NIH-funded work, because it is not up to any one scientist to determine what data they have generated may or may not be useful to someone else, or to solve some other problem, even and perhaps especially if it's negative data. Preprints can be a method for doing this.

Summary

I got into science because I love solving challenging problems. I left academic research in part because this current way of sharing your results frustrates that effort, and the efforts to share your work with people and communities who may need it. Moving to a consulting position, where I share all of the fruits of my labor with the people who paid me to do it, has been a refreshing change from having to shoe-horn certain parts of it to fit a story for a magazine, and I now use preprints for sharing my federally-funded work - not least because it saves the taxpayer money.