



AAAS Response to **RFI** on the NIH Plan to Maximize Research Funds by Limiting Allowable Publishing Costs

The American Association for the Advancement of Science (AAAS) commends the National Institutes of Health (NIH) for building on prior public access reforms to address the rising Article Processing Charges (APCs) that scientific journal publishers are increasingly charging NIH-supported scientists to publish their findings. Indeed, as journal publishing models have shifted in recent decades, often to APC models, AAAS – which publishes six journals, five of which do not charge APCs to create public access – has steadfastly advocated publishing approaches that do not place this cost burden on the researcher so as much of their taxpayer-funded grant as possible can be used for their scientific analysis. We believe publishing costs should not be a barrier for researchers seeking to share scientific progress. As a scientific enterprise, we should endeavor to find new ways, or to revisit existing ones, to make peer-reviewed work publicly accessible without APCs. However, as the APC-focused landscape we encounter today has been built over two decades, it would be impractical and damaging to the U.S. scientific enterprise to ban APCs immediately. Similarly, to immediately cap these fees risks turning publishers focused on quality into those that must focus on something else entirely: quantity. This does not serve the NIH's goals.

A new approach is needed in scientific publishing, one that more consistently finds its funding from sources other than APCs charged to authors – including through costly hybrid journals – and one that prioritizes the highest taxpayer return through elements that have been central to the AAAS approach to publishing for decades. At AAAS, our experience as a U.S.-based non-profit publisher continues to reveal the impact that rigorous scientific peer review, critical quality checks, and thoughtful dissemination of findings hold – for authors and for the public. Thorough peer review conducted by professional editors in collaboration with deeply committed peer reviewers helps authors improve their work¹, which maximizes its long-term impact. It requires data as a condition of publication, which supports replication. The intentional communication of new work to the public by publishers committed to accuracy emboldens researchers to articulate limitations, which builds trust. Visibility enabled by publishers with strong ties to their disciplinary communities helps research be seen by prospective scientific collaborators who can spur innovation and enhance the taxpayer return.

¹ https://www.linkedin.com/posts/julian-fairey-b02b28330_the-chloramine-dilemma-activity-7373345546289192960-xdmS/
https://www.linkedin.com/posts/pietro-valdastri-7aa2021_harnessing-the-oloid-shape-in-magnetically-activity-7373306289659224064-AIbW/
https://www.linkedin.com/posts/jean-marie-volland-7b267836_a-centimeter-long-bacterium-with-dna-contained-activity-7112578024851599360-geEi



Publishers committed to quality in these efforts are an integral part of the process by which [Gold Standard Science](#) is achieved – and by which taxpayer’s original investments are multiplied.

The cost of this work is growing; APC-based models that immediately and significantly reduce their fees by slashing quality improvement would not serve the scientific enterprise. A cap to APCs could also lead to unintended consequences, including limiting authors’ freedom to publish in journals where they find a valuable audience. It could drive authors to publish in journals with which their institution has a transformative agreement (such that the author doesn’t feel the APC cost). This could in turn lead to further consolidation in an [already heavily concentrated](#) market by channeling researchers to a limited number of larger publishers, many of which aren’t U.S.-based. Also, an APC cap could become a “ceiling” – a fee that journals raise their existing APC fees to meet. These potential outcomes do not support the NIH’s goals of improving efficiency, saving money, and supporting scientific excellence.

AAAS, a multi-disciplinary non-profit association of over 100,000 scientists at all levels of the scientific enterprise, publishes the Science family of journals. Our mission is to advance science and innovation throughout the world. The Science family of journals is open to the public without embargo using green open access models for five of our journals and a gold open access model for one. This means that for most of the journals, authors do not pay to make a peer-reviewed version of their paper freely available; they can freely deposit it in a public repository. AAAS has supported green open access for more than two decades. For authors who wish to have the version of their paper on the publisher website openly available, they can choose our gold open access journal, Science Advances.

We appreciate that scientific publishing is a diverse ecosystem, a facet we’ve emphasized in numerous settings, including a [2024 briefing](#) for congressional staff. The standards of many publishers, particularly non-profit society publishers, reflect the needs of their discipline-specific communities. Thus, publishers use different models to create public access. When used to support quality over quantity, including at our own gold open access journal, APCs have been part of ensuring the integrity of the scholarly record. As properly deployed, these fees have supported a robust editorial review process; validation checks around critical features of a paper; and implementation of standards related to discoverability of work in perpetuity. Publishing that requires investment in this way bolsters the tenets of Gold Standard Science. At the same time, APCs hold risk by forcing authors to make tradeoffs with limited funds to pay high publishing costs. Yet, a publisher charging a low APC to be affordable to more authors may compensate by increasing the volume of papers accepted, even if individual papers don’t meet editorial standards. This weakens the scientific record.

We appreciate the NIH concern about the financial burden placed on the public – who may have funded underlying research and then also supported payments to access a published, peer-reviewed version of the outcomes. The reality is that publication in quality-focused journals is an integral part of the research process akin to other core



costs. It creates a “version of record,” making good on the public’s initial investment. It provides transparency by holding taxpayer-funded authors accountable through requiring elements like clarity on author conflicts of interest, as well as by requiring datasets for replication. Without publication in quality-focused journals, what taxpayers get for their tax dollar investments is harder to track and harder for others to build on. But, to NIH’s concern, costs for making this work publicly accessible should not be borne by individual authors, each navigating variable funding based on their career stage, discipline, or other variables. The [tradeoffs they face](#) in doing so are significant. By supporting publishers committed to research quality who are equally focused on exploring non-APC-based approaches to public access, NIH can help avoid such costly outcomes.

AAAS commends the NIH for considering the consequences that utilizing journals with high APCs may have. Of the options it presented in its Request for Information, and if forced to choose, we would select option 4 as the best short-term strategy for the way it balances concerns about cost with flexibility to choose a journal the author deems best (ideally one focused on quality). In the long term, however, AAAS encourages NIH to work actively with publishers to incentivize exploration of non-APC-based approaches to making peer-reviewed work publicly available – or to revisit existing ones, like green open access – all the while prioritizing quality-focused outputs that bolster Gold Standard Science. AAAS recommends that the NIH APC policy supports American publishers, when aligned with quality and cost goals, to help ensure that publishers informed by American standards of scientific excellence continue to be arbiters of quality in the global landscape. As part of this process, we encourage NIH to:

- Account for different publishing models, particularly United States-based publishers focused on rigorous peer review and quality checks; and
- Support the aims of Gold Standard Science by establishing parameters to guard against potential abuses, including payment of APCs to journals that fail to prioritize research quality and integrity.

AAAS is committed to collaborating with NIH, other federal research agencies, and OSTP to develop public access policies and publishing models that achieve these outcomes and is pleased to offer its response to the NIH’s RFI in this document. A response to NIH’s key prompts, with additional comments for consideration, follows.

AAAS Response:

AAAS applauds the NIH for the leadership it has assumed in public access policy development, balancing flexibility in providing research results with the goal of maximizing the use of taxpayer funds to support research. Through experimentation and [analysis](#), AAAS has found that differences exist in how various public access models impact the ability of scientists to conduct and publish their work, based on scientists’ funding. Finding the right balance between publishing opportunity and cost, and enabling access to published work, is crucial. It will likely require revisiting existing



approaches to public access that don't involve APCs, like green open access, or developing entirely new approaches to public access that work to eliminate APCs over time – all while prioritizing quality output.

As the recently issued Gold Standard Science Executive Order recognizes, federally funded research being transparent, rigorous, and impactful is a national priority. And high-quality science is not visible absent a rigorous review and publication process that has costs. This process requires commitment to core principles in the lab, but also through publishers who prioritize reproducibility-related elements like data quality and data openness, as well as communication of uncertainty. Responsible publishers also are committed to oversight of a study's final version. Sometimes, final versions require updates ranging from corrections to retractions, even long after their initial publication.

Not all publishers are created equal. Fortunately, many publishers – including here in the United States, and especially non-profit society publishers – are committed to rigor and quality. However, expanding public access requirements in recent decades also have sparked a business model shift resulting in some publishers now being focused on quantity of content rather than its underlying quality. Indeed, in models that charge lower APCs, quantity of articles is particularly critical for sustaining revenue. Every article is a unit of revenue with the attendant incentives.

A focus on quantity in scientific publishing has created problems that are becoming increasingly high-profile. For example, it has emboldened predatory publishers who cut corners in quality checks, often unbeknownst to authors. (In some cases where editors [have](#) been asked to adopt a quantity-first approach – accepting more and lower quality papers than they normally would – editors [have resigned](#) from their posts in protest or been fired if they wouldn't comply.) The focus on quantity in scientific publishing also has enabled researchers who seek to have a publication online quickly, at the expense of rigor, to publish in so-called “papermill” rings. And as more papers are published via papermills and predatory publishers, the peer review system – a cornerstone of integrity in publishing – has been further strained.

We should not sacrifice quality or trust in the pursuit of public access. As such, it is crucial to sustain and improve the approaches that have served the scientific enterprise and the public for decades, while rooting out the undiluted focus on volume, which is at odds with Gold Standard Science.

One approach for achieving this is to openly recognize publishers committed to principles like rigorous peer review, technical checks, and post-publication accountability. Publishers committed to quality are a crucial component of the scientific ecosystem. Their investments are growing with time as they perform peer review and evaluate features of papers that signal a study's underlying rigor. All *Science* journal papers, for example, include details about the source of funding, author contributions, competing interests, and availability of data and materials. Technical checks for such elements require time and follow-up by the publisher. And they are done in addition to



Science journals' thorough peer review, which helps strengthen research, [transforming it](#) to be richer in functional insight and more accessible, among other useful outcomes.

As a criterion to publish, AAAS requires authors in each of our journals to make their data publicly accessible. *Science*'s leadership in open data – a cornerstone of replication – has recently created new costs too, including related to [ensuring all data needed to replicate a given study](#) is available in a useable form in perpetuity. What's more, in *Science*'s experience, authors depositing data tend to be familiar with field-specific data repositories. Where these don't exist, data deposition is harder. AAAS has initiated a partnership with Dryad, a general data repository, to ensure data the scientific community requires to verify, replicate, and reanalyze new research is openly available, no matter the discipline. This partnership is another example of the costs associated with high-quality journal publishing and a distinguishing feature of a publisher's commitment to quality and reproducibility.

AAAS, as a publisher, also is committed to oversight of the final version of a study (the version of record), which we believe is essential not only to maintain the quality and accuracy of scientific research but also to advance subsequent work. Only the final version of a manuscript overseen by a publisher committed to maintaining the accuracy of the scientific record can be counted on to be corrected, retracted, or otherwise updated with clear notation for the global scientific research community. This, too, takes investment in resources over decades.

Science is further committed to [holding authors accountable](#) to communicating to the public about mistakes or even fraud, where they are relevant. As our Editor-in-Chief said recently in a sentiment [reposted](#) on the White House website, "it is possible to support science and hold it accountable at the same time."

The *Science* journals' approach to publishing further invests in communicating peer-reviewed science to reporters, leading to news stories on the peer-reviewed version of a study from myriad media outlets – itself a form of public access. We also are committed to answering concerns the public raises about the scientific process, [engaging our authors in such efforts](#).

Of course, scientific progress depends not just on individual publications by individual publishers, but on the accumulation of evidence from multiple sources committed to quality. Scientists integrate results across multiple publications in their ongoing work. If several publications address overlapping or similar questions, scientists judge the individual publications and then combine the results to generate interpretations that are consistent with the reliable observations across the entire set.

AAAS is committed to the highest standards of scientific integrity in scholarly communication and supports actions NIH should take to strengthen scientific integrity in its policies. AAAS recommends that the NIH policy provides incentives to publishers that actively explore approaches to making peer-reviewed work publicly available without APCs, and who show a commitment to principles of quality, transparency, rigor,



and post-publication oversight. The policy should reflect that such commitments come at a cost and that publishers with greater investments in resources to preserve, protect, and promote scientific integrity in their journals will necessarily have higher costs, which should ultimately be redirected to institutions or other bodies – not an individual author.

Through consideration of elements outlined above, the NIH policy should reflect the reality that not all publishers are created equal. This will require the agency to more directly evaluate the approaches of different publishers. In the short term, NIH could offer to cover APCs if the publisher could respond substantively to several standardized questions related to how they handle peer review, quality checks, research integrity-related problems that may surface post-publication, and related issues. In work to support public access policy development following the August 2022 OSTP memo, AAAS created a concise grid of five key questions for major U.S. funders (NIH, NSF, DOE, NASA) to answer at a public webinar (see [here](#) and [here](#)). These questions informed funders' frameworks as they developed their public access policies. Similarly, NIH could craft and adopt a consistent model for publishers, inquiring about particular processes that recognize their approaches to quality, many of which support NIH's own [goals](#) for improving the scientific enterprise (*i.e.*, some publishers offer peer review training for authors and provide lay summaries to create situationally appropriate communication for public audiences). NIH's role in elevating publishers committed to rigorous peer review and thoughtful dissemination would bolster the research integrity principles laid out in the Gold Standard Science Executive Order.

It is important to consider unintended consequences of capping APCs. From an author perspective, it could limit authors' publishing options – driving scientists to publish in open access journals where they can afford a fee, but may not find a valuable audience; or in journals not committed to quality; or in journals with which their institution has a transformative agreement such that the author doesn't feel the APC cost personally. This may temporarily work well, but over time it will lead to less visibility for NIH funded scientists to the audiences who can act best to further their work; stagnation around post-publication correction, which inhibits forward momentum in a field and public trust; and further consolidation in an [already heavily concentrated](#) market by channeling researchers to a limited number of commercial publishers – many of which are not U.S.-based – who have made transformative agreement deals with institutions.

Transformative agreements, typically paid out of institutions' indirect costs, may provide a means to avoid APC caps entirely for some publishers. The costs associated with the hybrid journal model that some publishers use are also worth mention; [research](#) shows fees to publish in hybrid journals – primarily financed by library subscription fees, but where authors have the choice to remove the paywall for their individual paper through an APC payment – are higher than fees for gold open access journals.

An APC cap may also mean that authors in states that historically have had lower levels of NIH funding – as recognized by the NIH's Institutional Development Award, for example – cannot publish in the journals that reach the audiences these authors most want to reach with their taxpayer-funded results. Or, if they are determined to publish in these journals, they may need to cover additional costs out of pocket.



With respect to consequences at the publisher level, a cap could become a floor for publishers who don't charge the cap amount yet – but now might. For publishers at the other end of the spectrum who would be forced to consider lowering their APCs, they will likely need to decrease resource-intensive efforts related to peer review and quality checks, or, to accept more papers of lesser quality, hoping volume would make up for revenue losses. Collectively, these outcomes do not support the NIH's goals of improving efficiency, saving money, and supporting scientific excellence.

We urge the agency to proactively communicate with publishers about their peer review, validation check, and dissemination policies to learn more about how they operate in key areas, with the goal of ensuring authors can publish in journals committed to quality outputs. At times, this may mean the associated APC cost NIH supports is greater than 2000 USD (ultimately the goal is for that cost to be carried elsewhere, not by the author). This approach also may mean some publishers are not supported by NIH. Again, not all publishers are the same, and an approach by NIH to help elevate those committed to quality could assist not only their own investigators, but researchers, universities, and the taxpayer more broadly by providing a reliable quality product.

Of the options NIH presented in its Request for Information, and if forced to choose, we would select option 4 as the best short-term strategy for the way it balances concerns about cost with flexibility to choose a journal the author deems best (ideally one focused on quality). In the long term, however, AAAS encourages NIH to work actively with publishers to incentivize exploration of non-APC-based approaches to making peer-reviewed work publicly available – or to revisit existing ones, like green open access – all the while prioritizing quality-focused outputs that bolster Gold Standard Science. AAAS recommends that the NIH APC policy supports American publishers, when aligned with quality and cost goals, to help ensure that publishers informed by American standards of scientific excellence continue to be arbiters of quality in the global landscape. As countries like [China](#) grow in research dominance, the US may not continue to set the standards in scientific research. What's more, as NIH updates its policies in ways that could lend support to some publishers over others, it should consider how changes made too quickly could force a reorientation towards other nations. If, for example, we cap APCs and China does not, large publishers may refocus on China as a source of publication revenue, leaving American-led science out of their pages.

AAAS believes that monitoring publishing costs paid by researchers – and the support researchers receive from journals in doing so – will help show the differential value publishers offer. It may be valuable for NIH to conduct a survey of researchers' work with publishers and/or to develop a public reporting scheme about scientist-borne publishing-associated costs and related publisher value.

Additional Comments Not Addressed in Responses to Question Above

Depositing to PubMedCentral:



In the current NIH public access policy, manuscripts must be deposited into PubMed Central (PMC) for an NIH-funded author to be considered compliant, even if the study is already open through methods including gold open access (where the version of record is online at the publisher site) or green open access (where the author accepted manuscript is publicly available in a repository).

It is our understanding from talking to NIH-funded researchers – some of whom have had to wait for studies that are already publicly available via gold or green methods to be deposited on PMC, to be considered compliant – that this process is taxing. To provide easier paths for authors to be considered compliant, NIH should consider committing additional resources to the process by which manuscripts are uploaded to PubMed Central.

Open licenses' impact on accuracy of research reuse:

Today, with greater use of scientific research not only by humans but also by artificial intelligence tools, NIH should endeavor to monitor how changes resulting from greater public access — including a breadth of open license types like CC-BY, which allow for broad reuse of scientific work— might facilitate reuse that adversely impacts the integrity and accuracy of the downstream communication of research. AAAS issued [a survey to researchers](#) on this topic in 2024. The goal of the survey was to evaluate researchers' understanding of open license impacts, particularly with respect to the accuracy of downstream use rights, but where other impacts could result from the choice of license, too.

Among our results, 28% of respondents were concerned about reuses of work with a CC-BY license, largely related to possible misrepresentations. In general, younger researchers were slightly more concerned than their older counterparts. Respondents also conveyed concerns about published research with an open license being used for generative AI applications, specifically; AI doesn't always provide attribution, which is typically a priority for publishing researchers.

One of the most striking findings from the AAAS survey — shared by nearly 40% of the scientists who responded — was that when misrepresentations of work do happen, nothing can be done. The reality is that for work that's made available with a publisher license instead of an open license, publishers can and do intervene when authors have reuse concerns. This is true at AAAS. And we believe this is essential to upholding the accuracy of a given work and the accuracy of the scholarly record more broadly. This in turn builds trust in the process by which science is done and disseminated.

AAAS recommends that NIH consider surveying NIH-funded researchers about specific concerns they have about work published with open licenses being used to support different outcomes – and about whether there are specific groups they would be concerned to see using their findings to support their own initiatives.

New challenges in data management:



With the ongoing shifts in public access policy, researchers and institutions will face new challenges for data management. These require fundamental research infrastructure that is lacking. Database infrastructure oversight is resource-intensive, and in a way that is only increasing with time. The ability to protect data – even anonymized data – is also increasingly challenging in the age of sophisticated artificial intelligence tools. As more databases come online to meet the needs of various parts of the scientific community, it is crucially important that these databases follow best practices designed to ensure the data are maintained and protected to highest current standards.

AAAS is among publishers requiring that data supporting research papers be available at the time of publication, either in the manuscript or supplementary material or through a public repository. This may include nontrivial costs, as some repositories require payment for data archiving. These costs will only increase as the capacity for high-throughput research increases. At the Science journals, we found that questions around complying with our data policies arose mainly for datasets that lack a field-specific repository. As noted earlier, to help support data deposition, AAAS has a partnership with Dryad, an international open-access general data repository, and we are covering costs for data publication for *Science* family journal authors.

However, covering data archiving costs is not viable on a larger scale. The amount of data associated with studies across disciplines is [growing at extremely rapid rates](#). At AAAS, we can foresee the challenges in this space, even as efforts to ensure all data underlying new publications are available via repositories are, in many ways, at their earliest stages in the scientific publishing ecosystem. How to manage the cost for publishing in data repositories and for maintenance of data infrastructure – be it through grants or other means – is an important question. How this can be achieved while also ensuring the protection of data, especially sensitive data, is an equally pressing and resource-intensive consideration. As NIH moves forward in its public access leadership, therefore, AAAS encourages it to consider these issues and how NIH will monitor and manage unequal efforts in data deposition and sharing. A sophisticated data access strategy that best serves the research community may also need to consider tradeoffs in data deposition that ensure only the data most important to analyzing and replicating research is deposited, helping to reasonably manage data input streams.