

Free Access For All! Can We Afford It?

For most investigators, the advent of the online journal world has relieved them of the burden of going to the library, paging through dusty volumes, and tracking the multitude of note cards taken about articles of interest. Our online world allows us to perform full-text searching with linkage to databases, technology resources, etc., all from a home or office computer. The American Physiological Society is one of the scientific societies that, together with High Wire Press, has contributed significantly to this new world by creating a platform that now houses some 3.7 million articles, including nearly 1.5 million free articles as of October 2006. The creation of this online library has occurred without compromising peer review and without a significant impact on the subscription prices charged by not-for-profit publishers.

Having created a relatively seamless online world, Open Access (OA) advocates are now asking publishers to sacrifice existing models of cost recovery to bring about a world in which articles can be obtained from multiple sources, i.e., not only the journal of record but also institutional and government repositories such as PubMed Central (PMC). Although competition is generally a good thing, this is a very different kind of competition. In journal publishing, competition has generally occurred between the commercial and society publishers or between high-impact journals. The question is whether publishers should also be forced to compete with the government in the dissemination of journal content. In other words, should the

government and funding agencies dictate where researchers may publish based on the journal's willingness to allow the article to be deposited in PMC for display and access within 6 or 12 months? There are costs associated with this kind of competition, both to the government (to create the repository) and to the publisher (if government access supplants the journal of record).

The NIH and PubMed Central

The National Institutes of Health (NIH) has been the driving force in efforts to modify the publication policies of scientific journals. Although one can go back to Harold Varmus's ideas for E-Biomed to explore the origins of these efforts (4), the current program was launched in May 2005 as a Public Access Plan designed to provide taxpayers with access to the scientific literature their tax dollars support. NIH grantees were asked to upload accepted, peer-reviewed manuscripts to a PMC repository where they would be displayed 12 months or less after publication. The goals of this program were to facilitate public access and NIH portfolio management and to create an archive of NIH-funded research. The 12-month time frame was a compromise that attempted to balance the needs of NIH with the needs of society publishers, many of whom publish high-impact journals in which a significant proportion of the content consists of NIH-funded articles. Since its launch, only about 4% of the expected number of articles have been uploaded to PMC. No doubt one of the

reasons for some society authors was that they questioned the need for a duplicate publication site for their manuscripts when publishers already make the final articles freely available within the prescribed time frame.

Efforts to Shift the Time Frame

The low compliance experienced under the NIH Public Access Plan has stimulated efforts by OA advocates to mandate participation and make articles publicly accessible after only 6 months. Some have been aggressively lobbying Congress, seeking the inclusion of language in the NIH appropriations or reauthorization legislation. They enlisted the assistance of Senators Cornyn (TX) and Lieberman (CT) to broaden the government's program by introducing S.2695, Federal Research Public Access Act (FRPAA) of 2006. This bill would require 11 federal agencies with more than \$100 million in extramural research funding to arrange for grantees to deposit peer reviewed and approved manuscripts in government-approved repositories, where they would be made publicly accessible within 6 months of publication.

FRPAA advocates contend that a 6-month mandatory policy will help to protect the important role of journals and publishers in the peer-review process, the cost of which is presently covered by subscription revenue. At the same time, librarians contend that FRPAA will save them money by providing access to content to which they currently subscribe. However, librarians will only be able to save money by canceling subscriptions based on access from PMC. Thus journals would lose revenue, forcing publishers to identify other sources of revenue to support the peer-review and publication processes.

The NIH Public Access Plan was originally proposed as a 6-month mandatory plan. In supporting this view, NIH Director Elias Zerhouni wrote that the policy would not harm journals since "NIH-funded articles account for more than half of the total published articles for only 1%" of the 5,000 journals indexed by PubMed (5). However, that 1% represents 50 journals, and nearly two-thirds were society journals, including six APS journals. Many society journals publish articles supported not only by NIH but by the

Table 1. Impact factors and cited half-life of APS journals

Journal Title	Impact Factor	Cited Half-Life
<i>Physiological Genomics</i>	4.636	2.8
<i>Am J Physiol - Endocrinology & Metabolism</i>	4.456	6.0
<i>Am J Physiol - Renal Physiology</i>	4.263	5.8
<i>Am J Physiol - Cell Physiology</i>	3.942	5.8
<i>Am J Physiol - Lung Cellular and Molecular Physiology</i>	3.939	4.9
<i>J Neurophysiology</i>	3.853	8.0
<i>Am J Physiol - Regulatory, Integrative, and Comparative Physiology</i>	3.802	6.4
<i>Am J Physiol - Heart and Circulatory Physiology</i>	3.560	5.9
<i>Am J Physiol - Gastrointestinal and Liver Physiology</i>	3.472	6.2
<i>J Applied Physiology</i>	3.037	9.9

other federal agencies covered by FRPAA, as well as private funding agencies that are also advocating for a 6-month policy. As more of a journal's content becomes freely available within 6 months from PMC, the publisher's ability to support peer review through subscriptions will be diminished.

The threat to subscription revenue is real. According to Garfield (3), in a study of the 100 journals with the highest cumulative impact, the impact of physiology journals showed more significant increases over time than other fields when comparing impact at 2, 7, and 15 years. Garfield contended that the shift was due to the "innate character of physiological research." The long-term value of physiological research is also reflected by the journal's cited half-life. Among the APS research journals (Table 1), the one that publishes studies employing emerging technologies is *Physiological Genomics*, with a cited half-life of 2.8 years. The *Journal of Applied Physiology*, which addresses more established areas of physiological science, has a cited half-life of 9.9 years. The ready availability of content from physiology journals within 6 months could encourage institutions to cancel subscriptions. This might save money for libraries, but it would force the Society to seek support for peer-review and publication costs from other sources.

Shifting to Author Pays

The most commonly mentioned open access payment model is an author pays

model. A shift from a subscription model to an author pays model is actually what many OA advocates would prefer since free access would be immediate and not after 6 or 12 months. Many point to the Public Library of Science (PLOS) as an example of a publisher of high-impact journals that makes content freely available immediately through an author pays model. To do so, PLOS, which is subsidized by philanthropic sources, now charges authors a highly subsidized \$2,500 per article to publish in *PLoS Biology* and *PLoS Medicine*. (Originally, the fee was \$1,500.) At the APS and many other scholarly publishers, whose publication costs are not subsidized by philanthropic sources, the cost of peer review and publication averages \$3,000 per article. If subscription revenue were lost, these costs would need to be recovered through higher author fees. A Cornell University study estimated that it would cost that institution \$1.5 million more if researchers published exclusively in author pays rather than subscription-based journals (2). Using the same model, similar estimates have been made for other research-intensive institutions (1). Thus one unintended consequence of federal programs that mandate access could be that costs are shifted from a wide array of subscribers to a few research-intensive institutions.

Under an author pays model, library acquisition budgets could be reduced, allowing for the transfer of overhead funds to the Dean's office to assist with the payment

of author fees, assuming that the NIH does not reduce overhead rates and that Deans do not invest the new-found income in other ways. Alternatively, author fees might have to come directly from the author's research grant or from funding agency supplements. In either case, this would effectively reduce funds available for research.

Many OA advocates proclaim that free access to federally funded research is a public good. However, I would contend that research directed toward the development of treatments and cures for disease is also a public good. As scientists, we must actively work to make sure that research continues to be the public good on which the federal government and charitable foundations spend their money.

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References

1. Davis PM. Calculating the cost per article in the current subscription model. Cornell Univ. http://people.cornell.edu/pages/pmd8/ARL_OA.xls [December 2005].
2. Davis PM, Ehling T, Habicht O, How S, Saylor JM, and Walker K. Report of the CUL Task Force on Open Access Publishing presented to the Cornell University Library Management Team [Online]. Cornell Univ. <http://dspace.library.cornell.edu/handle/1813/193> [9 August 2004].
3. Garfield E. Long-term vs. short-term journal impact: does it matter? *Physiologist* 41: 113–115, 1998.
4. Marshall E. NIH weighs bold plan for online preprint publishing. *Science* 283: 1610, 1999.
5. Zerhouni EA. NIH public access policy. *Science* 306: 1895, 2004.