

Q&A: HAROLD VARMUS



Many of the issues of concern to the FAS founders still exist today. Harold E. Varmus is the director of the National Cancer Institute. He received the Nobel Prize for Physiology or Medicine in 1989. Previously he served as President and Chief Executive Officer of Memorial Sloan-Kettering Cancer Center (MSKCC) and as Director of the National Institutes of Health (NIH). He supplied his answers to FAS questions via email.

Learn more about Harold Varmus by visiting:

<http://www.cancer.gov/aboutnci/director>

In the decade since you founded PubMedCentral and cofounded the Public Library of Science, more than 6,000 open access journals have been created. PLoS ONE published a study by a team of researchers from the HANKEN School of Economics that showed very rapid growth of Open Access (OA) publishing during the period of 1993-2009. In 2009, an estimated 191,000 articles were published in 4,769 OA journals. What more needs to be done to improve access to scientific research? How can scientists increase and improve the dissemination of their findings? How do you refute the argument that the OA standard is not as rigorous or objective as subscription journals because scientists are paying to publish their research?

As your numbers indicate, there has been a remarkable increase over the past decade in the access that is now provided to much of the scientific literature, both through “public access” to digital archives like PubMed Central and through full-fledged “open access” to journals like those published by the Public Library of Science.

Still, there are shortcomings that we should not forget while we applaud the progress that has been made. Effective use of PubMed Central required Congress to mandate deposition; the mandate applies only to NIH-supported articles, not those supported by other agencies; deposition can be (and often is) delayed for as long

as a year, despite the lack of evidence that shorter delays would significantly diminish journal revenues; and use of the material is often curtailed because the journals continue to hold copyright and do not license use under optimal terms, such as those advocated by Creative Commons. In an ideal world, all journals would use an open access business model (it is sensible, and it works). But I am a realist and know that this complete transformation will take decades. In the near future, I would be pleased if public access occurred more quickly, if an open access “option” was standard for all journals, and if an effort were made to build a public archive of the older scientific literature which is becoming increasingly inaccessible despite its utility.

These changes are occurring slowly, despite their desirability, because some of the most lucrative, subscription-based journals continue to wield an inappropriate influence over the behavior of many scientists. The blame for this should be directed to the scientific community, not the journals. Their influence depends on the inordinate importance that our colleagues place on the journal in which an article appears, rather than on the content of article, in decisions about who wins grants and gets hired and promoted. In this fashion, many scientists have ceded power to the editors of a few highly selective traditional journals, which in turn have little incentive to change their practices, even though an “author-pays” open access model for publishing can be lucrative as well as beneficial. Until scientists acknowledge this inappropriate standard (counting citations in famous journals) and return to the traditional but more difficult task of judging colleagues by actually reading their work, it will be difficult to take open access to the next stage.

The suggestion that the review process used by open access journals lacks rigor because authors pay has not been substantiated and for good reason: all journals want their content to be scientifically sound and highly reputable, otherwise they will not continue to receive submissions. It is important to note that publication online, whether in subscription-based or open access journals, offers an opportunity to make post-publication evaluation by open, online commentary at least as important as secretive pre-publication review. Unfortunately, movement in this direction has been relatively slow.

In retrospect, what – if anything - would you have done differently when launching PubMedCentral and PLoS? What changes would you like to see in the next decade?

I don't think my co-founders (Pat Brown and Mike Eisen) and I made many large errors in the launch of PLoS, although we certainly made some small ones. While I cannot say we've achieved absolutely all our goals, we've had tremendous success, with the help of many great staff members and colleagues. The general strategy of starting our efforts with highly selective journals, like *PLoS Biology*, has helped to calm fears that standards would not be rigorous, and the roaring success of the much more inclusive and generally speedy *PLoS ONE* has proven the soundness of the business model. Now I'd like to see open access journals process and present their articles with new informatics tools, and to feature them more like newspapers do, with all reliable "stories" included but the most important ones highlighted (as "on the front page above the fold") and others positioned less ostentatiously--at least until post-publication commentary indicates that their profiles should be elevated.

The launch of PubMed Central was an earlier, more tortuous, and flawed process. I have tried to present my several missteps as honestly as possible in my book, *The Art and Politics of Science* (2009). But, miraculously, that worked out pretty well too, with a lot of help from others.

In an age dominated by fears of terrorism and the dual use of scientific research, how do you balance the inadvertent spread of knowledge that may aid terrorists with the scientists' need for access to the latest discoveries?

As well known by those who are following the current dispute over publication of papers about aerosol transmission between mammals of avian H5N1 influenza viruses, this is a very difficult question, and I don't pretend to have a simple answer. Of course, such situations are easier to resolve when the potential for dual use can be recognized before the work is undertaken, so that projects can be conducted as classified research. When the situation is highly ambiguous, however, I suspect that the damage that is

done to the scientific process by not publishing a full account of the work is likely to outweigh the likelihood of malign use in most circumstances. In these cases in which work is openly conducted before it is deemed potentially dangerous, the results are likely to be known by too many people to be genuinely restricted anyway.

The polarization of U.S. politics continues to grow worse. With a skittish economic recovery and contentious debate to cut the budget and reduce the U.S. deficit, how would you advise the United States in terms of its investment in health, science and technology? Where would you focus more money?

I am a strong believer in the idea that investments in science are critical to the future of our country and the rest of the world, and history has shown that both major political parties have produced champions for such views over the years. Even in economically difficult times, critical investments in science and technology are most likely to be sustained by the federal government, at least in the United States, so the government's financial support will remain crucial.

While I continue to advocate for spending on medical sciences (it is my job and my conviction), I am increasingly concerned about America's failure to devote adequate resources to studies of new sources of energy, earth and ocean sciences, and ecological conditions. In the long run, it is those sciences, not oncology, that might save us from extinction.

As director of the National Cancer Institute, and in light of impending budget cuts, how do you determine research priorities? How do you prioritize what programs get funding?

We've already had some actual cuts to our budget and have been receiving sub-inflationary increases for almost a decade, so the pressure on our resources is long-standing, not "impending." Like all NIH Institutes and other federal science agencies, we depend heavily on peer review of grant applications to help determine who gets funded. We also have numerous meetings and workshops to survey the landscape for missed opportunities that need to be advertised.

In the past year, we've expanded these consultations by engaging people from several disciplines relevant to oncology to help frame "Provocative Questions" that are intended to stimulate clever approaches to unsolved or novel problems in our field (see our essay in the January 26, 2012, issue of *Nature*). Judging from the many enthusiastic participants in our PQ workshops and the over 700 applications for funds to answer PQs, this has been a successful strategy.

*Your 2009 memoir **The Art and Politics of Science** emphasized the civic value of science. What is your advice to scientists who want to get involved in policy?*

I say, "Go ahead, get involved!" There are lots of ways to do this, but they need to be titrated against commitments made to other things: bench-work, teaching, family life, and other interests. I am pleased to see the proliferation of stimulating programs to train scientists to work in the policy arena, and many societies and advocacy groups, including FAS, offer opportunities to devote more limited amounts of time to experiences that can be broadening and effective.

You also touched upon the role of science and technology in foreign policy and the growing disparities between the rich and the poor. How can the United States expand the role of science and technology in developing countries? How realistic is the creation of a "Global Science Corps"? How else can the United States use medicine and science to

improve relations with developing countries?

There are lots of new ideas for training, scientific exchanges, collaborative research, partnerships between institutions, visits by eminent scientists, health-promoting programs and so on, but a limiting factor is money. At many agencies, efforts to improve conditions in developing countries through scientific initiatives must compete with the good things we are doing domestically. So, ideas like the Global Science Corps (<http://sig.ias.edu/gsc>) have not gotten the funds they need.

At the NCI, we have established a new Center for Global Health, in an effort to consolidate and improve international projects already underway and plan some new things too. I view such work as beneficial to both poor and rich countries, since it often involves the study of novel problems that will enhance our understanding of cancer everywhere. Furthermore, improving the control of cancer in all countries helps to create a healthier, more productive, and more stable world, while enhancing American prestige and displaying our best values. I have been very pleased to see from the response to our new Center that most scientists and cancer advocates agree strongly with this perspective. ■

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