



SMRB Discusses Pre-College Engagement in Biomedical Science; NIH Director Reflects on Impact of the Sequester

July 28, 2014

The National Institutes of Health (NIH) Scientific Management Review Board (SMRB) held a two-day meeting on July 7-8, 2014. The SMRB was authorized by the [NIH Reform Act of 2006](#). The statute provides certain organizational authorities to the Department of Health and Human Services and NIH on which the SMRB provides advice. The meeting's agenda included reflections from NIH director Francis Collins, and a full day discussion of pre-college engagement in biomedical science led by the SMRB Working Group on Pre-college Engagement in Biomedical Science (PEBS).

NIH Director's Reflections

Collins began by highlighting an example of the growing international competition in support of biomedical research and noted his recent trip to Brazil designed to further strengthen NIH's collaborations in Rio. Referencing the growing Brazilian economy, he explained that Brazil is sending over the course of a few years 100,000 young scientists to the United States, the United Kingdom, and Europe for scientific training, who will return home to build Brazil's scientific strengths.

Prior to his trip to Brazil, Collins noted that he was in China for a meeting of the Heads of International Research Organizations (HIROs), an organization composed of directors of international research organizations started by National Cancer Institute director Harold Varmus, former NIH director and Nobel laureate. The 16 heads around the table collectively represent approximately 90 percent of the public funding of biomedical research in the world, Collins explained. In addition to NIH, HIRO also includes the National Science Foundation, the Wellcome Trust, and the Gates Foundation, among others, and provides an opportunity to talk informally about "where they might take things next."

During the meeting, HIRO heard a presentation from Zhu Chen, previously China's Minister of Health and member of the Chinese Academy and the U.S. National Academy of Sciences. China is on an upturn in terms of its investments in research, now approximately 20 percent increases in absolute dollars per year over several years. At that pace, Collins noted, their investments in biomedical research will surpass that of the U.S. Collins pointed out that China has had major growth of their university systems to accommodate that kind of research. Chen shared evidence of how that is paying out in terms of scientific publications and patents. China has now exceeded the U.S. in annual patents, something that Collins noted a lot of people were not quite aware was happening. China is very interested in participating in international projects, said Collins, and characterized China's progress as both "sobering" and "inspiring." Despite this, Collins emphasized that it is important that the biomedical research community remain

tightly connected with what is happening in the rest of the world and that HIRO is extremely useful in that regard.

Reproducibility

According to the NIH director, the China meeting also included a discussion of the issue of reproducibility (see Update, [November 12, 2013](#)), which all of the Heads are tackling with great energy. He noted that NIH deputy director Larry Tabak, who discussed the issue at the 2013 COSSA colloquium, is addressing the problem at the agency with a variety of implementations intended to “tighten up the way in which studies are pursued.” The agency is also looking at assessing grants for the “kind of rigorous standards needed.” Collins highlighted a joint meeting by NIH, the editors in chief of *Science* and *Nature*, and more than 40 journal editors to discuss ways in which journal editors could, by imposing various kinds of standards, including checklists, make sure they “are not supporting the idea of rapid publication of papers based upon animal model studies that may actually not have been properly designed and which will, therefore, turnout to not to be reproducible.” In addition, journals would take a greater responsibility by publishing follow on studies that failed to show the same result.

Shift to Funding Investigators?

Collins shared that there was an interesting discussion led by Canada regarding the question of whether in difficult times agencies should shift a larger proportion of their research dollars into funding investigators as opposed to funding specific projects that are very detailed in terms of what the proposal says the investigator is going to do. Canada is prepared to make a major shift in their portfolio from the investigator-initiated style proposal to the [Pioneer](#)-like awards. The Wellcome Trust, he noted, did that several years ago, and HIRO members are interested in an update from Wellcome Trust on its progress.

The NIH, said Collins, has been talking about taking a similar shift going beyond the Pioneer Awards and other mechanisms in the Common Fund to having NIH institutes have their own version of these investigator awards. According to Collins, the National Institute of General Medical Sciences (NIGMS) is intending to make a fairly major shift in the near future (see [related article](#)). The opportunity to unleash the innovation instincts and the creativity of science by giving these more flexible awards is very appealing, but you do have to think about unintended consequences, Collins cautioned.

Responding to a question regarding the resources China is providing to its biomedical community compared to that being provided to in the U.S., Collins noted his efforts to share that message with the more 300 members of Congress he has met with over the course of his tenure as NIH director. The problem, he explained, is the nation’s ongoing financial situation, which will continue to impact discretionary spending, including research. He added that “sequestration is not over;” while it was avoided in FY 2014 and FY 2015, it could go on another ten years if Congress doesn’t act, which could result in additional loss of resources from an NIH that has already lost about 25 percent of its purchasing power in the last 12 years.

Pre-College Engagement in Biomedical Science

The SMRB’s PEBS working group is chaired by Clyde Yancy, Northwestern University. PEBS is charged with “recommending ways to optimize NIH’s precollege programs and initiatives that both align with the NIH mission and ensure a continued pipeline of biomedical science students and professionals.” Specifically, PEB’s charge includes:



- Examining the evidence base for successful approaches for pre-college biomedical science programs aimed at strengthening the biomedical workforce pipeline;
- Identifying the attributes, activities, and components of effective pre-college biomedical science programs, including the role and relative importance of teacher training programs;
- Identifying the points in pre-college biomedical workforce pipeline where NIH's efforts could be applied more effectively, given finite resources; and
- Defining ways for NIH to improve the evidence base for effective pre-college biomedical science programs.

Yancy explained that what started out as a somewhat ambitious charge without a clear direction has become more focused: the working group has been able to define what the problem is not, and it has identified what is already in the NIH inventory and what is being done. He noted that they have also identified an opportunity to better coalesce around the things that are already underway and understand more about their impact and their value.

PEBS, according to Yancy, has identified a number of nascent or pilot projects that are supported by either government or not-for-profit and private institutions that are helping the working group to identify new strategies to engage those that might not otherwise be engaged in careers in biomedical sciences. The working group has also begun to think about new initiatives, including those that involve working collaboratively with those dealing with science standards, the emergence in the science curriculum, finding ways to make science exciting and fun again, and getting away from some of the traditional caricatures of what constitutes a scientist, making it more relevant in today's world, Yancy reported. An important subtext from what the working group has done has been to identify "that where our shortcomings are greatest are in the realm...of diversity."

Anderson: "Optimizing NIH Efforts to Engage Pre-college Students in Biomedical Science"

James Anderson, director of the NIH Division of Program Coordination, Planning, and Strategic Initiatives (DPCPSI), began the discussion on with a presentation on *Optimizing NIH Efforts to Engage Pre-college Students in Biomedical Science*. Anderson, however, noted that he was sharing his own opinions and was not providing the position of the NIH. He explained that he is the director of the division with oversight over [SEPA](#) (Science Education Partnership Awards); SEPA programs were listed for elimination in the President's FY 2014 budget request. Congress, however, directed the NIH to continue the program. Questions from a variety of individuals, Congress, and the media, according to Anderson, have led him to the opinion that NIH can have the most unique and appropriate impact on STEM education by leveraging the investments it has already in research. Anderson explained that the NIH has a very large and unique investment in researchers and infrastructure that can be leveraged in support of pre-college STEM. Contrasted with the role of other agencies, such as the Department of Education, the NIH has a very unique and high impact opportunity to contribute to STEM in this area.

He began by reviewing the NIH Mission: "to seek fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to enhance health, lengthen life, and reduce illness and disability." One of the strategies that the NIH uses to pursue its mission is to develop, maintain, and renew human capital as well as physical resources to do its research. In STEM education, the NIH is primarily focused on workforce development. It is a very distinctive and highly trained workforce required to conduct biomedical research, said Anderson. Several percentages of NIH's budget



are devoted principally to graduate postdocs, some college. And there is a small investment in K-12. This leads to the question of how can NIH best contribute in the precollege area.

The NIH supports more than 300,000 research personnel at more than 2,500 universities and research institutions in every state, Puerto Rico, and the District of Columbia. Additionally, approximately 6,000 scientists work in NIH's intramural program on six campuses in Maryland, North Carolina, Arizona, and Montana. The agency can use this unique resource to leverage training, Anderson explained, and provided examples of how he thinks the NIH can use the infrastructure and how it is currently doing it effectively. His first example was a funding opportunity that supports NIH summer research experience programs. The program uses the R25 funding mechanism, which provides support for eight weeks with a stipend of \$5,000 for a high school student and \$1,000 for the lab. Currently, eight institutes are using the mechanism with 38 active programs training multiple students and teachers in each program. The program is in 25 states with a total budget of approximately \$8 million. The opportunities are flexible, he added.

Anderson cited as a second example supplements to existing grants that can be tailored to the institute's needs. Another way the NIH can use its resources is to leverage its research centers. He highlighted the NIH's P40 mechanism and pointed to the NIH's intramural program which supports about 1,200 students each summer. On average, 25 percent of the students are high school students.

Concluding, Anderson observed that he thinks what makes NIH unique in the K-12 area is that the NIH can leverage investments, people, research, and infrastructure in ways that other agencies cannot. There are many approaches the agency already employs; it is difficult to quantify and describe and is not particularly well coordinated, he concluded.

The SMRB heard a series of additional presentations from four panels that provided perspectives of science teachers, gender and racial disparities in the area of precollege engagement in biomedical sciences, awareness among students in pre-K through grade 12, outreach programs that have been developed, and science standards. These presentations along with other materials from the meeting are available [here](#).

