When it comes to diversity grants, NIH hopes bigger is better

The National Institutes of Health (NIH) has funded scores of programs over the last 4 decades aimed at increasing the number of minorities who apply for its bread-and-butter investigator grants. But NIH Director Francis Collins is not satisfied with the progress to date in correcting the serious underrepresentation of African-Americans, Hispanics, and Native Americans in the applicant pool.

“We are far short of where I believe we ought to be,” he said during a 22 October media briefing on NIH’s latest attempt to achieve that deceptively simple goal. “I can tell you that a number of those programs have produced stunning successes in terms of individuals who have been significant contributors to the biomedical research enterprise. But those are more anecdotes than systematic data.”

The new, three-part program, which Collins called “a bold experiment,” hopes to address those problems with significantly more resources and better record keeping. Each of 10 BUILD (Building Infrastructure Leading to Diversity) awards, ranging from $17 million to $24 million over 5 years, will fund partnerships among several institutions to attract and retain more minority students. Another grant, based at Boston College, will create a national mentoring network serving all sites. The final

grant, to a consortium led by the University of California, Los Angeles, will be used to evaluate all of the BUILD grants. NIH expects to spend $240 million over the first 5 years of the initiative, which bears the clunky title of Enhancing the Diversity of the NIH-Funded Workforce. There are plans to hold a second competition in 2019, in which the first-round winners will compete against newcomers.

The awards are an order of magnitude larger than what existing programs to help minorities typically receive. That is welcome news to the community of scientists who have been deeply involved in NIH-funded diversity programs that serve a relative handful of students each year. But mixed in with their applause is some handwringing.

For starters, many scientists resent what they regard as Collins's implicit criticism of existing diversity programs—which they say laid the groundwork for many of the new awards. "The hair on the back of my neck went up when I heard his comments," says Renato Aguilera, a biology professor at the University of Texas, El Paso (UTEP), and co-principal investigator (PI) on UTEP's 5-year, $22 million BUILD grant. For the past decade, Aguilera has run a much smaller NIH-funded program, the Research Initiative for Scientific Enhancement (RISE), which supports a few dozen undergraduates doing research and a handful of graduate students pursing Ph.D. degrees in the biomedical sciences.

"I don't agree that the existing programs haven't worked," he says. "I'm also nervous that they might decide to throw out all the existing programs and replace them with these humongous BUILD grants."

UTEP cited the success of RISE and other NIH-funded programs on campus in its proposal to NIH—for example, Aguilera notes that "more than 50% of my students go on to graduate school in the life sciences." But he says there's a simple reason RISE hasn't had a bigger impact on the diversity of the NIH applicant pool: Its $800,000-a-year budget doesn't allow him to address all the factors that can affect the size of the minority pipeline.

"RISE doesn't give you any money for infrastructure, or to serve the rest of the student population," he notes. "You can't go into the high schools, or to community colleges. You can't serve students at other campuses in the region, or partner with research-intensive universities to provide more summer research experiences. You also can't do much to mentor faculty."

The BUILD grant will allow the university and more than a dozen academic partners—minority-serving institutions, 2-year colleges, and research-intensive universities—to pursue all of those activities and more, he notes. It will give a wider swath of students the chance to learn what it means to be a scientist through training in research practices and actual lab experiences. Some half a million dollars alone will go toward turning empty space in a new campus building into a state-of-the-art biology learning center, with wet labs and areas for tutoring and mentoring.

"BUILD merged things that have been successful," Aguilera says. "After all, you had to prove that they were working in order to get the NIH grant."

A long, hard road

The dearth of minorities in U.S. science—in particular, African-Americans, Latinos, and Native Americans—is a chronic problem. Although there are many ways to measure that underrepresentation, from low participation rates in high school science courses to their near-invisibility within science faculty at some elite universities, Collins chose the statistic most relevant to NIH's goals when he announced the new awards. "Although 12.6% of the U.S. population is African-American, only 1.1% of our NIH PIs are African-American," he told reporters.

Winning an NIH grant is a long and difficult process for any scientist. And many minority students who might aspire to a career as a biomedical researcher also must first overcome poor academic preparation in high school, inadequate financial support to complete a degree, a lack of academic mentoring and haphazard career counseling, and a hostile environment on campus. For those who surmount those roadblocks and earn a science degree, there's often strong family pressure to find a steady and well-paying job immediately after graduation. Even for those who persevere through graduate school and beyond, the dearth of faculty positions can dash their hopes of an academic research career. And then, as a final insult to those who do manage to snare a tenure-track position, there are the plunging success rates for grant applicants.

The new initiative hopes to address the factors that bear on earning an undergraduate and graduate degree. It's also meant to show that NIH is being responsive to a widely reported 2011 study showing that minorities are 10% less likely to obtain an NIH grant than their white counterparts.

"They had to do something that Francis could point to as being new because the [2011] report caused such a ruckus," says Richard Morimoto, a molecular biologist at Northwestern University in Evanston, Illinois. In 2006, Morimoto chaired an NIH advisory panel that proposed an 8-year doubling of the number of minority Ph.D.s in the biomedical and behavioral sciences. He said then that NIH's existing programs to foster diversity were piecemeal and that "the training of more minority scientists needs to be the responsibility of the entire community."

That doubling hasn't occurred, although the most recent figures from the National Science Foundation show that the number of African-American and Hispanic Ph.D.s in the biological sciences rose sharply in the late 2000s before leveling off over the past few years. At the same time, the absolute numbers are so small—267 African Americans and 329 Hispanics received Ph.D.s in the biological sciences in 2012, for example—that even a small increase or drop can represent a large percentage change.

Morimoto admits he "was not overwhelmed" when he first heard about the new diversity awards. But he sees them as "a significant investment in a time of limited resources." And he applauds the selection process: "Putting more money into the hands of people who have shown success is a good idea," he says.

Another BUILD winner that certainly fits that definition is the University of Maryland, Baltimore County (UMBC). It's already earned a national reputation in preparing minorities for scientific careers through its Meyerhoff Scholars Program that began in 1988. UMBC officials hope to extend the principles behind that elite program to reach what biochemist William LaCourse, dean of the College of Natural and Mathematical Sciences, calls "the murky middle" of students who show an interest in science but aren't eligible for the mentoring, internships, and additional services that the Meyerhoff Scholars receive.

"We want to weave what we've learned into the fabric of the university so we can offer the same experience to every student who walks through our doors," says LaCourse, a co-PI on the school's 5-year, $18 million grant. "And this award will allow us to move a lot faster."

Building on success

Maria Elena Zavala, a biologist at California State University, Northridge (CSUN), which also won a BUILD award, knows about all the academic barriers facing minority scientists. The daughter of former migrant workers in California, she took as much science as was offered at her high school despite being told by her guidance counselor that "your kind of people need [to learn] some kind of skill."

When Zavala joined the biology department at CSUN in 1988, she already knew about the school's long tradition of producing graduates who went on to earn science-related Ph.D.s. "But nobody could remember any minority Ph.D. students," she recalls. One big reason for their absence, she realized, is that "they couldn't afford to take the research courses that you need to get into graduate school. Most students do it on a volunteer basis, but minority students usually don't have the time because they have to work." Although the noncredit lab courses don't satisfy any graduation requirements, she notes, they do draw down a student's financial aid package.

So Zavala applied for and won an NIH Minority Access to Research Careers (MARC) grant. Twenty-five years later, she's still directing the program, and along the way she's developed several innovative approaches for helping minority students that university officials incorporated into their successful BUILD application.

"The spotlight is on us to make a difference," says Crist Khachikian, CSUN's associate vice president for research and graduate studies and the lead PI on the BUILD grant, which they hope will total $22 million over 5 years. "We have a rich tradition of success, but we are reevaluating our approach to mentoring and what factors might undermine student success." He says faculty members will be applying the concept of critical race theory—the interaction of law, race, and power—"to make mentoring more culturally appropriate for a diverse student population."

Zavala is no Pollyanna when it comes to her students' chances of carving out a career in science. And

she knows that any program, however comprehensive, can't cover all the bases.

"You want to be optimistic about student outcomes, but you have to be realistic about what happens to them after they graduate," she says. "Life happens. Say one of their parents comes down with cancer and tells them that they need to take a job to help pay the bills. They aren't going to do it?"

Zavala isn't a co-PI on the new grant, but she thinks she and her colleagues are on the same page. "We're already doing a lot of these things and they are working," she says. "What NIH has decided to do is to put these programs on steroids."

A fourth BUILD grantee, Xavier University of Louisiana in New Orleans, perennially tops the list of schools that produce the most minority Ph.D.s in the physical and life sciences. But that record isn't good enough, says Gene D'Amour, special assistant to the president and lead PI on the project. Some 70% of the school's predominantly low-income and black student body plans to major in either pre-med or pre-pharmacology, he says, but only 25% actually go on to graduate training in a STEM (science, technology, engineering, and mathematics) field or to medical or pharmacy school.

"We'd like to do a better job of keeping them," D'Amour says. The scholarships in the grant will help students whose parents were hit hard by the 2008 economic meltdown, he says, and make it possible for them to start thinking about a Ph.D.

Interim metrics

Of course, students at Xavier and all the other campuses funded by the new initiative won't actually earn that advanced degree until well after the 5-year grant ends. And it will be more than a decade before any of them are in a position to apply for an NIH investigator grant. That means NIH will need to apply intermediate markers in judging the overall success of the diversity initiative and, more specifically, whether institutions should receive a second, 5-year award.

Hannah Valantine, who in January was named NIH's first chief diversity officer, says the transition rates into graduate programs will be an important metric, although she admits that no baseline currently exists. "The transition rates for MARC and other programs vary from 20% to 60%," she says. "I'd like to see a rate of at least 50%, if not much higher, for the new round of grants."

For institutions with programs already meeting that standard, the new initiative is a chance for them to spread their wings. "What was really amazing about the solicitation was that it, in effect, asked people to describe what they need, and then to come up with creative ways to achieve it, without regard to the budget," marvels UTEP's Aguilera. "They told us to think big, and that's exactly what we're planning to do."