A decade of funding from a trio of federal grants has made VCU a leader in finding the talent the biomedical sciences have been missing.

By Erica Naone

Photography by Brian Strickland
Recent statistics strongly suggest that our society is missing a lot of potential talent in the science and engineering professions. And it has been – for years.

The National Center for Science and Engineering Statistics reported just last year that certain minorities, including African Americans, Hispanics and people with disabilities, remain underrepresented in science and engineering professions and as recipients of science and engineering degrees. Black students earned only about 9 percent of the biomedical Ph.D. degrees awarded in the U.S. in 2017, and Hispanic or Latino students earned about 15 percent.

Governmental agencies, educators and administrators at VCU and across the country envision an environment in which all students interested in the biomedical sciences have access, opportunities and empowerment — and are working together to make it a reality.

Since 2010, VCU has been home to a set of research and training programs designed to address these disparities and to tap that missing potential. Housed in the School of Medicine’s Center on Health Disparities (CoHD), these programs train future biomedical researchers at the undergraduate, graduate, postbaccalaureate and postdoctoral levels.

VCU is one of only two institutions in the U.S. to offer these programs at all levels of higher education, thanks to three grants that the university has maintained for more than a decade. Since the programs began, a total of $12.9 million has been awarded, serving more than 180 students and having a larger ripple effect as these students go on to teach the next generation of biomedical researchers.

The latest grant, $2.5 million awarded last year by the National Institutes of Health’s National Institute for General Medical Sciences, ensures that the Institutional Research and Academic Career Development Award (IRACDA), a three-year postdoctoral program, will continue supporting students through 2024.

Passionate faculty members helped drive the creation of these programs, and they're deeply committed to helping students get the most out of them. Joyce Lloyd, Ph.D., professor and vice chair of education and faculty affairs in the Department of Human and Molecular Genetics, is involved in running all of the CoHD’s research training programs.

A diminutive woman with a hearty laugh and a kind demeanor, Lloyd also is a recognized biomedical researcher in projects related to the future treatment of sickle cell anemia. She carries an encyclopedic knowledge of the students who participated in the programs over the years and can rattle off long lists of their achievements since graduation.

“I have a passion for making sure we get all the talent into science, not just a fraction of it,” Lloyd says. She dreams of getting more students into careers that will broaden the scope of what can be studied and accomplished through the biomedical sciences.

In its 2019 report on Women, Minorities and Persons With Disabilities in Science and Engineering, the National Science Foundation writes, “Scientists and trainees from diverse backgrounds and life experiences bring different perspectives, creativity and individual enterprise to address complex scientific problems.”

Those different backgrounds and life experiences, however, also can make the path to academia a tricky one. Lloyd recalls her own journey as a first-generation college student. She lost her father at 14 and found herself working her way through college with little knowledge of scholarships or academia.

While she is quick to say these challenges don't compare to some she's seen students face and overcome — including getting a degree and applying to graduate school while homeless — her experiences gave her a sense of empathy and an understanding of how important support and mentorship can be.

Lloyd says that when she first talked with other faculty members about creating programs to help train underrepresented biomedical scientists, she wasn’t thinking nearly big enough. She credits Suzanne Barbour, Ph.D., who was a professor in the Department of Human and Molecular Genetics, has “a passion for making sure we get all the talent into science, not just a fraction of it.”

Photography by Allen Jones, VCU University Relations
The Center on Health Disparities was focused at the time on research and community engagement, but its mission aligned with that of the research and training programs. It soon became a leader in addressing disparities among scientists who work in health-related fields.

The VCU six-year graduation rates for African American and Hispanic undergraduates already exceed national averages considerably: 63 percent for African American students and 64 percent for Hispanic students, compared with 40 percent and 54 percent, respectively. However, the CoHD program for undergraduates goes far beyond that. Ninety-eight percent of participants in that program, who also are from underrepresented groups, have earned a bachelor’s degree.

CoHD programs boast a wide range of impressive results. Twelve out of 14 postdoctoral trainees have entered tenure-eligible positions. Eighty-eight percent of participants in the undergraduate program are pursuing careers in the biomedical workforce. Ninety-two percent of postbaccalaureate students who enrolled in Ph.D. programs since 2011 have earned their degree or are still actively pursuing it.

Meanwhile, a national study conducted by the Council on Graduate Schools found that less than 60 percent of African American and Hispanic students enrolled in Ph.D. programs earned the credential within 10 years.

Lloyd takes great pleasure in the quality of the programs’ results and the successes of participants. She recalls her own struggles to get into graduate programs, including receiving multiple rejections from top schools on the same day. “When I see our students get into schools that turned me down, I feel a sense of vindication,” she says.

Discovering the training programs on the MCV Campus “felt like serendipity,” says Nisan Hubbard, Ph.D., now a postdoctoral fellow in cell biology and physiology at the University of North Carolina-Chapel Hill.

“There’s this sort of misunderstanding among students,” he says, “that if you’re interested in biology, you have to go straight to medical school. I learned that there are multiple ways of being able to study biology.”

While working on his undergraduate biology degree at VCU, Hubbard participated in an eight-week research program called Step Up, designed to introduce underrepresented persons to the experience of conducting research. There, he learned about the CoHD’s Initiative for Maximizing Student Development Scholars Program (IMSD). Under the direction of Hamid I. Akbarali, Ph.D., professor in the Department of Pharmacology and Toxicology, the program offers mentorship, training and financial support for students at the undergraduate and doctoral levels.

In IMSD, Hubbard’s love for research blossomed — along with a newfound love of teaching. “Mentors introduced me to different aspects of biology, but also the importance of passing that knowledge on to the next generation,” he says. “I have had a lot of mentors who helped facilitate my love of science and create opportunities for me to participate in all these different endeavors.”

He began to see his fellow program participants as a family and met the mentors he calls his “science moms”: Sarah Golding, Ph.D., is an assistant professor and director of undergraduate research in the Department of Biology; and Suzanne Barbour, Ph.D., who helped found the training programs at VCU, is now dean of the Graduate School and professor of biochemistry and biophysics at UNC-Chapel Hill, where Hubbard’s SPIRE fellowship operates similarly to IRACDA.

Aside from training in conducting research, Hubbard says he can’t overstate the importance of the soft skills he learned through the School of Medicine’s CoHD programs, such as networking and public speaking.

“The amount of opportunities the programs provided for a growing scientist was a good kind of overwhelming,” he says. “These are programs that are essential to increasing diversity and creating pipelines to continue increasing it at multiple levels of academia, getting additional deserving people into these seats.”

Nisan Hubbard, Ph.D. calls Suzanne Barbour, Ph.D., one of his “science moms” in recognition of the value of her mentorship during his time in IMSD at VCU and now at the University of North Carolina-Chapel Hill, where he is a postdoctoral fellow.

Photography by Brian Strickland

Serendipity

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IRACDA is unique among the research and training programs because it’s not only open to students who are themselves from underrepresented minorities. It’s also open to students who are committed to teaching at institutions with diverse student bodies.

Andrea “Andy” Beyer, Ph.D., refers to herself as a first-generation college student and farm girl. She recalls her family trying to figure out how to apply for college loans and tuition waivers and her own lack of knowledge about what the college experience would really be like.

“Everything I knew was based on TV and movies,” Beyer says. She wasn’t sure how to balance between classes she wanted to take and classes she had to take, wasn’t sure of the differences between a minor and a concentration, and didn’t understand the value of internships. She didn’t know you could continue to graduate school, much less how to go about it.

“Luckily, some faculty members and mentors recognized my deer-in-the-headlights look,” Beyer says.

She grew up in a primarily white community, without much knowledge of other cultures. But by the time she earned her doctorate, she was very interested in teaching, especially other first-generation college students. Since there’s overlap between first-generation students and underrepresented minorities, she found her way to IRACDA.

“The program was an answer to prayers,” Beyer says. “It was a really confirming and empowering experience.” She valued learning how to balance the roles of research and teaching in her life, receiving candid feedback from mentors about the realities of academia and receiving structured guidance toward improving the skills of a professor.

After completing IRACDA, Beyer found a home at Virginia State University as assistant professor of biology. “I fell in love with the students,” she says. Whether connecting to students who have similar backgrounds or learning about the experiences of those who grew up very differently from her, Beyer says she can’t get enough of watching students experience the joy of scientific discovery.

“IRACDA made my career. It made me who I am today.”

Beyer loves introducing freshman microbiology students to the experience of doing research. She also aspires to be the “internship queen,” introducing students to all the internship opportunities that she wasn’t aware of as a college student. She often encourages her students to apply to the CoHD programs.

She says IRACDA helps train educators who are uniquely equipped to shepherd underrepresented students through the often-twisting path of academia. Beyer says, “We need people to realize that bringing more diverse groups to the STEM fields may not be a simple process. Some institutions assume students will just naturally go on to these opportunities. But it comes down to awareness and patience and being resourceful, finding ways that you can assist students or provide them the tools to empower them.”

Beyer’s words clearly reflect the values of the CoHD’s research training programs as a whole. She, Joyce Lloyd, Nisan Hubbard and Nicole Jimenez all speak passionately about the significance of giving back and carrying what they’ve learned everywhere they go.

“I don’t know if this is an outcome of the programs, or if the programs draw people who are passionate and community-minded to begin with,” Beyer says. “Compassion is built into the program, and it’s also led by great people, great mentors. I try to embody the things I found so comforting and helpful in my interactions with them.”

When asked why the CoHD programs have had their grants renewed again and again, Lloyd leans forward in her chair and smiles.

“We’ve been able to show progress, and that we’ve made an impact,” she says. “The strength of our outcomes has enabled these programs to continue.”
VCU is one of only two institutions in the U.S. to offer research and training programs designed to address disparities in biomedical researchers at all levels of higher education. Since they began, these programs housed within the School of Medicine’s Center on Health Disparities (CoHD) have been awarded a total of $12.9 million in grant funding and have served more than 180 students while maintaining excellent trainee outcomes.

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Program Focus</th>
<th>Success Rate</th>
<th>Trainees to Date</th>
<th>NIH Funding</th>
<th>Compared with National Averages</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMSD-undergrad (Initiative for Maximizing Student Development Scholars Program)</td>
<td>Provides research training in the biomedical sciences for undergraduate students from groups traditionally underrepresented in biomedical research</td>
<td>98% of participants earned a B.S. within six years.</td>
<td>82</td>
<td>$2.5 million</td>
<td>40% of African American students and 54% of Hispanic students receive a bachelor’s degree within six years nationally.</td>
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<tr>
<td>PREP (Postbaccalaureate Research Education Program)</td>
<td>A one-year biomedical research training program for recent college graduates in groups that are underrepresented in the biomedical sciences</td>
<td>92% of participants who enrolled in Ph.D. programs since 2011 have earned that degree or are actively pursuing it.</td>
<td>59</td>
<td>$2.8 million</td>
<td>Less than 60% of African American and Hispanic students enrolled in a Ph.D. program completed their degree in 10 years, according to a national study by the Council on Graduate Schools.</td>
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<tr>
<td>IMSD-Ph.D. (Initiative for Maximizing Student Development Scholars Program)</td>
<td>Provides Ph.D.-level training in the biomedical sciences for students from groups traditionally underrepresented in biomedical research</td>
<td>67% of participants received Ph.D. degrees in seven years or less.</td>
<td>22</td>
<td>$2.6 million</td>
<td>52% of minority Ph.D. students in life sciences complete their degrees in seven years or less nationally.</td>
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<tr>
<td>IRACDA (Institutional Research and Academic Career Development Award)</td>
<td>A three-year postdoctoral program to train fellows in biomedical research and teaching, focusing on individuals from groups traditionally underrepresented in biomedical research and those committed to teaching at diverse institutions</td>
<td>85% of participants found faculty positions as assistant professors and beyond.</td>
<td>18</td>
<td>$5 million</td>
<td>Less than 15% of Ph.D. degree recipients were in tenure-eligible positions six years after receiving their degree, according to 2014 data from the National Science Foundation.</td>
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