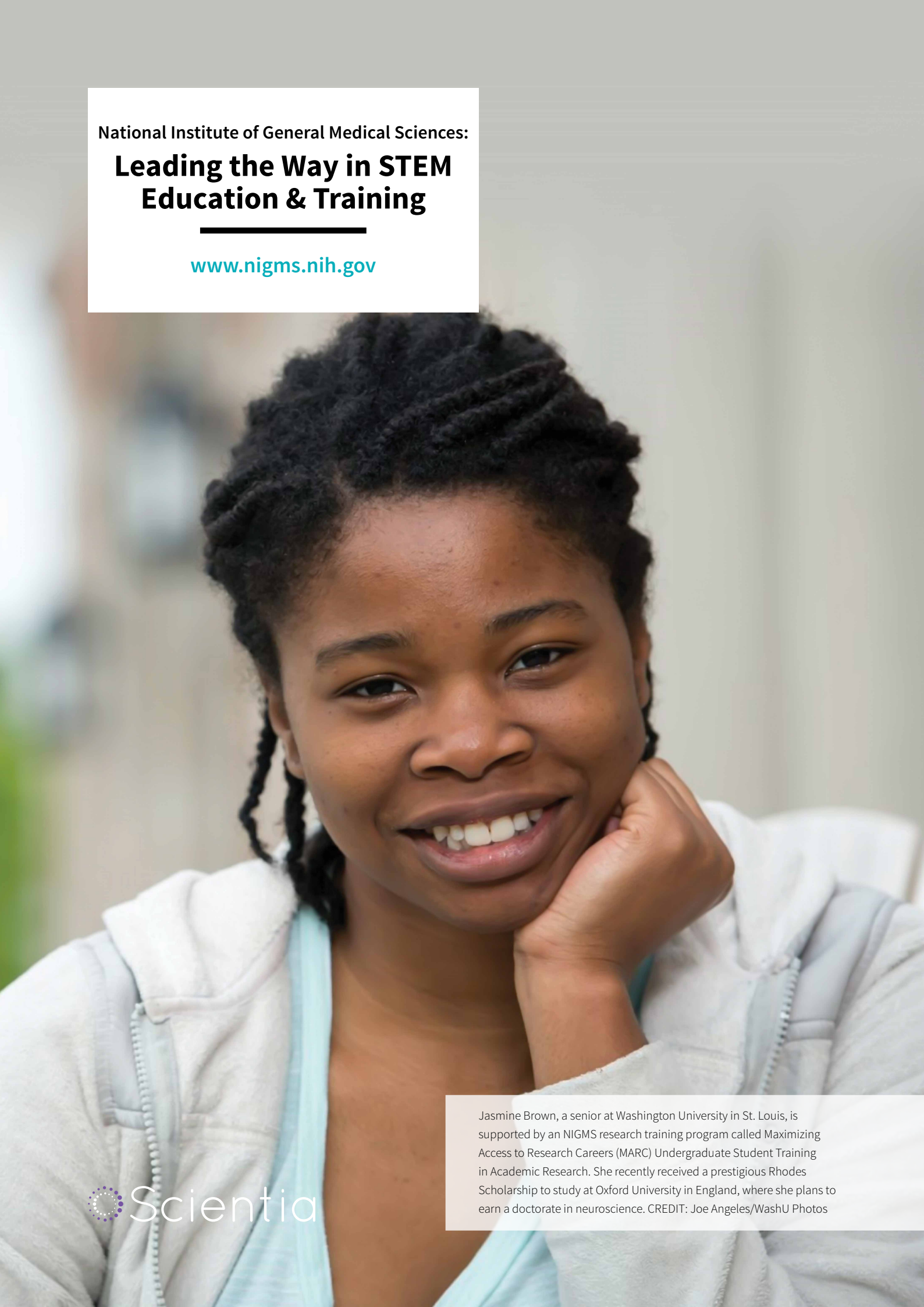
National Institute of General Medical Sciences:

# Leading the Way in STEM Education & Training

www.nigms.nih.gov



Jasmine Brown, a senior at Washington University in St. Louis, is supported by an NIGMS research training program called Maximizing Access to Research Careers (MARC) Undergraduate Student Training in Academic Research. She recently received a prestigious Rhodes Scholarship to study at Oxford University in England, where she plans to earn a doctorate in neuroscience. CREDIT: Joe Angeles/WashU Photos

Scientia

# NATIONAL INSTITUTE OF GENERAL MEDICAL SCIENCES: LEADING THE WAY IN STEM EDUCATION & TRAINING

Established in 1962, the National Institute of General Medical Sciences (NIGMS) is one of the 27 Centers, Institutes and Offices within the National Institutes of Health (NIH) – the primary medical research agency of the US Government.

In addition to supporting basic biomedical research, NIGMS provides leadership in training the next generation of scientists. To do so, NIGMS supports a broad range of science education, training, and career development programs for individuals and institutions.

In this exclusive interview, we had the opportunity to speak with Jon R. Lorsch, Director of NIGMS, who discusses the Institute's varied approaches towards fostering the best trained, most innovative, diverse, and productive biomedical research workforce possible.

*NIGMS offers a wide range of education and training programs in the biomedical sciences. Shown above (from left to right) are: a high school student participating in a Science Education Partnership Award (SEPA) program, an undergraduate scholar in the Building Infrastructure Leading to Diversity (BUILD) program, a graduate student pursuing a dual MD/PhD degree with support from a predoctoral fellowship to promote diversity, a fellow in the NIGMS Postdoctoral Research Associate Training (PRAT) program, and a postdoctoral scientist supported by an NIH Pathway to Independence Award. Descriptions of all NIGMS education, training, and career development programs are available on the NIGMS website.*

**To start, please tell us about NIGMS's mission to foster the next generation of biomedical scientists.**

Ensuring the vitality and continued productivity of the research enterprise is core to the mission of the National Institute of General Medical Sciences (NIGMS). To accomplish this goal, NIGMS sponsors training programs tailored for each stage of career development from undergraduate students through faculty members. The goal of all these efforts is to develop a diverse pool of well-trained scientists available to address the nation's biomedical research needs.

*Young students in the Integrated Science Education Outreach (InSciEd Out) program in Rochester, Minnesota, learn about environmental science by studying zebrafish. Funded by a Science Education Partnership Award, InSciEd Out is a collaborative partnership designed to engage students and empower teachers through research-based, experiential, classroom learning. CREDIT: InSciEd Out*

**Is NIGMS involved in any initiatives to encourage school children to pursue careers in biomedical science?**

Yes! We reach school children across the nation through the Science Education Partnership Award (SEPA) program. This program connects biomedical or clinical researchers with teachers and students in pre-kindergarten through grade 12. The interactive partnerships, along with special opportunities for students from underserved communities, form a pre-college pipeline to careers in biomedical, behavioural and clinical sciences.

SEPA also bolsters the understanding and appreciation of science, technology, engineering and mathematics (STEM) among young students. To do so, SEPA provides teachers with professional development in science content and teaching skills; funds health-related exhibits in museums and science centers; and supports the creation of educational tools that use technologies like virtual reality, 3D printing, wearable devices and interactive, online learning platforms.

**'Striving to increase workplace diversity is not an empty slogan — it is a good business decision… Nonhomogeneous teams are simply smarter.'**

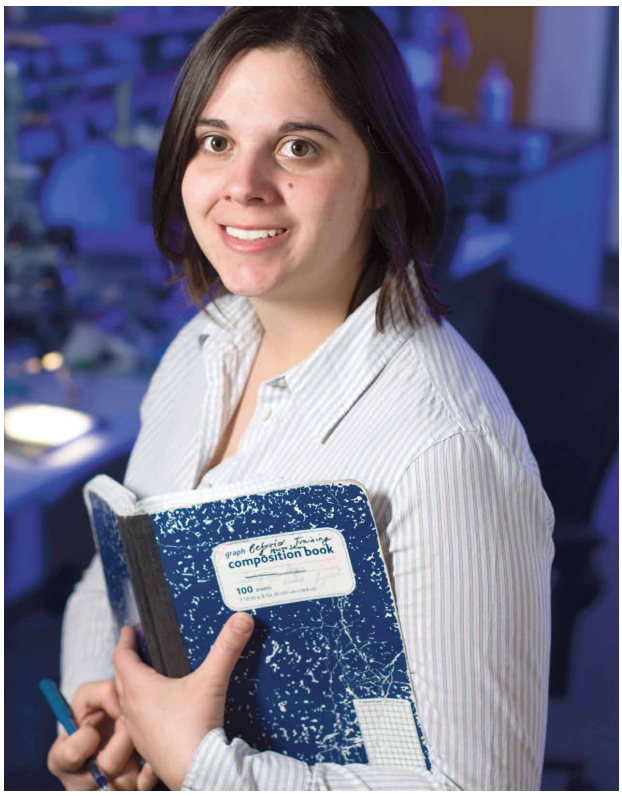
**– David Rock and Heidi Grant, Why Diverse Teams Are Smarter, Harvard Business Review**
**Why Diverse Teams Are Smarter**

**Explain how NIGMS works towards achieving diversity and inclusion at undergraduate, graduate and postdoctoral levels, to ensure a diverse biomedical workforce in the future. How is this initiative important for meeting national research goals?**

NIGMS firmly believes that our nation is best served by a research workforce that benefits from a rich diversity of perspectives, skills and experiences. Research on business productivity backs up this assertion. Multiple studies demonstrate that diversity within work teams enhances creativity, balances biases, promotes innovation and sharpens decision-making abilities.

Fostering a diverse and inclusive future workforce is a key priority for the Institute. Toward this end, NIGMS supports a broad collection of training and capacity-building programs designed to develop talented people from underrepresented populations. These programs provide many types of support, training and mentoring for students at multiple career stages. The programs operate at a variety of educational institutions across the country, including research-intensive universities, community colleges, undergraduate institutions, minority-serving institutions and medical schools. Some of the efforts, such as those that fall under the Institutional Development Award (IDeA) program, support students in 23 US states (and Puerto Rico) that historically have not received high levels of NIH funding.

Together, these programs aim to ensure we draw from the entire pool of talented individuals, bringing different aptitudes, skills and approaches to address complex scientific problems. By training and retaining a diverse and inclusive workforce, we will maximise our opportunities to advance biomedical science, improve our nation's health and maintain its global competitiveness.




*Cara Altimus was supported by NIGMS as a PhD student at Johns Hopkins University. She is now associate director at the Center for Strategic Philanthropy at the Milken Institute. Altimus uses her expertise in neuroscience to monitor research on many diseases and to advise individuals and foundations seeking to donate to biomedical science. CREDIT: Keith Weller*

**NIGMS supports almost half of all NIH-funded PhD students in training programs at colleges, universities and medical centres in the US. Please tell us about the Institute's focus on PhD student development.**

The primary objective of training PhD students is to develop future generations of responsible, well-trained, rigorous scientists who will advance biomedical and behavioural research. Since its establishment in 1962, NIGMS has played a leadership role in this endeavour. We are currently focused on supporting needed updates and improvements to graduate-level education, which has remained largely unchanged for decades.

**Only a fraction of PhD students will go on to achieve tenure-track positions. How does NIGMS adapt its training programs and initiatives to provide the foundation for a wide variety of scientific career paths?**

As the demand for biomedical scientists expands beyond academia, many graduate trainees pursue careers in industry, business, education, communication, science policy, government, law or other fields. To ensure they are equipped to play important roles in these professions, we aim to shift the focus of NIGMS training programs to place more emphasis on broad-based skills that facilitate success in a range of occupations. Examples of such transferrable skills include analytical thinking, data analysis, clear writing, oral presentation skills, project management, the ability to work effectively in diverse teams,

**'Not all trainees choose an academic path today, nor should they. In an increasingly technical world, a variety of professions benefit from well-trained scientists who address critical societal needs. Many trainees possess the skills and passion to contribute their scientific expertise to the worlds of business, policy, teaching or writing.'**

**– *Investing in the Future*: National Institute of General Medical Sciences Strategic Plan for Biomedical and Behavioral Research Training 2011: IDeA Networks of Biomedical Research Excellence**

and character traits such as creativity, curiosity and resilience. NIGMS promotes the use of individual development plans to help trainees plan for their future careers. The Institute also encourages efforts by scientific societies, institutions and mentors to make students aware of the range of professions that can benefit from a scientific perspective and honed research skills. In other words, by providing rigorous intellectual experiences, cultivating transferrable skills and encouraging self-awareness, NIGMS training programs are preparing trainees to make valuable contributions not only in academia, but also in boardrooms, classrooms and courtrooms around the nation.

**Finally, what does NIGMS do to ensure that colleges and universities monitor, measure and continuously improve the quality of their training efforts for students and postdocs?**

We use a variety of methods to evaluate the success of our training efforts. We fund training grants for a limited time (usually five years). Each year, the director of the training program submits a progress report that describes the research and professional activities of his/her students. In addition, many programs require an annual evaluation to assess how each training grant is contributing to an overarching goal – say, increasing the number of students from underrepresented groups who complete a PhD degree. Some programs, such as the IDeA Networks of Biomedical Research Excellence require an external advisory committee and an external evaluator to regularly monitor and assess success of the program.

To continue the training program after the initial grant period, the director must reapply for funding. This re-application process includes a rigorous review by a panel of experts, including experienced scientific mentors and well-regarded researchers. Periodically, reports on long-term evaluations of specific training programs are issued by the NIGMS Office of Program Planning, Analysis, and Evaluation (see examples at https://www.nigms.nih.gov/about/opae/Pages/reports.aspx) and the National Academy of Sciences (https://www.nap.edu/collection/43/higher-education and https://www.nap.edu/read/18384/chapter/1).

As I mentioned above, NIGMS is also actively engaged in improving and modernising graduate education in the biomedical sciences.

**www.nigms.nih.gov**