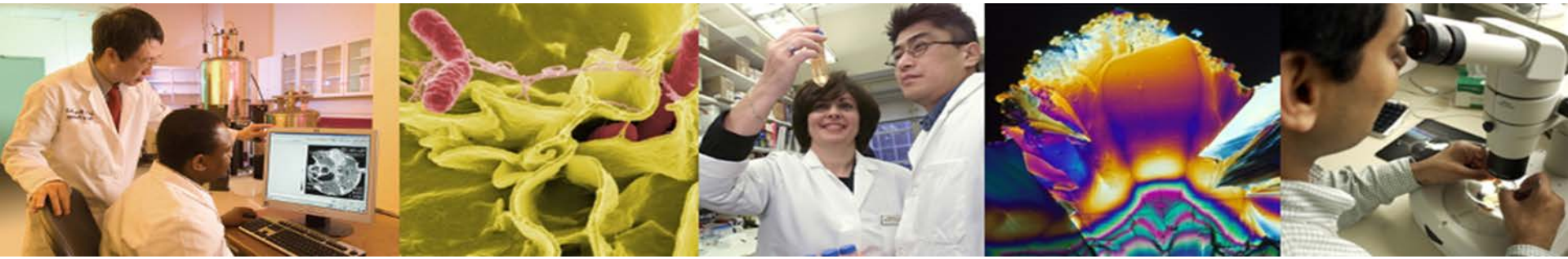
ATTACHMENT 8

SMRB STEM Charge

December 18, 2013



Lawrence A. Tabak, DDS, PhD

Principal Deputy Director

Department of Health and Human Services

NIH National Institutes of Health

Science, Technology, Engineering, and Math (STEM)

- Introduction and Challenges
- National Effort to Coordinate STEM Programs
- NIH STEM Programs
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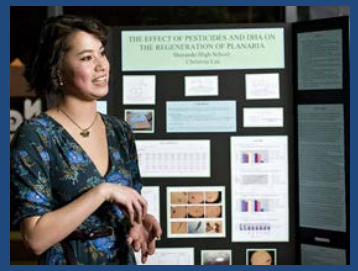
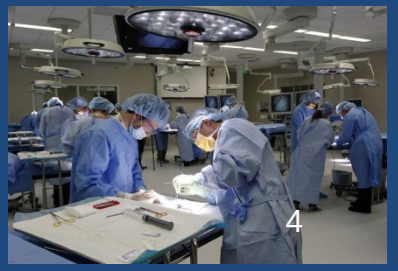
Science, Technology, Engineering, and Mathematics (STEM)

- STEM typically includes educational activities across all grade levels—from pre-school to post-doctorate—in both formal and informal settings
- Inventories of STEM programs are complex because no precise definition of what constitutes a STEM education program or activity exists
- U.S. agencies with STEM programs define the fields encompassed by STEM differently. For example:
  - NSF includes psychology and social sciences (e.g., political science and economics)
  - DHS only include "core" sciences (e.g., physics, chemistry, and math) and engineering



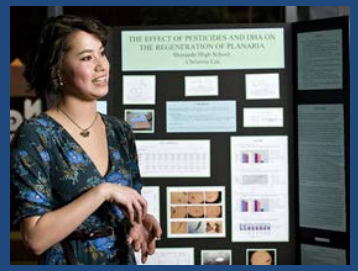




Science, Technology, Engineering, and Mathematics (STEM)

- Federal interest in science and technology literacy dates back to George Washington, but the launch of the Sputnik satellite in 1957 catapulted STEM to the forefront of U.S. education policy
- More recent U.S. concerns about STEM focus on the essential role that a STEM-educated and STEM-trained workforce plays in the competitive global economy
- Testing indicates that U.S. students are being outperformed by many other countries in STEM





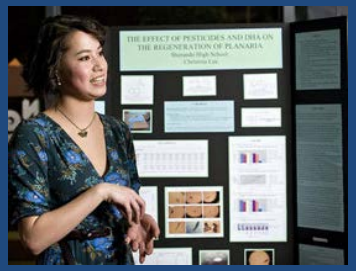
U.S. Students Lag Globally in STEM

- In 2012, the Programme for International Student Assessment (PISA) conducted an assessment of 15 year olds in reading, math, and science in 65 countries and economies
- Among the 34 Organization for Economic Co-operation and Development (OECD) countries, the U.S. performed below average in math and is ranked approximately 26th
- U.S. performance in reading and science was about average among OECD countries
- While the U.S. spends far more per student than most countries, this does not translate to better performance
- Despite investments of $3 billion per year in STEM education, PISA trend data show no significant changes in performance over time

STEM Investment in Other Countries

- Other countries are investing in STEM programs to reinforce the pipeline to train a strong biomedical workforce
- For example, Singapore focuses its support on training individuals to prepare them for careers in industry or to work in hospitals
  - The government also provides support to schools to encourage young people (from the youngest ages) to go into science
- The UK houses STEM teaching and learning resources in the National STEM Centre to provide teachers of STEM subjects with support materials. The STEM Centre also works with business, industry, charitable organizations, and professional societies to facilitate collaboration and promotion of STEM career awareness





U.S. Students Lag Globally in STEM: Impacts on the Biomedical Workforce

- Failure to foster a strong foundation in STEM education among U.S. students will have ripple effects on the biomedical workforce
- A steady stream of students entering science education tracks at a young age is essential to feeding the pipeline with individuals inclined to pursue careers in biomedical science
- Strong, evidence-based STEM programs at all points along the career path is vital for training a strong biomedical workforce
- Without a strong biomedical workforce, NIH will be unable to fulfill its mission and U.S. global competitiveness will falter





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National Effort to Coordinate STEM Programs: Committee on STEM Education (CoSTEM)

- CoSTEM was established in 2010 by the National Science and Technology Council to coordinate Federal STEM programs and activities
- CoSTEM consists of a wide spectrum of members from Federal departments, agencies, councils, and offices
- Functions:
  1. Ensure effectiveness of STEM education activities and programs
  2. Coordinate STEM education activities and programs with the Office of Management and Budget
  3. Develop and implement through the participating agencies a 5-year STEM education strategic plan, to be updated every 5 years

Federal Agencies with STEM Programs

WHAT IS NIH'S UNIQUE ROLE?

NIH Mission and Goals

- NIH's 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 is supported by the following goals:
  - to foster fundamental creative discoveries, innovative research strategies, and their applications as a basis for ultimately protecting and improving health;
  - **to develop, maintain, and renew scientific human and physical resources that will ensure the Nation's capability to prevent disease**
  - **to expand the knowledge base in medical and associated sciences in order to enhance the Nation's economic well-being and ensure a continued high return on the public investment in research**; and
  - to exemplify and promote the highest level of scientific integrity, public accountability, and social responsibility in the conduct of science.

Biomedical Workforce Pipeline

- Growing concerns about waning interest in science among young people
- Long training times and relatively low early-career salaries when compared to other scientific disciplines and professional careers may make the biomedical research career less attractive to young people
- Launching a traditional, independent, academic research career is increasingly difficult
- Current training programs do little to prepare people for anything besides an academic research career, despite clear evidence that a declining percentage of graduates find such positions in the future

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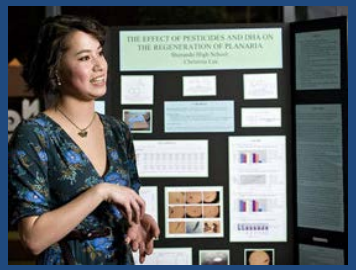
NIH STEM Programs

- NIH is uniquely responsible for training and retaining the biomedical research workforce
- STEM education is an important element in both attracting people to, and preparing people for, careers in biomedical research
- It is also important to the mission of NIH that the general public is scientifically literate
- The U.S. government is grappling with how best to improve STEM education programs and the pipeline, and NIH must identify its role given its unique mission to support and conduct biomedical research

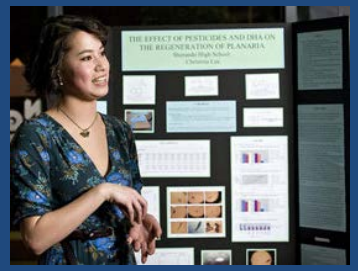




Examples of NIH STEM Efforts

- Science Education Partnership Awards (SEPA) - OD
  - Development and evaluation of innovative research education programs to improve pre-K-12 understanding of biomedical research and provide insights into biomedical research career opportunities
  - NIH will present a new concept clearance about SEPA to the Council of Councils early in 2014 and obtain their input on best ways to enhance SEPA
  - We anticipate issuing a new funding opportunity for FY 2015 SEPA programs

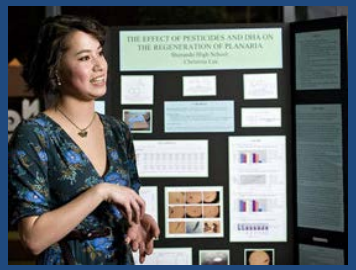




Examples of NIH STEM Efforts *(cont.)*

- NIH Summer Research Experience Programs
  - Provides high quality research experiences for college students and for science teachers during the summer academic break
  - Encourages young students to consider careers in science, gain valuable research experience to prepare for graduate school
  - Aids science teachers in effectively communicating the nature of the scientific process to their students





Examples of NIH STEM Efforts *(cont.)*

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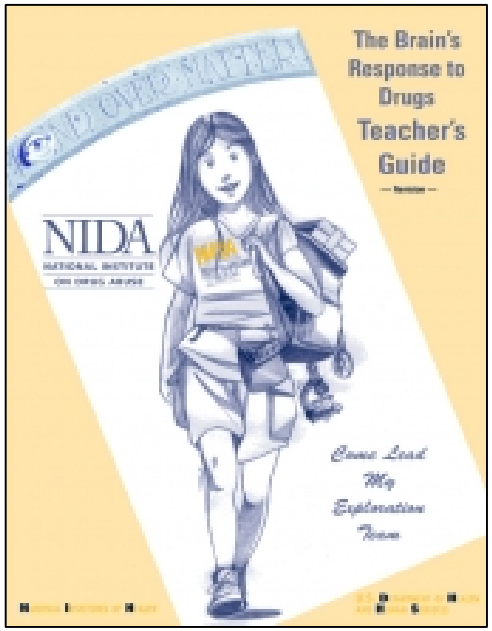
National Institute on Drug Abuse
The Science of Drug Abuse & Addiction

NIDA has developed "Mind Over Matter" booklets that follow the scientific research activities of a young scientist, Sara Bellum. Teens learn about the brain's complex responses to drugs, including cocaine, hallucinogens, inhalants, marijuana, nicotine, opiates, prescription drugs, and steroids.

Teacher's guide



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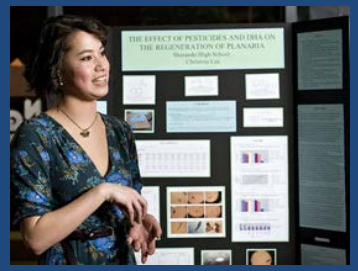
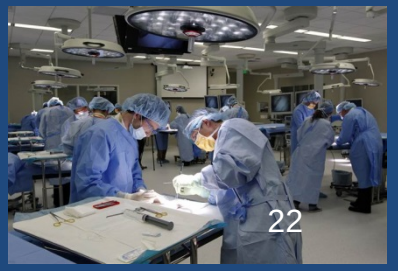
Charge to the SMRB Working Group on NIH STEM Programs

The SMRB is charged with recommending ways to optimize NIH's STEM programs and initiatives that both align with the NIH mission and ensure a continued pipeline of STEM-educated students and professionals.





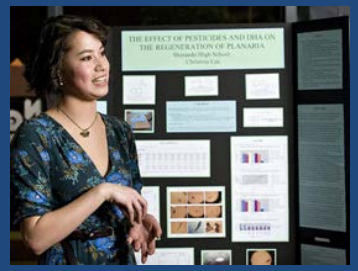


Charge to the SMRB Working Group on NIH STEM Programs *(cont.)*

In addressing this charge, the SMRB should:

- Study previous and current Federal STEM education efforts, particularly in the life sciences
- Review an inventory of NIH STEM activities
- Assess, at a high level, the effectiveness and impacts of NIH's STEM activities



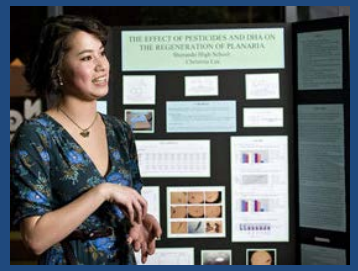


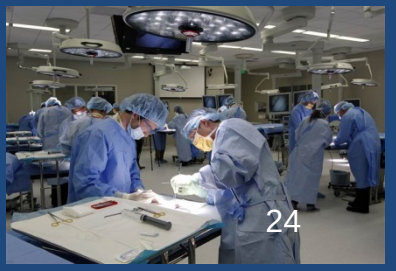
Charge to the SMRB Working Group on NIH STEM Programs *(cont.)*

In addressing this charge, the SMRB should:

- Define principles to guide future NIH efforts in evidence-based STEM programs and initiatives
- Identify attributes, activities, and components of effective STEM programs
- Determine how to augment the evidence base for identifying successful approaches for STEM programs and for monitoring and adjusting STEM activities










NIH...

Lawrence.Tabak@nih.gov

Turning Discovery Into Health