American Society for
Biochemistry and Molecular Biology
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August 10, 2022

Committee on Emerging Science, Technology and Innovation
National Academy of Medicine
National Academies for Science, Engineering and Medicine
500 5th St. NW
Washington D.C. 20001

RE: CESTI call for input

The American Society for Biochemistry and Molecular Biology is an international nonprofit scientific and educational organization that represents more than 12,000 students, researchers, educators and industry professionals. Founded in 1906 to advance the science of biochemistry and molecular biology, the society publishes three peer-reviewed journals, supports science education at all levels, and promotes the diversity of individuals entering the scientific workforce. The ASBMB strongly advocates for strengthening the science, technology, engineering and mathematics (STEM) workforce, supporting sustainable funding for the American research enterprise, and ensuring diversity, equity and inclusion in STEM.

The National Academy of Medicine created an ad hoc committee to develop a cross-sectoral governance framework for considering potential benefits and risks that emerging science, technology and innovation in health and medicine can bring to society. This Committee on Emerging Science, Technology and Innovation asked for input from the scientific community.

1. What are key gaps and needs in the current system of governance for emerging science, technology, and innovation in health and medicine? How do the gaps and needs lead to ethical or societal consequences such as inequities or unfairness?

We have identified the following gaps and needs: (1) limited funding for emerging issues in science, (2) unconscious bias against funding lesser-known labs and/or emerging research institutions, especially for high-reward, high-risk projects, and (3) the lack of a global focus on emerging science-related issues.

In response to the COVID-19 pandemic, the federal government created new, fluid funding opportunities to better understand the SARS-CoV-2 virus and continues to offer these awards to this day. These investments directly led to the quick development of a vaccine and other monumental findings about COVID-19. However, the pandemic also underscores how important it is to have funding set aside for unexpected and nascent science and health–related issues. The federal government must have mechanisms ready to be activated when issues emerge. This is a significant gap in the current system.

High-risk, high-reward research can yield transformative ideas and results. But funding mechanisms for less risky and less impactful research are far more abundant. In addition, those who make decisions about which high-risk, high-reward projects to fund often are biased in favor of well-known researchers and institutions, which ultimately narrows the pool of scientists working on emerging science and health–related issues. Diversity fosters excellence and innovation. Scientists who have varied life experiences provide different insights when faced with complex scientific questions. Addressing this

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flaw in the current system of governance will significantly increase the innovative potential of the American research enterprise.

Lastly, changes must be made to how science is taught in order to encourage innovative, cross-sectoral thinking, which will have a long-lasting positive impact on the bioeconomy. The traditional "pipeline" model of workforce development, in which a person follows a linear, predictable, path (K–12, undergraduate and graduate education) into an industry or academic position is no longer accurate for individuals who contribute to the American research enterprise. A modern model would capture the opportunity, variability and responsiveness of a contemporary STEM career. It would embrace the diversity and experiences of workers. It would contain a multitude of on-ramps for talent. Ultimately, such a model would lead to more innovation and collaboration.

2. In what ways does the current governance system succeed? What governance elements or strategies work well and should be preserved or built upon?

Firstly, as mentioned above, the federal government, and in particular the National Institutes of Health and the National Science Foundation, created successfully funding mechanisms for understanding the SARS-CoV-2 virus and the impact the virus had on people throughout the pandemic. The resulting findings improved our understanding of the virus and disease and aided in the development of treatments and vaccines. While this was successful, these funding mechanisms need continued investments so they can be available for future emerging scientific and health–related issues.

Secondly, the peer-review system used by most federal funding agencies ensures that researchers are held to excellent standards when designing and delivering research results. The peer-review system also contributes to the collaborative and innovative discourse of science. The peer-review system works very well and should be built on to ensure that the American research enterprise is held to the highest standard of research integrity.

3. What is the most critical stage to act, and who are the most impactful actors for enhancing governance of emerging S&T in health and medicine to promote societal benefits and align with ethical principles such as equity and justice?

Incorporating studies of short-term and long-term impact on society when researching and designing emerging technologies would promote societal benefits and align with ethical principles. As studies have described, the current innovative system focuses on early technology development and requires minimal consideration or research on the potential impact of the technology on society, which impedes policymaking. Once potential harmful effects have become clearer, it often is too late for policymakers to act. Incorporating societal impact studies and working across disciplines to understand the potential effects of technologies on everyday living would go a long way in ensuring equity.

4. What approaches or incentives are most useful for improving governance of emerging science, technology and innovation to mitigate potential risks, enhance societal benefits, and increase alignment of emerging technologies with ethical principles?

No response.

5. Are there practical ways to enhance coordination among potential actors and at various stages in the emerging S&T lifecycle?

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No response.

6. Which governance pathways, emerging developments, or topics should be the focus of the study report to enable it to have the greatest impact?

Science literacy and misinformation must be addressed, especially when it comes to creating new solutions to health and science–related issues. New technologies can help mitigate some of the most pressing challenges of the twenty-first century, but, if trust is not built between scientists, the federal government and the American public, then new technologies will not help. Improving science literacy, defined by the National Academies as "knowledge and understanding of scientific concepts and processes required for personal decision, participation in civic and cultural affairs and economic productivity" must be incorporated in science training and in K–12 education.

In addition, building science literacy in the digital world is a key and promising practice that will fight science disinformation. Building science literacy means teaching individuals how to access, understand and critically assess scientific information that they come across. And teaching scientists how to communicate and improve science literacy among the American public will build trust.

7. We welcome any other comments relevant to the study's task that you think the committee should consider, including relevant governance models, tools, practices, and resources of which the committee should be aware.

The committee must take into account the importance of investing in discovery research — also known as curiosity-driven research or basic research. Without reliable, sustainable funding for basic scientific research, the pillars of innovation are weak. Basic scientific research expands the knowledge base needed for breakthrough scientific progress, and without it there would be no science to apply for innovative treatments or therapies.