

Written Statement  
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Subcommittee on Commerce, Justice, Science and Related Agencies  
Appropriations Committee  
In Support of FY21 Appropriations for the National Science Foundation

Mr. Chairman and members of the Subcommittee, I am Barry Everitt, President of the Society for Neuroscience (SfN), and it is my honour to present this testimony on behalf of the Society in strong support of at least \$9 billion in funding for the National Science Foundation (NSF) for FY21. As both a researcher and a Professor in the Department of Psychology at Cambridge University, I understand the critical importance of federal funding for neuroscience research in the United States. The NSF supports fundamental research on the basic biology the brain and is a shining example of how governmental funding for research in the US leads the world and inspires related and collaborative research internationally.

My own research focuses on the neural and psychological basis of drug addiction and is dedicated to understanding the maladaptive engagement of the learning, memory, and motivational mechanisms that underlie compulsive drug use. Drug abuse and addiction are critical issues in my country as in yours, having devastating consequences at the individual, family, and society levels. My research group has made significant advances in showing that structural and neurochemical changes in the brain associated with behavioral impulsivity confer a major risk on the vulnerability to develop cocaine addiction. We have also demonstrated the neural circuit basis of the transition from recreational to the compulsive use of opioids, stimulants, and alcohol revealing commonalities as well as differences in the neural basis of addiction to these drugs. This understanding has opened the door to the development of novel pharmacological and psychological treatments for addiction that may promote and maintain abstinence from drug use. For example, we have shown that a novel opioid receptor antagonist greatly decreases opioid, cocaine, and alcohol use in animal models, as well as showing its efficacy and safety in experimental studies in humans. We have further revealed that reducing the impact of maladaptive drug memories can promote abstinence from drug use, as well as being effective in the treatment of anxiety disorders and post-traumatic stress disorder.

SfN believes strongly in the research continuum. Basic science at the National Science Foundation ultimately leads to clinical innovations, which lead to translational uses that positively impact the public's health. Basic science is the foundation upon which all health and other scientific advances are built. However, basic research depends on reliable, sustained investment from the federal government. The Society is grateful to the Congress for the support it has provided to NSF. Growing the NSF budget to \$9 billion is exactly the kind of robust effort that is needed. Your strong support of basic research will pay dividends for years to come.

The Society stands with organizations and institutions throughout the broad scientific research community in support of this funding. The increase would provide certainty to the field, advance scientific opportunity, allow for more training of the next generation of scientists, and further strengthen America's innovation economy.

Equally as important as providing a reliable increase in funding for scientific research is ensuring that appropriations are approved before the end of the fiscal year. Late 2018 into early 2019 was a low point for the scientific community. The 35-day shutdown of the NSF had

terrible, negative impacts on research and researchers. Continuing Resolutions (CRs) have significant consequences. But a total shutdown for scientists working in the field, and for the institutions in which they work, is incredibly disruptive and is counterproductive to discovery. Shutdowns have real, negative impacts on scientific understanding and the lives of those dependent on the sector, all while interrupting the positive benefits that research provides in this country and globally. Ensuring sustained and dependable resources is critical to advancing our understanding of the brain.

I would also like to express my and the Society's appreciation for your support of the Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative. While only one part of the research landscape in neuroscience, the BRAIN Initiative has been critical in promoting future discoveries across neuroscience and related scientific disciplines. Through the BRAIN Initiative, and NSF's Understanding the Brain (UtB) program, scientists are making progress in both substantive understanding of this complex biological system and in development of the tools and technologies that will further increase our knowledge.

The deeper our grasp of basic science, the more successful those focused on clinical and translational research will be. We use a wide range of experimental and animal models that are not used elsewhere in the research pipeline. These opportunities create discoveries – sometimes unexpected discoveries – that expand knowledge of biological processes, including at the molecular level. This level of discovery reveals new targets for research that may result in treatments for a spectrum of brain disorders that affect millions of people in the United States and beyond.

Some recent, exciting advancements include the following:

#### *Integrating computer and biological vision science*

The field of vision science, studied from either the perspective of the human brain or computer algorithms, is dedicated to understanding how to make sense of the objects and scenes in the world around us. While those studying human and computer vision have the same goals, the data they use for their research are often so different as to make collaboration and integration impossible. The NSF funded project BOLD5000 hopes to make it easier for the neuroscience of vision and computer vision to work together. The BOLD5000 database includes data for nearly 5,000 distinct images viewed by participants in a human functional magnetic resonance imaging (fMRI) study. These images overlap with those in datasets that are often used to train computer vision models, allowing for comparison between how computer models and human participants process the same scene. This public dataset is a critical step in better understanding and modeling how humans and ultimately computers view and interpret the world around us.

#### *Understanding how adolescents make decisions*

As children grow into adolescence, they gain the opportunity to make more independent decisions and, consequently, experience the repercussions of those choices. For example, studies have shown that when making decisions adolescents are more likely to rely on information they have learned through experience rather than through description. This may mean that if a teenager has made a risky decision, such as driving without a seatbelt, and not experienced a negative consequence, they are more likely to make future choices to buckle their seatbelt based on their experience rather than what they have been told about the dangers of driving without buckling up. The research also suggests that one of the most effective ways of teaching improved

decision-making to adolescents may be through simulations and other forms of experiential learning, which will help create new opportunities to help young adults be more careful before making risky choices. NSF funded researchers are exploring the behavioral reasoning that underlies adolescent decision-making. This research could lead to more effective methods for helping young adults make safe and considered choices, resulting in safer outcomes and higher quality of life.

### **Summary and Conclusion**

NSF funding is not only critical for the future of biomedical research and for training researchers at the bench but is also a key economic driver of science in the United States through funding universities and research organizations across the country. For this nation to remain a leader in biomedical research, Congress must continue to support the basic research that fuels discoveries as well as the economy.

As the leading scientific society dedicated to understanding the brain and the central nervous system, SfN hosts one of the largest annual scientific meetings and publishes two highly rated scientific journals where scientific discoveries are put on display. I have seen first-hand the tremendous progress we have made and the potential for brain research that lies ahead.

To reiterate, the Society for Neuroscience strongly supports the appropriation of at least \$9 billion for the National Science Foundation for FY21. Like the Subcommittee, we also strongly support the appropriation of this funding in a timely manner, one that avoids delays in approving new research grants or causes reductions in funding for already approved research funding.

Thank you for your strong and continued support and I look forward to working with you to ensure that research remains central to the economy and remains a priority of Congress. The trinity created among Congress, the NSF, and the scientific research community has created great benefits for the United States, its people, and those suffering from diseases and disorders. As an international researcher, I also see clearly the global impact of your funding of the NSF. On behalf of the Society for Neuroscience, I urge you to continue it.