

Written Statement
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Subcommittee on Labor, Health and Human Services, Education and Related Agencies
Appropriations Committee
In Support of FY21 Appropriations for the National Institutes of Health

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 \$44.7 billion, a \$3.0 billion increase over FY20, in funding for the National Institutes of Health (NIH) for FY21, including the release of the 21st Century Cures funding. As both a researcher and as 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.

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 (PTSD). The NIH, especially NIDA and NIAAA, supports the great majority of the global research on addiction and its treatment and this is a shining example of how governmental funding for research in the US leads the world and inspires related and collaborative research internationally on this major brain disorder.

SfN believes strongly in the research continuum: basic science leads to clinical innovations, which lead to translational uses that impact the public's health. Basic science is the foundation upon which all health advances are built. However, basic research depends on reliable, sustained funding from the federal government. SfN is very grateful to Congress for its appropriations and increases for NIH over the last five years. Growing the NIH budget over \$11 billion in that period is exactly the kind of sustained effort that is needed, and your continued support will pay dividends for years to come.

SfN stands with the more than 335 organizations and institutions in the biomedical research community supporting an increase in NIH funding of at least \$3.0 billion above the final FY20 level, including the release of the 21st Century Cures funding. This increase is consistent with those provided by this committee for the past few years and provides certainty to the field

of science, allowing for the exploitation of more scientific opportunity, more training of the next generation of scientists and more improvements in the public's health.

Equally as important as providing a reliable increase in funding for biomedical research is also ensuring that funding is approved before the end of the fiscal year. Your success in 2018 in completing appropriations prior to the start of the fiscal year was a tremendous benefit to research. Continuing Resolutions have significant consequences on research, including restricting NIH's ability to fund grants. For some of our members, this means waiting for a final decision to be made on funding before knowing if their perfectly scored grant would in fact be realized, or operating a lab with 90 percent of the awarded funding until appropriations are final. All of this has real and negative impacts on research and all of the positive benefits that research provides in this country. Meeting the example you set in 2018 would be another substantial benefit to science.

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 (see an example below). By including funding in 21st Century Cures—and note that it is only part of the funding that the BRAIN Initiative will require—Congress helped maintain the momentum of this endeavor. Note however, using those funds to supplant regular appropriations would be counterproductive. There is no substitute for robust, sustained, and predictable funding for NIH.

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, often at the molecular level. This level of discovery reveals new targets for research to treat all kinds of brain disorders that affect millions of people in the United States and beyond.

As the leading scientific society dealing with 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. Some recent, exciting advancements include the following:

Decoding speech from the brain

The BRAIN Initiative has been key for developing new technologies that may one day be used in the clinic. For patients suffering from a stroke and other neurological disorders, the loss of speech due to paralysis in the muscles in their face and neck can be devastating and leaves few ways to communicate quickly or easily. While there are devices that allow the use of head or eye movements to produce speech, these currently rely on choosing individual words or letters one at a time and are consequently very slow. Researchers hoping to close this communication gap recorded the brain activity of volunteers when speaking, including their muscle movements associated with speech. They were then able to use machine learning techniques to decode these brain signals, creating simulated movements of the vocal track that could be turned into synthesized speech. Testers asked to transcribe these sentences were able to accurately determine the phrases more than half of the time. While further refinement and testing is needed before this technology can be used with patients, it provides a path towards restoring speech those who have lost the ability.

Generating a library of new molecules

The discovery of new molecules and compounds is critical to developing new drugs to treat mental illnesses and other neurological disorders. To facilitate this, scientists funded by NIH have created an expanding virtual library of what will soon be 1 billion new molecules that can be tested for compatibility with specific receptors in the brain. Using this expansive library, researchers were able to model how each molecule would interact with the receptor they were interested in blocking and then choose the most likely candidates to test in the lab. Through this method, they were able to generate six new molecules that interacted specifically with a dopamine receptor type linked to schizophrenia, ADHD, Parkinson's disease, and other neurological conditions. The creation of this extensive, publicly available library will allow researchers around the world to expand their search for new treatments.

Summary and Conclusion

NIH 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 basic research that fuels discoveries as well as the economy.

To reiterate, the Society for Neuroscience strongly supports the appropriation of at least \$44.7 billion for the National Institutes of Health for FY21, including the release of the 21st Century Cures Act funding. 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 the Congress. The trinity created among Congress, the NIH, 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 NIH. On behalf of the Society for Neuroscience, I urge you to continue it.