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Executive Office of the President of the United States
to the
Subcommittee on Commerce, Justice, Science, and Related Agencies
of the
Committee on Appropriations
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Chairman Wolf, Ranking Member Fattah, and Members of the Committee, I am pleased to be here with you today to discuss the current state of Federal support for neuroscience and related research and our shared interest in improving the efficiency and effectiveness of Federal programs in this domain.

BACKGROUND

Neuroscience is the study of the brain and nervous system, which control every aspect of body and mind, including heart rate, memory, attention, and muscle movement, as well as pain sensation, decision-making, and sleep-wake cycles. Neuroscience research is essential to understand how people learn, move, speak, interact with the world through senses, and feel emotions. Understanding these complex functions requires detailed information about how the brain's 100 billion nerve cells are created, how they grow and connect through all stages of life, and how they interpret input from the external environment through nerve networks extending throughout the body.

The importance of neuroscience research cannot be overstated. Neurological disorders and stroke affect millions of Americans and cost hundreds of billions of dollars to treat. Today, 50-70 million Americans suffer from sleep-related neurological disorders alone. Advances in neuroscience research enable scientists and medical professionals to both improve fundamental understanding of how the brain and nervous system function and apply that knowledge to better explain, prevent, and treat diseases and disorders of the nervous system. Despite major advances in recent years, understanding the brain and its relationship to behavior remains one of the most important scientific challenges of our time. A broad and comprehensive approach to basic and applied neuroscience research is a critical foundation for advancing efforts to promote and protect brain health; optimize learning strategies and educational paradigms; and develop treatments for the devastating injuries, diseases, and disorders that afflict all age groups and most segments of our society.

The Obama Administration has placed a strong emphasis on ongoing and new neuroscience and related research efforts under the auspices of the White House Neuroscience Initiative. This Initiative encompasses neuroscience and mental health related activities directed by the White House or supported by the White House Office of Science and Technology Policy (OSTP) and seeks opportunities to build upon and coordinate across established efforts within Federal agencies. By identifying strategic opportunities to work across agencies and promote collaboration between the Federal Government and the private sector, the White House Neuroscience Initiative aims to increase the positive impact of Federal investments in neuroscience to improve health, learning, and other outcomes of national importance. The White House Neuroscience Initiative includes or supports such activities as the Interagency Working Group on Neuroscience, The Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative, The National Alzheimer's Project, and other programs described in the following sections.

INTERAGENCY WORKING GROUP ON NEUROSCIENCE

With the encouragement of Congress, including members of this Committee, the Interagency Working Group on Neuroscience (IWGN) was chartered by OSTP in June 2012 under the National Science and Technology Council's (NSTC) Committee on Science to "*coordinate activities in neuroscience research across the Federal government with a focus on the fundamental understanding of learning, brain development and plasticity, and brain health and recovery.*" Co-chaired by OSTP, the National Science Foundation, and the National Institutes of Health, the IWGN membership comprises more than twenty Federal departments and agencies with equities in neuroscience research and diverse missions that include funding, conducting, and utilizing research related to health, education, public safety, security, intelligence, defense, and more. The IWGN's mission is to enhance Federal efforts related to improving understanding of learning and cognition; elucidating the causes and impacts of neurological disorders and injuries; and developing appropriate resources, tools, interventions, and therapies to assist in research, treatment, and recovery.

Ongoing IWGN efforts, coordinated by OSTP, involve encouraging and supporting scientific research; sponsoring workshops to set forward-looking research agendas; developing and establishing common standards and guidelines; and sharing data and information. Beginning in fall 2012, the IWGN examined the landscape of basic and applied Federal research activities and investments related to neuroscience. The IWGN's analyses and deliberations have resulted in a set of recommendations for accelerating progress in neuroscience through enhanced interagency coordination. The IWGN recently released a report identifying challenges and proposing recommendations in each of five areas of research, policy, and communication: understanding and applying the brain's information processing capabilities; understanding and treating brain diseases, disorders, and trauma; understanding and optimizing interactions between the environment and the brain across the lifespan; translating research to practice; and improving communication and engaging the public. The report also highlights a subset of recommendations that can be implemented in the near term.

One of the recommendations stemming from this report is to improve communication and engagement with the public on the topic of neuroscience. A recent example of such outreach is "Super Neuroscience Saturday," an event that was co-sponsored by OSTP, the Smithsonian Institution, the American Association for the Advancement of Science (AAAS) Science & Technology Policy Fellowships' Neuropolicy Affinity Group, and the Society for Neuroscience Washington, DC, Metro Area Chapter in November 2013. Super Neuroscience Saturday included a full day of educational activities meant to inspire DC area students about the promise and potential of neuroscience, hosted in partnership with the National Museum of Natural History, as well as an evening of public lectures and discussion with leading experts meant to expand awareness of neuroscience issues, held at AAAS.

THE BRAIN INITIATIVE

On April 2, 2013, President Obama announced The BRAIN Initiative, a Grand Challenge designed to revolutionize our understanding of the human brain. OSTP coordinated the development of this effort with Federal agencies and philanthropic and research stakeholders. Under this initiative, Federal agencies including the Defense Advanced Research Projects Agency (DARPA), the National Institutes of Health (NIH), the National Science Foundation (NSF), and more recently, the Food and Drug Administration (FDA) support the development and application of innovative new technologies that can create a dynamic understanding of brain function and its relationship to behavior. When launching the Initiative, President Obama challenged the participants to give "scientists the tools they need to get a dynamic picture of the brain in action and better understand how we think and how we learn and how we remember." The

BRAIN Initiative ultimately aims to generate new ways to treat, cure, and even prevent brain disorders, such as Alzheimer's disease, epilepsy, and traumatic brain injury.

Recently, DARPA, NIH, and NSF have all announced significant new awards and solicitations related to The BRAIN Initiative. In December, the NIH released new solicitations that will provide \$40 million in research funding to advance the goals of The BRAIN Initiative, including funding to generate an inventory of the different cell types in the brain; develop new tools to analyze the complex circuits responsible for brain function; develop new approaches to record the activity of large numbers of neurons in any location in the brain and improve existing technologies for widespread adoption of these techniques; understand large-scale neural circuits by integrating experimental, analytical, and theoretical approaches; and develop the next generation of non-invasive imaging technologies. The research breakthroughs and technologies developed through these efforts have the potential to profoundly improve the lives of the millions Americans suffering from neurological disorders.

In addition, DARPA is supporting the development of technologies that will improve the understanding and treatment of neuropsychological illness for American veterans and service members through more precise neural stimulation therapies. The agency has also launched a new program to understand how neural stimulation could enable recovery of memory following brain injury.

NSF has announced its intent to support The BRAIN Initiative across a broad range of scientific disciplines, from psychology through engineering. For example, NSF recently awarded \$25 million to the Center for Brains, Minds and Machines based at the Massachusetts Institute of Technology and Harvard University and partnering with many other institutions around the country. This Center seeks to advance understanding of human intelligence and develop truly intelligent machines through interdisciplinary collaborations between researchers in computer science, math, statistics, robotics, neuroscience, and cognitive science.

Given The BRAIN Initiative's ambitious goals, President Obama has called for The BRAIN Initiative to be an "all hands on deck" effort involving the Federal Government, companies, health systems, patient advocacy organizations, philanthropists, state governments, research universities, private research institutes, and scientific societies. For example, President Obama has highlighted the investments being made by foundations and private research organizations such as the Allen Institute for Brain Science, the Howard Hughes Medical Institute, and the Kavli Foundation.

Later this year, the White House plans to hold an event to highlight public and private commitments that respond to the President's call to action. Examples of the kinds of commitments that advance The BRAIN Initiative include: support for basic and translational research and shared facilities at universities and private research institutes; efforts by patient advocacy organizations to accelerate the development of diagnostics, treatments, and cures; information technology infrastructure that improves researchers' abilities to store, share, visualize, and analyze the huge volumes of data that The BRAIN Initiative will generate; pre-competitive collaborations involving industry, such as the recently announced Accelerating Medicines Partnership between NIH, 10 leading pharmaceutical companies, and several non-profit disease foundations; education and training programs to prepare the next generation of scientists, engineers and entrepreneurs; regional "clusters" to accelerate economic growth, job creation, and innovation in neurotechnology-related industries; and well-designed incentive prizes.

OTHER FEDERAL ACTIVITIES

National Alzheimer's Project. An increasing number of our Nation's elders and their families are faced with the burden and tragedy of disorders such as Alzheimer's disease, resulting in profound societal and economic impacts. A 2010 Alzheimer's Association report projected that delaying the onset of

Alzheimer's disease by just five years could save \$50 billion in annual U.S. health care costs. In order to confront these challenges, on January 4, 2011, President Obama signed into law the National Alzheimer's Project Act, requiring the Secretary of the U.S. Department of Health and Human Services to establish the National Alzheimer's Project. This Project will create and maintain an integrated national plan to overcome Alzheimer's disease; coordinate Alzheimer's disease research and services across all Federal agencies; accelerate the development of treatments that would prevent, halt, or reverse the course of Alzheimer's disease; improve early diagnosis and coordination of care and treatment of Alzheimer's disease; improve outcomes for ethnic and racial minority populations that are at higher risk for Alzheimer's disease; and coordinate with international bodies to fight Alzheimer's and other neurodegenerative diseases globally.

Improving Mental Health Prevention and Treatment Services. The President's FY 2014 budget request included approximately \$2.3 billion in mental health research funded by several NIH Institutes and Centers. The Administration is pleased that Congress endorsed the direction this budget proposed to fund research that aims to transform the understanding and treatment of mental illnesses through basic and clinical research, paving the way for prevention, recovery, and cure. For example, the budget proposed to support The BRAIN Initiative's efforts to develop technology to explore how the brain processes information and explore the complex linkages between brain function and behavior. This knowledge could lead to the creation of new tools and techniques for treating conditions such as depression and schizophrenia.

Executive Order on Access to Mental Health Services. To improve prevention, diagnosis, and treatment of mental health conditions affecting veterans, service members, and military families, the President issued an Executive Order in 2012 which, in part, directed Federal agencies to develop a coordinated National Research Action Plan. The Departments of Defense, Veterans Affairs, Health and Human Services, and Education have responded to the President's call with a wide-reaching plan to improve scientific understanding; provide effective treatment; and reduce occurrences of Post-Traumatic Stress Disorder (PTSD), Traumatic Brain Injury (TBI), various co-occurring conditions, and suicide. The plan builds on substantial work already underway in Federal agencies and provides a framework for improved coordination both across government and with scientists from the academic and private sectors to share information, brainstorm innovations, and accelerate productive scientific outcomes, in particular to enhance the detection, prevention, and treatment of PTSD, suicide, and TBI.

INTERNATIONAL COLLABORATION

OSTP and the IWGN have worked to identify concrete opportunities to leverage and accelerate the impact of Federal investments in neuroscience to improve health, learning, and other outcomes of national importance. Some of these opportunities have also been recognized by international partners, resulting in both collaborative and complementary efforts to advance neuroscience research.

For example, in 2013, the European Commission launched the Human Brain Project to use advanced supercomputers to simulate the human brain in order to better understand how it functions. Leveraging the Commission's investment in this activity with complementary efforts through The BRAIN Initiative to understand brain function will significantly advance the frontiers of neuroscience.

In December, 2013, the United Kingdom hosted the G8 nations for a Dementia Summit to build the foundation for an international effort to approach the problem of dementia. OSTP represented the White House at this summit, which set ambitious goals for identifying the causes of and pursuing therapies for dementia through shared research plans and encouraging open access to dementia-related research data and results. In the coming years, the United States and France will both host events building on this meeting's outcomes, including a summit to be hosted by NIH in February 2015.

The Binational Industrial Research and Development Foundation (BIRD), a U.S.-Israeli foundation to stimulate cooperation between the U.S. and Israeli private-sector high-tech industries, has recently expressed interest in pursuing collaborative activities in neuroscience. This long-standing, successful foundation co-sponsored a 2012 Neurotechnology and Neuroscience Conference with the U.S.-Israel Science and Technology Foundation and the U.S.-Israel Binational Science Foundation to bring together American and Israeli experts in neuroscience to discuss recent advances in the understanding of brain function and brain disorders. In addition, through the Collaborative Research in Computational Neuroscience (CRCNS) program, NSF, NIH, the German Federal Ministry of Education and Research (Bundesministerium für Bildung und Forschung), the French National Research Agency (Agence Nationale de la Recherche), and the United States-Israel Binational Science Foundation support collaborative activities that will advance the understanding of nervous system structure and function, mechanisms underlying nervous system disorders, and computational strategies used by the nervous system.

Finally, the European Union Joint Programme – Neurodegenerative Disease Research (JPND) is the largest global research initiative aimed at tackling the challenge of neurodegenerative diseases. The NSTC Interagency Working Group on Neuroscience will coordinate discussions with the JPND on common research goals that would benefit from joint action among countries.

CONCLUSION

In summary, this Administration and OSTP are actively working to coordinate a wide range of Federal activities related to neuroscience research. The potential of these endeavors to help advance our fundamental understanding of the human brain and behavior, and to improve the prevention, treatment, and cure of neurological and related diseases cannot be overstated; the human and economic costs of these challenges are substantial and continue to grow. I thank the Committee for its continued support and interest in this issue and I look forward to continuing to work with you. I will be pleased to take any questions that the Members may have.