Is Obama's plan to map the human brain this generation's equivalent to landing a man on the moon?

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Will creating a map of the human brain enable scientists to develop new treatments for debilitating neurological diseases like Alzheimer's, Parkinson's and autism?

President John F. Kennedy's mission in 1960 was to land a man on the moon. President Bill Clinton made cracking the human genome one of his top priorities. Now, President Barack Obama says a detailed map of the human brain is necessary to understand how it works and what needs to be done when it's not working properly. The president is expected to unveil his plans for an estimated $3 billion, decade-long commitment to

the Brain Activity Map project next month in his 2014 budget proposal.

Rutgers Today talked with Rutgers University behavioral neuroscientist Timothy Otto, professor and director of the Behavioral and Systems Neuroscience program in the Department of Psychology, about what we know about the brain, how much we still need to discover and if spending billions of dollars in research will enable scientists to develop new treatments for debilitating neurological diseases like Alzheimer's, Parkinson's and autism.

Rutgers Today: How important is this initiative?

Otto: The ultimate goal of this initiative is to provide a detailed "map" of the ways in which our 100 billion brain cells are interconnected and how activity within networks of brain cells gives rise to thoughts, feelings, actions, perceptions, memories and ultimately, consciousness. Clearly these are incredibly important questions of fundamental interest to scientists and nonscientists alike. Equally important, is the flip side: fully understanding normal brain function will reveal the underlying causes of many forms of brain dysfunction. This initiative has tremendous potential not only for discovering and fully understanding the complexities of the human brain, but also for developing treatment strategies directed toward alleviating the debilitating effects of nervous system disorders.

How much do we know about the workings of the brain?

Over the past century we have developed a fairly rich understanding of how individual brain cells work, how pairs of brain cells communicate with one another and how some disease states are associated with disorders of specific clusters of brain cells. Despite these advances,

however, we really know very little about how networks of brain cells in different regions of the brain interact and how these interactions ultimately provide us with the complex psychological phenomena we all take for granted—seeing and recognizing objects and other people, forming lasting memories, planning and executing complicated movements and developing novel solutions to difficult problems. So, while we've made some progress, we've only begun to scratch the surface of a very deep set of important questions that have widespread implications for understanding both how the healthy brain works and why it sometimes doesn't work as well as it should.

Why is this scientific challenge important?

During the mid 1990s through 2003, over $3 billion was invested in the Human Genome Project. The incredibly complex code of the human genome was essentially cracked during that 10year span, and it had an enormous impact on enhancing human health, technological development, science education and the global economy. Similar outcomes are a very likely result of Mr. Obama's brain mapping initiative.

Will it help us find cures to diseases like Alzheimer's, Parkinson's and autism?

To the best of my knowledge the primary objective of the brain mapping initiative will be to generate a detailed and complete map of the connections both within and between brain regions in the healthy brain. However, as I mentioned earlier, knowing how the healthy brain works is an important step in understanding both why it is compromised in some individuals and how to develop treatments for a variety of brain disorders, including Alzheimer's, Parkinson's, and autism.

Why should American taxpayers agree to allocate billions of dollars for this project?

The eventual health benefits are obvious – as the population ages, the number of people afflicted with age-related neurobiological disorders, including Alzheimer's disease, is expected to skyrocket. Similarly, we are only beginning to realize and appreciate the extent of autism-spectrum disorders and other brain disorders that have dramatic impact on afflicted individuals and their families. So, to the extent that this project addresses the underlying neurobiological causes of brain disorders and their treatment, it will have enormous impact on the health of our nation. A second and really quite important reason to support this project is non-scientific, but rather economic. The best estimates suggest that the $3.8 billion invested in the Human Genome project in the 1990s had a net economic impact exceeding $800 billion, including the creation of jobs and development of technology. So from several important perspectives, this project deserves the strongest possible support. There really is no downside.

What happens if the U.S. government doesn't fund this brain mapping initiative?

If the United States doesn't do this now, another country will. While contemporary science, in general, and neuroscience research, in particular, is a collaborative enterprise in which scientists in the U.S. often work directly with scientists across the globe, the reality is that the overwhelming majority of the $3 billion initiative will likely be invested to support scientific research within the U.S. The implications of this investment are widespread and go far beyond the primary goal of the initiative. This investment will enhance the development of research infrastructure, dramatically improve science education and produce technological advances that we cannot even think of yet, all of which are

tremendously important and exciting.

Provided by Rutgers University