
Laura Luongo

Straight talk with… Miyoung Chun

It was a single tweet. In February, after US President Barack Obama made a subtle nod to a new neuroscience project in his annual State of the Union address, Francis Collins, director of the country's National Institutes of Health (NIH), posted on the @NIHDirector Twitter feed: "Obama mentions the #NIH Brain Activity Map in #SOTU." Instantly, scientists were buzzing with rumors that the Brain Activity Map could be the next moon shot, with a budget and timeline similar to the Human Genome Project.

The brain map began as a brief white paper and has grown into a large—and still largely undefined—collaboration of several government agencies, nonprofit foundations and private companies. As the stakeholders describe in a commentary published last month (*Science* **339**, 1284–1285, 2013), the goal of the initiative is to understand how thousands of neurons work in concert to control behavior and trigger disease. Miyoung Chun, vice president for science programs at The Kavli Foundation in Oxnard, California, has been developing the project since the beginning and is the self-described "glue" between its many diverse stakeholders. Chun spoke with **Virginia Hughes** about the evolution of the project and what it might mean for biomedicine.

Were you surprised that President Obama mentioned the Brain Activity Map during his speech?

Absolutely. I had no idea that he was going to mention the project. All of us scientists who have been working so hard and talking about this issue for the past 18 months, we were writing emails to each other, we were calling each other, shouting, jumping. We were like, "Wow, he knows about this project? That's amazing!"

How did the whole thing get started?

We had a workshop back in September 2011 at the Kavli Royal Society International Centre [in Chicheley, UK]. It was hosted by three different organizations: the Allen Institute for Brain Science, the Gatsby Charitable Foundation and the Kavli Foundation. We thought that we would gather the best scientists in neuroscience and the best scientists in nanoscience and see what they can come up with. At the very end of the meeting, the scientists developed the idea of measuring brain activity.

Don't we already measure brain activity?

We know how to measure at the single-cell level and the surrounding cells, up to say 100 to 200 neurons. We also know how to look at the whole brain through processes like fMRI [functional magnetic resonance imaging], where we get patches of activity of anywhere from 30,000 neurons to a million neurons. So, we understand how brain activity works at the micro and macro levels, but we don't know the in-between. It was clear from that very first day when the idea first came up that this was an unmet need.

What happened after the meeting?

We wrote a white paper and sent it out to the White House Office of Science and Technology Policy (OSTP). We did that in October [2011], and when I went to the Society for Neuroscience meeting that year, in November, I got in touch with Story Landis [director of the US National Institute of Neurological Disorders and Stroke], and I learned that she had actually received that white paper from OSTP. The OSTP had actually circulated our white paper.

What is the main thing you hope will come out of this effort?

There's clearly an issue with tool development—and not just amending current, existing tools, although that will be important in the initial stages. In the long run, one of the very important points would be to come up with revolutionary new tools that will measure brain activity in a completely different way than what we know now.

Some media accounts about the Brain Activity Map have cited funding estimates of several billions of dollars over a decade. Have any budget specifics been worked out?

The answer to that is no. It shouldn't be us making such judgments, anyway. It should be funding agencies that will realize the scope of the project and then come up with the budget accordingly.

What about a timeline?

We believe that the Brain Activity Map project, if it gets to be initiated, will be not five-year project. It will be a decade at a minimum, if not longer.

How would this kind of map contribute to our understanding and treatment of disease?

One should be absolutely careful not to overpromise, but there are a few outcomes of this initiative, what I think of as low-hanging fruit, that would be directly important for the biomedical community. For example, in the case of the prosthetics field, John Donoghue [of Brown University in Providence, Rhode Island] has this patient who had a stroke 15 years ago. She is completely paralyzed from the neck down, and, with a brain implant stimulating about 100 neurons, she can now, just by thinking, move a robotic arm and drink her morning coffee. That's working with 100 neurons. Imagine what she might be able to do if we understood the activities of maybe 10,000 neurons. In the long term, perhaps there are other hard diseases that [the Brain Activity Map] could tackle, like autism, depression and many behavioral diseases that we have no solutions for. We have so much to understand and so much to do to improve our capacity to work with brain disorders.