The Brainstorm Project: A Collaborative Approach to Facilitating the Neuroethics of Bioengineered Brain Modeling Research

Research scientists around the world are now able to investigate the structural, cellular, and developmental intricacies of the human brain using bioengineered stem-cell-based models called organoids. But the ethics to help guide researchers and regulators lags behind the technological capability to "grow" brain tissue in a petri dish.

That is about to change as a group of bioethicists and scientists chart the unexplored territory of neuroethics, which is quickly emerging from the ability to bioengineer models of the brain. The study, called "The Brainstorm Project," will be led by Insoo Hyun, Ph.D., professor of bioethics at Case Western Reserve University School of Medicine, jointly with Jeantine Lunshof, PhD, Philosopher/Ethicist at MIT Media Lab and Harvard Medical School. The project can be seen as a first step toward building a philosophical framework on which to base government policy and regulations.

Launched this September in a partnership of investigators from Case Western Reserve university, Massachusetts Institute of Technology (MIT), Harvard University and Stanford University, the two-year project is funded by a $569,410 grant from National Institutes of Health Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative.

The organoid researchers in the Brainstorm Project are at the cutting edge of this field and this project is a novel opportunity to track their studies in terms of the emerging ethical issues. They are among the world's scientific leaders in this new field of neuroscience and are eager to explore ethical dimensions of their work alongside bioethicists.

The core group of the Brainstorm Project consists of the co-Principal Investigators Hyun and Lunshof, together with co-investigator Aaron Goldenberg.

The bioethicists will interact weekly with scientists, including making laboratory visits to follow brain organoid experiments from the beginning of studies at the collaborating universities.

There are three major areas in current brain organoid research:

In the first area, bioengineers try to maintain and grow the brain models for extended periods—months or years. They experiment with artificial circulatory and vascular systems over time until the organoids reach further maturity."

The second area of research consists of making more accurate brain organoids that have all the relevant cell types found in the natural human brain.

The third area of investigation consists of performing signal readings to see how different brain regions function.

Workshops with the extended Brainstorm Working Group collaborators will take place in Cambridge, MA in year two of the project to explore findings in each of the three areas. The summary workshop will be held at Case Western Reserve, after which the team will send their report to NIH.

According to Hyun, close interaction between neuroscientists and bioethicists is something the BRAIN Initiative has wanted to accomplish. The approach now taken by Hyun and Lunshof—essentially developing a new field—is a focused effort to avoid the "silos," which are common in scientific fields.

The Brainstorm Project's ultimate goal is to develop greater awareness and understanding between scientists and ethicists and—beyond the duration of the project—to provide guidance for future management of ethical issues that may be unique to new areas of brain modeling research.

The collaborators in the extended Brainstorm Working Group are:
- George Church, PhD, Harvard Medical School
- John Aach, PhD, Harvard Medical School
- Paola Arlotta, PhD, Harvard University
- Segiu Pasca, MD, Stanford University
- Mark Skylar-Scott, PhD, Harvard University
- Alex Ng, PhD, California Institute of Technology
- Robert Truog, MD, Harvard Medical School
- Melissa Lopes, JD, Harvard University
- Christopher Thomas Scott, PhD, MLA, Baylor College of Medicine
- Henry Greely, JD, Stanford University

Adapted from a press release by Case Western Reserve University.