'Brain in a dish' models advance studies of neural development and disease

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Experimental advances using lab-grown brain organoids are helping to clarify how best to use them as a model system to understand human brain development and diseases. The findings were presented at Neuroscience 2019, the annual meeting of the Society for Neuroscience and the world's largest source of emerging news about brain science and health.

Brain organoids are self-organizing, three-dimensional tissues grown from human stem cells guided to become the cell types and structures found in the brain. These "brains in dishes" display many features of the developing human brain, making them a promising model system to study processes of early human brain development. Recent studies have begun to use brain organoids to model interactions between brain regions, circuit formation, and neurodevelopmental diseases, but it remains unclear how well brain organoids mirror the complexity of human brain development.

Today's new findings show that:

- Brain organoids reproducibly produce the rich diversity of cell types found in the human cerebral cortex, paving the way for modeling aspects of human cortical development and disease that have never been experimentally accessible outside the embryo (Paola Arlotta, the Broad Institute).
- Brain organoids that model early neural circuit development support a possible imbalance between excitation and inhibition in the brain as an underlying basis for autism (Michael Nestor, Hussman Institute for Autism).
- Brain organoids fail to reproduce some important features of the developing human cortex, which may limit their use for studying normal and disease-associated processes (Arnold Kriegstein, University of California, San Francisco).

"The advances presented today illustrate the exciting potential of using organoids to study brain processes in normal development and disease," said Hongjun Song, Ph.D., a professor at the University of Pennsylvania Perelman School of Medicine who studies neurogenesis and epigenetics. "However, we know they must be rigorously compared to the normally developing human brain to better understand their strengths and limitations."

More information: Related Neuroscience 2019 Presentation:
Presidential Special Lecture- Understanding Cortical Development and Disease: From Embryos to Brain Organoids
Sunday, Oct. 20, 5:15 - 6:30 p.m., Hall B

Provided by Society for Neuroscience