Docket #: S23-439

Brain Organoids For Modeling Neurodegenerative Diseases

Stanford scientists have developed an innovative 3D brain organoid culture system derived from adult neural stem cells to model neurodegenerative diseases like Alzheimer's and enable high-throughput drug screening. The method overcomes key limitations of current organoid models by providing efficient nutrient exchange, uniform 3D structure formation, and improved reproducibility and scalability for translational applications.

This technology utilizes a hanging droplet plate system with a hybrid biomaterial composite that mimics the biophysical properties of the brain tissue microenvironment. Additionally, the researchers have also characterized USP16, a novel Alzheimer's disease target found to underpin neural progenitor cell defects, contribute to inflammation and plaque pathology, and regulate stem cell aging and memory.

This combined approach of advanced organoid technology and novel target characterization represents a significant advancement in modeling neurodegenerative diseases, offering a more physiologically relevant platform for drug discovery and personalized medicine approach.

Stage of Development
Proof of concept - *in vitro* data

Applications

- Neurodegenerative diseases modeling
- High-throughput drug screening and organoid profiling
- Rapid single-cell resolution phenotyping and spatial mapping
- Developing personalized treatment for neurodegenerative diseases

Advantages

- Developing organoids from adult neural stem cells, not just pluripotent stem cells or embryonic stem cells
- Studying adult neurogenesis and key disease phenotypes
- Cost-effective and amenable to automated cell culture techniques
- "Scaffold-free" system allows for easy treatment with various drugs

Patents

- Published Application: 20260146231

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