First step toward model brain: turning iPSCs into working blood-brain barrier

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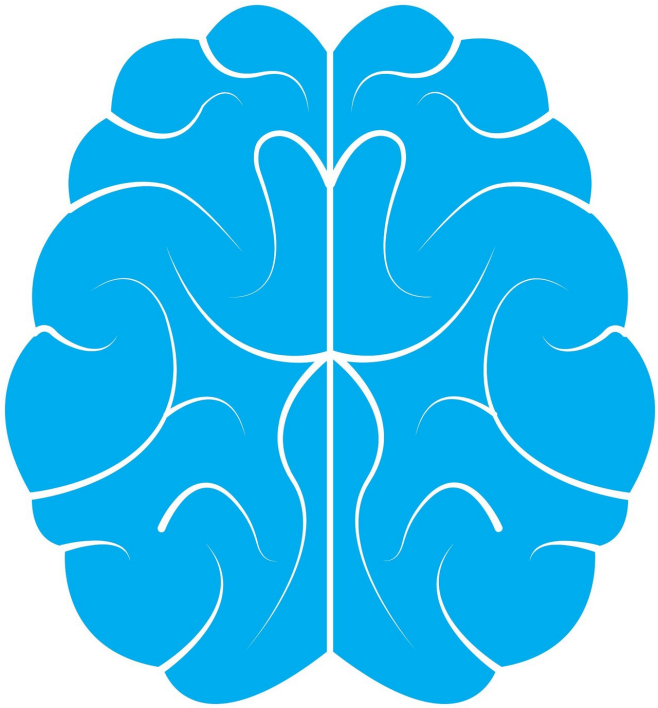

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Vanderbilt University engineering researchers took a major step toward building a "brain in a dish:" They cultured induced pluripotent stem cells into a successful three-dimensional blood-brain barrier model.

The future of drug testing and disease research lies in creating organoids, or models of human organs, to determine efficacy and potency of medications. Duplicating the endothelial barrier in brain organoids is critical, because the brain must be protected from substances in the blood. The brain endothelial barrier had previously been generated from induced pluripotent stem cells in a two-dimensional culture but not validated in three-dimensional, vein-like structures that are necessary to feed the organoids.

"Before, it was enough to develop drugs by doing an initial test in animals and then going to humans, but now we're realizing that method has its limitations," said Ethan Lippmann, assistant professor of chemical and biomolecular engineering. "These models are meant to complement all the other preclinical work."

Leon Bellan, assistant professor of mechanical engineering and the other senior author on the study, said the method could be superior even to two-dimensional organs-on-a-chip. Both professors have secondary appointments in biomedical engineering.

Their team's recent work was published Feb. 14 in *Stem Cell Reports*.

More information: Shannon L. Faley et al. iPSC-Derived Brain Endothelium Exhibits Stable, Long-Term Barrier Function in Perfused Hydrogel Scaffolds, *Stem Cell Reports* (2019). DOI: 10.1016/j.stemcr.2019.01.009

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