Researchers develop increasingly complex mini-brains

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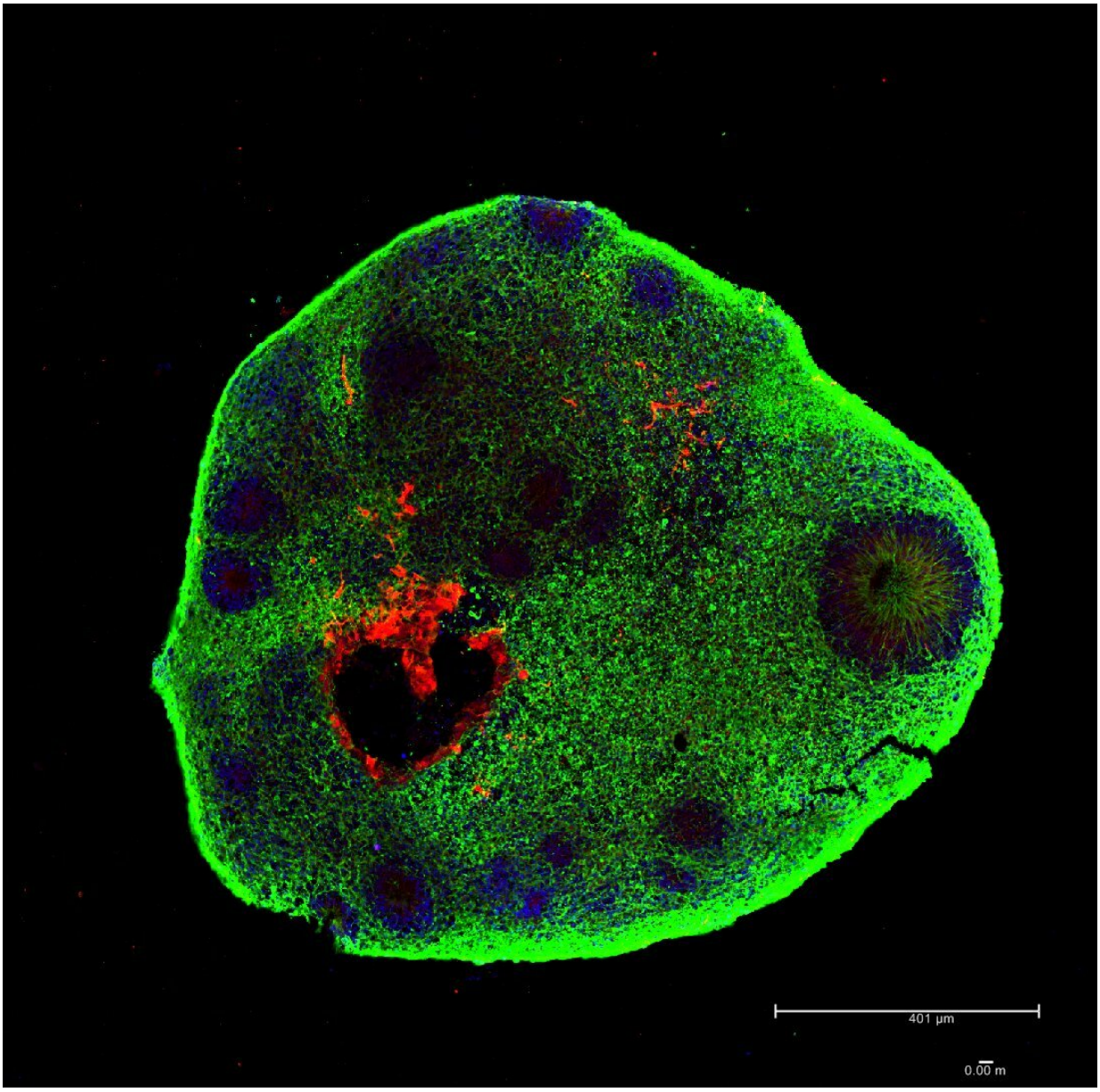

75 days old brain organoid with staining for neurons (green) and astrocytes (red). Credit: D'Or Institute for Research and Education.

Scientists of the D'Or Institute for Research and Education have improved the initial steps of a standard protocol and produced organoids displaying regionalized brain structures, including retinal pigmented cells. Their results are published in *BMC Developmental Biology*.

Human brain organoids are aggregates formed by nervous cells obtained from cell reprogramming. Via this technique, cells extracted from skin or urine of volunteers are transformed into stem cells and then into neurons and other nervous cell types. They are cultivated for weeks, until they start forming agglomerates that resemble an embryonic brain.

For the past few years, scientists have been trying to perfect this model in order to create increasingly complex organoids similar to those at later stages of development. Since 2016, in partnership with the Federal University of Rio de Janeiro (UFRJ), scientists from the D'Or Institute have cultivated human brain organoids to study neurological diseases and the effects of new drugs on the nervous system.

They put nerve cells in a nutrient-rich liquid, similar to the development environment of the human embryo. From there, the mini-brains develop in a self-regulated process. In other words, all researchers must do is make sure they have the right environment to develop.

Recently, the team lead by Stevens Rehen has been able to refine the environment in which the cells are maintained. "These organoids are a demonstration that it is possible to repeat in the laboratory increasingly advanced gradients of human brain development," says Rehen. "We developed a cost-effective suspension method on orbital steering plates

as an alternative for the cultivation of brain organoids with retinal pigmented cells."

More information: Livia Goto-Silva et al, Computational fluid dynamic analysis of physical forces playing a role in brain organoid cultures in two different multiplex platforms, *BMC Developmental Biology* (2019). DOI: 10.1186/s12861-019-0183-y

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