New company aims to broaden researchers' access to organoids

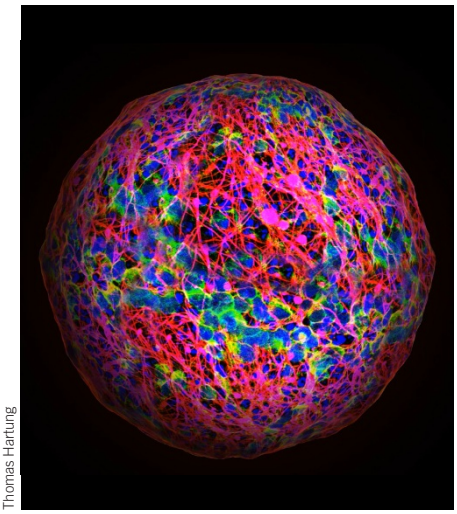
Ever since organoids were first developed a decade ago, researchers with the know-how to create these miniature, organ-like structures have also been the main people using them. That may soon change: as scientists in the US wait for government institutions to create organoid banks for research, at least one company is preparing to commercialize organoids for study.

At the American Association for the Advancement of Science's annual meeting in February, Thomas Hartung introduced Organome, a Baltimore-based company formed to mass-produce brain organoids for research. Hartung, director of Johns Hopkins University's Center for Alternatives to Animal Testing, also announced the development of a new brain-organoid model to be sold through the company. Not revealed at the meeting was that in addition to selling "mini-brains," Organome will help other organoid developers to commercialize their products, for profit or otherwise.

"That's why we call it Organome and not Brainome," Hartung says. "It's an app-store kind of platform," he added, referring to the application clearinghouses that companies such as Apple operate. Unlike other portfolio companies, which primarily serve as distributors, Organome will instead lend its expertise to researchers and help to validate and scale-up organoid models. The resulting "store" will offer a portfolio of organoids to scientists.

Hartung's brain organoid is not the first model ever to be developed, but he says that previous models have measured up to 5 millimeters across and taken several months to produce. These large models vary in size, he explains, with considerable differences in the number of different cells they contain. This variability is problematic for drug screening and disease modeling. Because they are thick 3D structures, standard tools such as microscopy cannot be used, Hartung says. By keeping the organoids as standardized as possible initially, scientists can avoid a need later on to make the structures consistent enough for mass testing by pharmaceutical companies. "When you have 100 substances to test, you don't want to spend a lot of time standardizing these structures," Hartung says.

Hartung has made strides in such quality control. "Ours is different because ours is the only standardized model." All Organome's organoids are roughly 350 micrometers across, and thus have roughly the same number of cells. These uniform organoids were grown in 10 weeks using a gyratory shaker: a machine that constantly shakes dishes of cells in a circular motion. For still unclear reasons, this movement molds the organoids into the same round shape and size. Furthermore, the organoids had the same cellular composition: roughly 40% myelinated axons, 20% astrocytes and 10% oligodendrocytes, ensuring similar samples for testing. And although he has not tested substances in his models and compared the results to substances tested in other models, "The need for standardization for testing is a general truth," Hartung says.



Thomas Hartung

Sphere for study: A brain organoid from Hartung's lab.

Commercial venture

A commercial platform for exchanging research materials is not a new concept. Boston's Kerafast emerged in 2010 to alleviate a problem involving access to rare and leftover chemical reagents. Within the organoid field, the Hubrecht Organoid Technology (HUB) in Utrecht, the Netherlands, is a nonprofit biobank that makes organoids created from adult stem cells available to other researchers for a cost. HUB also licenses its organoid-growth technology. Vancouver, British Columbia-based StemCell Technologies is one company that has licensed HUB's technology to make IntestiCult, a kit containing growth medium to generate mouse intestinal organoids. But no company, to Hartung's knowledge, has set out to guide other scientists through the process of commercializing organoids.

"We're constantly frustrated by the lack of access to things generated in academic labs," says Elizabeth Iorns, co-founder of ScienceExchange, a website that enables scientists who lack equipment or expertise to outsource projects to labs with the proper materials.

Iorns also thinks that Hartung's ability to deliver consistent products—given that his organoids are derived from induced pluripotent stem cells, which are difficult to standardize—is key: "What Thomas is doing is really great and will provide standardized materials for a lot of people."

"I haven't come across anything like this before," says James Wells, director of the Pluripotent Stem Cell Center at the Cincinnati Children's Hospital Medical Center, of Hartung's "app store" vision. Wells grows small intestine and stomach organoids and makes them available, at a highly subsidized price, to researchers at his institution. He has considered commercializing his model, he says, and expects to hear from Organome if it seeks to work with researchers such as him.

Whereas Hartung hopes to launch Organome's operations by September, issues of delivery and storage must still be ironed out. He has transported his brain organoids in warm media to others at Johns Hopkins, but his team is working out how to freeze organoids, so that the company doesn't have to constantly produce them. "We can freeze and even thaw them properly, but the electrical activity in the organoid is lost," Hartung says. "There'll be lots of bottles of champagne when we figure this out."

Organome's collaborator right now is Luxembourg-based tissue-engineering company Atera, which sells models of the human epidermis. Atera is also working with the Fraunhofer Institute for Interfacial Engineering and Biotechnology in Würzburg, Germany, to commercialize its portfolio of mini-organs. Organome will serve as the US base for these ventures, and Atera will serve as Organome's European counterpart.

Ultimately, Hartung wants to give researchers easy access to organoids. "It's important that we not lose 90% of brilliant ideas out there because of lack of availability," he says.

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