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Autism researcher Alysson Muotri's audacious plans for brain organoids

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It is nearly sunset, and Alysson Muotri ducks into a small, cluttered room in his expansive laboratory at the Sanford Consortium for Regenerative Medicine in La Jolla, California. An incubator the size of a mini-fridge houses unusual residents — and he wants to make introductions.

“This is the factory of mini-brains,” says Muotri, cracking a smile. His colleague holds a glass tray up to the light, and pink spheres the size of caviar whirl into view.

The spheres are 3D balls of human cells, called brain organoids — and Muotri spends his days thinking up ways to use them to study the human brain’s complexity.

The cells of these spheres form layers, just as human brains do, and show brain-like activity, passing electrical signals from one cell to the next. But they do not have the anatomical complexity of a real brain. They also cannot think or feel — at least, not yet.

Muotri coaxes stem cells to develop into globes of about 1 million cells of the types seen in the brain. He aims to understand how these quasi-brains mature — and how their patterns of activity match up to those in a human brain. To the extent they do, he hopes to use them to unravel what goes awry in autism and related conditions — and find leads for treatments.

Muotri created his first brain organoids in 2014 with stem cells from the father of an autistic boy. Two years later, he found that organoids made using stem cells from autistic children have different network dynamics than those from neurotypical controls. He has made organoids from cells toting Neanderthal DNA and those infected by the Zika virus. In July, he helped send the first **brain organoids to space**.The ultimate goal, he says, is to create organoids that can learn.