



Lab-grown Human Nerve Cells Accelerate Development of New Drugs

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To determine whether a new drug is safe and effective in humans, scientists often test them on animals first. But these studies don't always predict how a drug will perform in humans and sometimes drugs that are safe for animals end up being toxic to people.

To make better predictions on how a drug will affect the human nervous system, the company AxoSim has grown human nerves on a millimeter-sized chip by triggering stem cells to develop into nerve cells. Not only do they hope to accelerate the pace of finding new drugs to treat neurodegenerative diseases like ALS and multiple sclerosis, they aim to one day offer precision medicine by creating customized nerves-on-a-chip for each patient.

Lowry Curley co-founded AxoSim in 2014 when he realized the spinal cord regeneration research he worked on during his graduate studies could be transformed to better predict drug toxicity. The name AxoSim comes from joining the words axon—the tail end of a nerve cell—and simulate.

Then in 2016, AxoSim, in collaboration with Tulane University, was awarded a Phase I Small Business Technology Transfer (STTR) grant from the National Center for Advancing Translational Sciences (NCATS). "That truly was when we operationally got started," says Curley, who used the funds to test four drugs on the nerve-on-a-chip. "At that point we were able to grow the company, not just through grant funding, but through actual revenue from customers."

“ He envisions someday a patient’s own cells could be used to grow a personal nerve-on-a-chip, allowing their physician to test which drugs might work best for that patient’s nervous system. ”

In 2017, the company received a Phase II STTR from NCATS to refine their nerve-on-a-chip platform and to test more drugs. "By the end of that Phase II grant, we were up to six pharmaceutical companies [as AxoSim customers]," says Curley. He adds that the Phase II STTR also allowed AxoSim to collaborate with Tulane University, where the original work started with his co-founder Michael Moore.

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AxoSim

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Technology

Diagnostic

Primary Institute

Translational Sciences (NCATS)

Primary Institute

Environmental Health (NIEHS)

Project Details from NIH RePORTER AxoSim

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In addition to their two STTR grants, AxoSim was awarded a Phase I Small Business Innovation Research (SBIR) grant in 2018 from the National Institute of Environmental Health Sciences (NIEHS) to evaluate nerve toxicity of potentially harmful environmental chemicals, mostly pesticides. Curley says the EPA is backlogged with a catalog of chemicals that require testing, and AxoSim was well positioned to pivot into the new role.

Aside from working with scientists to predict drug toxicity and effectiveness, Curley is also excited about moving into the realm of precision medicine. He envisions someday a patient's own cells could be used to grow a personal nerve-on-a-chip, allowing their physician to test which drugs might work best for that patient's nervous system.

Curley hopes AxoSim's chip technology can help drug discovery for all types of neurodegenerative diseases to ultimately get treatment to those who have little to no alternative. "We see an opportunity to help."

