# Chili peppers spark discovery: WSU effort to fix injured brains with new nerve cells funded

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Cutline and credit: Washington State University neuroscientist Krzysztof Czaja and student Rachel Wanty look at images of nerve cells that he has found can be grown outside the brain. Czaja has an NFL grant to see if the cells can treat concussions and other brain injuries. Credit: Photo by Robert Hubner, Washington State University photo services. (Credit it as you wish; no restrictions on photo use.)

As research efforts go, this one is high risk. Which is to say, it could easily fail.

And it's high reward. Meaning it could provide some relief to concussions and subsequent health effects seen in athletes, soldiers and other head-injury victims.

The National Football League thinks enough of the work that its charitable arm has given Krzysztof Czaja (pronounced K-shish-toff Chai-uh), a Washington State University neuroscientist, $100,000 to keep looking.

Five years ago, Czaja and WSU colleagues discovered by accident that a nerve center just outside the brain can recover from damage by inducing developing stem cells to become functional nerve cells, or neurons. Now he is looking for the substances that get the process going.

"Our idea is to trigger the cells and then plant them in a new, injured environment so they start to develop and seek connections," Czaja says.

The grant is one of 15 that NFL Charities awarded last year to support sports-related medical research, mostly in the prevention and treatment of concussions. Mounting concerns over football-related head injuries have led to congressional hearings, research linking injuries to long-term neurological problems like dementia, and lawsuits from former players. The league has instituted rule changes to make the game safer, but NFL players still had 170 concussions this season, according to the Concussion Watch database of FRONTLINE and ESPN.

Czaja's work grows out of experiments in which he and colleagues killed neurons in rats' nodose ganglia, a sort of brain outside the brain. They used capsaicin, the active component of chili peppers, but at doses thousands of times more potent than Tabasco sauce. The goal was to see

if the damage to the nodose ganglia neurons affects nerve signals curbing the desire to eat.

Usually, the rats are euthanized soon after the experiment. But when Czaja learned that one group of rats was in good condition six months later, he thought to see what the ganglia looked like.

"What I found is that we actually got more neurons than less," he said.

The damage, he said, was "like a double-edged sword. It's damaging the nervous system but it's also inducing a cascade of events to fix it." Before this discovery, decades of neuroscientific thinking held that new neurons can only be formed inside the brain, putting them off limits to harvesting, let alone experimentation.

If Czaja can find the chemical agent stimulating the creation of new neurons, doctors could in theory use it to produce new neurons and graft them to damaged areas of the brain. Because they are from the patient, doctors might avoid autoimmune problems and both the ethical questions and technical challenges surrounding human embryonic stem cells.

"I think that our nervous system is much more plastic and much more capable and powerful than we think, than we imagine," said Czaja. "That's just unleashing this potential. And the beauty of our model is that this is something on the periphery we can use to fix the central nervous system."

Provided by Washington State University