Fishy fight-or-flight response may hold answers to human nerve damage

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Declan Ali and Shunmoogum Patten believe that these little zebrafish may hold some answers to for humans dealing with nerve damage.

(PhysOrg.com) -- Researchers at the University of Alberta are looking to the tiny zebrafish for a way to regenerate damaged nerve cells in people.

The zebrafish, a common fresh-water tropical fish, share the same fight-or-flight reaction that humans do. This synaptic response-the complicated brain to muscles signals-catapult an embryonic zebrafish to safety and has been partially unraveled by Declan Ali.

Ali, associate professor of biological science, says zebrafish are good match for humans because nerve cells deliver their instant messaging the

same way for fish and people.

"All sensory information has to be transferred from one part of the brain to another by synapses," said Ali. "We're interested in how the nervous system of the zebrafish develops while it's still an embryo."

The hope is that one day understanding the sequence of synapses in the escape response of the embryonic zebrafish might lead to recovery for people suffering nerve damage through spine and brain injuries.

In a damaged brain or spinal cord, communication along the nerves is cut off. The solution: re-connect the synaptic contact points. While this is a complicated concept that will require more research, Ali believes something can be learned from the tiny tropical fish. "We believe that the development of communication pathways for nerves in a zebrafish embryo is similar to the regeneration of synaptic contacts in damaged nerves."

One of the reasons Ali and his colleague, PhD candidate Shunmoogum Patten, have found zebrafish to be ideal for analysis is because its sensory system and synapses fire from the moment it hatches. In fact, Ali and others are considering the possibility that while it's still in the egg, the zebrafish's escape response is triggered so it will begin struggling to break out.

That's the vital moment that most interests Ali. "If we can understand how the synaptic pathways of a still developing zebrafish are laid out, we can apply that to damaged nerve pathways in people."

Ali has moved the understanding of the synaptic regeneration one step forward by identifying proteins vital to linking a nervous system in a still-developing organism. Ali and Patten had their work published earlier this month in Proceedings from the National Academy of Sciences.

The U of A researchers are hopeful others will build on their work. Ali is confident that one day researchers will have an "eureka" moment and the final piece of the puzzle will fall into place.

"Somebody might say we know that such-and-such a drug can enhance a connection, but before that happens we've got to know more. And we're slowly getting there."

Provided by University of Alberta (news : web)