

Nerve regeneration research and therapy may get boost from new discovery

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Thomas Kidd, center, in his biosciences lab at the University of Nevada, Reno with post-doctoral researcher Gunnar Newquist and biology student Kirsti Walker, uses genetic studies with fruit flies to investigate nerve development. They have found a new mechanism that guides the growth of nerves that involves cell-death machinery that may bring advances in neurological medicine and research. The team reported their discovery in an article published in the prestigious science publication *Cell Reports*. Credit: Mike Wolterbeek

A new mechanism for guiding the growth of nerves that involves cell-

death machinery has been found by scientists at the University of Nevada, Reno that may bring advances in neurological medicine and research. The team obtained the evidence in studies of fruit flies and reported their discovery in an article published in the prestigious science publication *Cell Reports*.

"Although the fly is a relatively [simple organism](#), almost every gene identified in this species appears to be carrying out similar functions in humans," said Thomas Kidd, associate professor in the University's biology department in whose lab the work was performed.

The Kidd lab is part of a \$10 million Center for Biomedical Research Excellence Project in [Cell Biology](#) of Signaling at the University, which is funded by the National Institute of Health's Institute of General Medical Sciences. The project is also funded by the National Science Foundation.

"Flies are useful because the [neural mechanisms](#) we are studying are similar to those in mammals," said Gunnar Newquist, lead author of the *Cell Reports* article and a post-doctoral neuroscience researcher in Kidd's lab. "We've found something no one has seen before, that blocking the cell-death pathway can make nerves deprived of guidance cues figure out the right way to connect with other neurons. This was completely unexpected and novel, but really exciting because it changes the way we look at [nerve growth](#).

"Neurons have a natural ability to die, if they fail to make the right connections they usually die. Neurons, like most other cell types, have the capacity to commit suicide and many do so during the formation of the [nervous system](#)."

The wiring of nervous systems is composed of axons, specialized extensions of neurons that transmit [electrical impulses](#). During

development axons navigate long distances to their targets by using signals in their environment. Netrin-B is one of those signals. Kidd, Newquist and colleagues have shown that Netrin-B also keeps neurons alive.

"Take away the Netrin-B and growth and cell death goes haywire," Newquist said.

This led them to the discovery that the cell-death machinery is active in growing nerves, and appears to be an integral part of the navigation mechanism.

"We use fruit fly genetics to study how these axons navigate these [long distances](#) correctly when developing," Kidd said. "Understanding the mechanisms they use to navigate is of great interest, not only for understanding how our brains form, but also as a starting point to devise ways to stimulate the re-growth of axons after injury, especially spinal cord injuries.

"Our work suggests that therapeutics designed to keep neurons alive after injury may be able to stimulate neurons to start re-growing or sprouting new connections."

"I am very pleased to see Tom's and Gunnar's hard work come to fruition," said Chris von Bartheld, director of the University's cell-biology COBRE and a professor in the University of Nevada School of Medicine. "Linking axonal path finding and cell death signaling opens exciting new venues to better understand both topics. It also shows that our recently established center in cell biology is achieving its goals of producing top-level biomedical research."

The research featured in the Cell Report article is a major focus of Kidd's lab, which is one of five research projects in the COBRE. The

center is a strong stimulus to integrate the University's research in cell biology, developmental biology, signaling and neuroscience and to develop collaborations between basic scientists and clinicians.

More information: The research article is featured on the front page of the *Cell Reports* website, along with a video of Kidd and Newquist talking about the research, in their new "At the Movies" section.

Provided by University of Nevada, Reno

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