SOUTHWESTERN NEWS

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**UT SOUTHWESTERN SCIENTISTS EXPLAIN
HOW THE INJURED BRAIN REMODELS ITSELF**

DALLAS – Nov. 1, 2001 – Researchers at UT Southwestern Medical Center at Dallas have begun to reveal the cellular mechanisms critical for restoring brain functions after traumatic injuries – a step that could lead to effective treatments of paralysis and other brain and spinal-cord damage.

The study indicated that the injured brain's long-observed restorative powers at least partially derive from generating waves of adult-neural stem cells, or specialized precursors, to develop into critically needed replacement neurons and astrocytes. Neurons, the basic building blocks of the nervous system, and astrocytic cells, which provide metabolic functions between neurons and blood vessels, are crucial to restoring or remodeling damaged brain and spinal-cord tissue.

Published in the Nov. 1 issue of the *Journal of Neuroscience Research*, the study involving adult mice showed that following traumatic brain injury, the brain's stem-cell proliferation continues at a rapid pace and persists over a much longer time than expected, both at the injury site and even in the most-distant areas affected by the injury, said Dr. Steven G. Kernie, assistant professor of pediatrics and lead researcher.

The findings suggest that manipulating the expression of stem-cell regulators might accelerate or prolong the regeneration of neurons in humans, said Kernie, who collaborated with Dr. Luis F. Parada, director of the Center for Developmental Biology and the Kent Waldrep Foundation Center for Basic Research on Nerve Growth and Regeneration.

"We wanted to answer some basic questions about the persistence of neural stem cells proliferating into adulthood," Kernie said. "Our study of traumatic brain injuries in adult mice found that nature's own restorative powers are more extensive than previously thought. Perhaps even more exciting, we found that the regenerative powers are widespread, not just in the immediate area of the injury. Though using mice, our study raises the possibility that similar brain-remodeling processes may occur in humans."

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The study examined three mice groups. They were tested for indicators of stem-cell growth at post-injury intervals of 24 hours, seven days and 60 days.

"As one might expect, the neural repairs or remodeling were most prominent in and near the injury for the short term, but the study also showed long-term remodeling for the injured mice at a rate five times greater than expected in the distant injury-affected areas," Kernie said.

With more research in mice and humans to confirm and build on the current findings, he said, scientists might be able to develop new human medical therapies to enhance an injured brain's or spinal cord's restorative capabilities.

In the long term, Kernie said, the current results also raise hopes of developing new or more effective human therapies using embryonic or adult stem cells for reducing or overcoming paralysis and other severe brain and spinal-cord injuries.

Until now, he said, this area of intensive investigation has produced only limited understanding of how a brain injury might affect the ability of the neural stem cells to multiply and repopulate or repair injured areas.

The study was funded by the Christopher Reeve Paralysis Foundation Consortium on Spinal Cord Injury, the Kent Waldrep Foundation Center for Basic Research on Nerve Growth and Regeneration, and the National Institutes of Health.

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