

New Hope for Spinal Cord Injury Patients

By Leora Rabatach



September 15, 2010 - A team of researchers in the Department of Clinical Neurosciences, Faculty of Medicine, UCalgary, is showing how minocycline - a common antibiotic used to treat acne and joint pain - shows promise for limiting the severity of spinal cord injuries (SCI).

In Canada, there are approximately 1200 spinal cord injury (SCI) cases per year, and it is the leading cause of disability in young adults. When a car crash, diving accident, fall, or even a bullet crushes or cuts through the spinal cord, the resulting damage does not stop there. Instead, tissues continue to discharge toxic chemicals for hours and sometimes days or weeks after the initial incident, killing and disabling cells away from the core injury - compounding the damage and making rehabilitation much more difficult, and sometimes impossible.

Current treatments for SCI are limited, and used to involve the use of a steroid to reduce swelling and decrease inflammation. So far, these treatments have failed to provide positive outcomes for people affected by a spinal cord injury.

Putting together clues about how brain and other nerve cells die, Dr. John Hurlbert, a neurosurgeon and an associate professor in DCNS, and his team, are trying to find new ways to reduce the extent of this progressive tissue loss (neuroprotection), which could result in better recovery for SCI patients. In partnership with colleagues in the Hotchkiss Brain Institute, they are continuing to explore how minocycline could influence several secondary injury mechanisms implicated in spinal cord injury.

"Our goal as researchers and clinicians is to make an impact and have a therapeutic strategy available for spinal cord injury patients," says Hurlbert, the lead clinical investigator for the clinical trial. "If minocycline, or a similar drug, is successfully tested in humans and approved for use, any small benefit resulting from drug treatment could greatly improve the quality of life for our patients."

Preliminary results using animal models to test minocycline were extremely positive. Over the course of the study, researchers exposed the spinal cords of mice and applied an aneurism clip to mimic specific spinal cord injuries. The mice were then given injections of the drug or a placebo beginning one hour after the injuries occurred, and monitored for seven specific measures to see if minocycline displayed any benefits over a placebo.

They found that minocycline significantly reduced tissue damage and improved mobility in mice with SCI. The hind limbs of mice that had not received the drug remained paralyzed. In contrast, animals that received minocycline could walk with their hind legs supporting their weight and stand in a way that was close to normal. Their reflexes were better than those of the untreated mice. Moreover, gross lesion size in the spinal cord was significantly reduced by minocycline, and there was evidence of increased survival of nerve cells vital for passing signals along their spinal cords (axonal sparing).

"We think that the anti-cell death, anti-scarring and anti-inflammatory effects of this drug are primary factors for reducing the secondary damage of spinal cord injuries," says Hurlbert. "Initial results were exciting because they demonstrated a novel strategy in the form of a safe substance that could serve as a prototype drug for developing better treatments for people suffering from spinal cord injuries."

Although approved by the Food and Drug Administration for other uses, minocycline still has to be tested on humans with spinal cord injuries before it can be used specifically for this purpose. Because of its FDA approval status, translation into human clinical trials has occurred much more quickly.

Over 50 patients have already been enrolled in the new clinical trial, estimated for completion in November of 2010. In addition to evaluating the feasibility of minocycline as a treatment option for patients with acute spinal cord injury, Hurlbert and his team also hope to ensure adequate drug dosing and metabolic effect for their patients.