

## Stem cells: from skin to spine

[Print](#)

In rats, stem cells taken from the skin can help heal a damaged spinal cord. This, according to research published in the [Journal of Neuroscience](#) conducted by a team from the University of British Columbia and The Hospital for Sick Children (SickKids). In most previous studies, stem cells to treat spinal injuries have come from less accessible nerves or brain tissue.

About 36,000 Canadians live with spinal cord injuries, and there are over a thousand new injuries each year. Recovery is a slow and uncertain process for a person with spinal cord damage. The body cannot naturally re-grow new nerves to repair the damaged spinal cord. In fact, even remaining nerves often don't function properly after an injury.

Just as wires need insulation, the long nerve fibres called axons work more efficiently when wrapped in a jacket of fat and protein. This insulating layer, called myelin, can be lost in a spinal cord injury and often does not grow back.

The treatments suggested by these experiments also show promise for people with leukodystrophies, rare brain diseases in which axons slowly lose their myelin sheaths and fail to transmit. The leukodystrophies cause severe degeneration of mental and movement abilities, often beginning in infancy or childhood.

Dr. Freda Miller, a senior scientist at SickKids and lead author of the study, has been searching for ways to help heal damage to the nervous system since 2001. "These types of axons normally do not regenerate," she says, but the body's supportive Schwann cells can replace myelin and even coax axons to grow out from surviving cells. This work goes beyond rats; other scientists have given Schwann cell transplants to injured primates and they are effective in repairing myelin. But Schwann cells are difficult to surgically remove and purify.

"Knowing that harvesting Schwann cells from nerves is invasive and difficult, we wanted to test whether skin-derived precursors could be used to repair the injured rat spinal cord," says Dr. Wolfram Tetzlaff, a professor of zoology and neurosurgery at the University of British Columbia and a co-author of the study. These skin-derived precursors are stem cells. They can multiply as stem cells, and they also have the ability to become several different types of nerve, bone, muscle, fat, and skin cells. In previous work, Dr. Miller's team had worked out the sequence of chemical signals that would encourage many of the precursors to mature into Schwann cells.

Dr. Tetzlaff's team injected the purified harvest of Schwann cells into the spinal cords of injured rats. The rats gained mobility and coordination, enjoying the benefits of axonal regrowth and myelin production.

Dr. Miller explains that cells transplanted from donors or embryos can be rejected, as the body's immune system sees them as foreign invaders. But if stem cells could be derived from a tissue like skin, rejection could be avoided by using a patch of the patient's own skin.

The skin-derived precursors are found in humans as well. The next stage of the research will look at whether those human cells have the same ability to mature into Schwann cells and help heal a damaged spinal cord.

3/4/2010

Biernaskie J, Sparling JS, Liu J, Shannon CP, Plemel JR, Xie Y, Miller FD, Tetzlaff W. Skin-derived precursors generate myelinating Schwann cells that promote remyelination and functional recovery after contusion spinal cord injury. *The Journal of Neuroscience* 2007 Sep; 27(36):9345-9559.

aboutkidshealth

[www.aboutkidshealth.ca](http://www.aboutkidshealth.ca)