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Researcher finds stem cell success

By Curtis Wackerle

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Not all stem cells are created equal.

Dr. Stephen Davies, a University of Colorado Medical School scientist on the cutting edge of spinal chord injury research, spoke Wednesday night to about 60 people at the Given Institute about a breakthrough he made by manipulating stem cells into a certain type of spinal chord cell. The crowd included at least six wheelchair-bound spinal- chord injury victims.

Minor differences in astrocyte cells — which support neurons in the spinal chord — turned out to have major differences.

Previous research had shown that certain types of astrocytes created more scar tissue in a spinal chord injury, which inhibits the neuron pathways that communicate between body and brain. Stem cell induced scar tissue built up in the spinal chord also causes pain in patients.

But when Davies started experimenting with GDA-BTM, a type of astrocyte, the results were encouraging. The BTM astrocytes promoted nerve fiber growth across a spinal chord injury, with 40 percent of the nerve fibers able to bridge the gap of severe spinal chord injuries in lab rats. Untreated injuries typically see regrowth in the low single digits. The introduction of the astrocyte cells also prevented the degeneration of nerve cells in the brain, which is a side effect of spinal chord injury.

Lab rats that received this treatment regained near normal walking ability, Davies reported.

For nearly 20 years, Davies has been studying why nerve fibers don't regenerate after a spinal chord injury — a quandary that has kept scientists guessing for more than 100 years. Especially when new born babies up to five days old have shown the ability to regrow the nerve cells.

Davies believes the answer lies in scar tissue, which forms after an injury. In forming scar tissue, the body draws on whatever cells are available in the specific area. With the spinal chord, these cells happen to be dense cells that provide support in the middle of the spinal chord — not the best for promoting nerve fiber regrowth.

"We were the first lab in the world to really look in detail at how scar tissue is formed," said Davies, who is originally from Scotland.

Besides the astrocyte tests, Davies and colleagues have had great success inhibiting scar tissue by introducing a protein called Decorin into spinal chord injuries.

About one in five spinal chord injuries are a result of sports and recreation, with car accidents and falls by the elderly the main causes, Davies said. But men suffer 80 percent of the spinal chord injuries, and 53 percent of the injuries are to people under 30 years old. In the United States, there are about 450,000 spinal chord injuries with about 11,000 new cases every year. There is no approved therapy in America for spinal chord injuries, Davies said.

"We are all at risk," he said.

But that may be changing. One of the first moves President Barack Obama made in office was to grant federal funding to Geron, a California company working on treating spinal chord injuries by promoting the regrowth of myelin, which helps nerve fibers function. Federal funding of stem cell research was banned under the George W. Bush administration.

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Stephen Davies, associate professor in the department of neurosurgery at the University of Colorado-Denver, talks to Amanda Boxtel (right) and others at the Given Institute Wednesday night after his lecture about new stem cell technologies for spinal cord repair.