

Sick kids researchers unmask the potential of stem cells found in adult skin

Therapies for spinal cord injury may result

TORONTO -- Researchers at The Hospital for Sick Children (Sick Kids) have shown that stem cells found in adult skin retain their embryonic capability of making many types of cells. This discovery affirms the potential that stem cells derived from this non-controversial source possess for the development of possible therapies for spinal cord injury and nervous system disorders. This research is reported in the November issue of the scientific journal *Nature*. "We think these stem cells are actually embryonic cells that go out into the skin during development and then stay in reservoirs in hair follicles," said Dr. Freda Miller, the study's principal investigator, a senior scientist in Development Biology in the Sick Kids Research Institute and a professor of Molecular and Medical Genetics, and Physiology at the University of Toronto.

"These stem cells are similar to a type of embryonic stem cell called a neural crest stem cell, and like neural crest stem cells, are endogenous and multipotent in nature. These neural crest stem cells generate the peripheral nervous system, and we are therefore now confident that we can make neural and other types of cells from the stem cells found in adult skin," added Dr. Miller, also Canada Research Chair in Developmental Neurobiology.

The research team can now predict what type of cells can be made from these stem cells (called skin-derived precursors, or SKPs) based on the role played by neural-crest stem cells during embryogenesis. In addition to generating the peripheral nervous system, neural crest stem cells generate other tissues such as bone, cartilage, some types of muscle, and even part of the heart. This research was conducted in mice, with similar findings made recently by Dr. Miller's group in the human cells.

"The cells that Dr. Miller's group has found in the skin have huge potential to treat brain disorders because they are capable of transforming into neurons normally only found in the brain and other nervous tissue. This new research provides an explanation for the cells' ability to make neurons and further enhances our understanding of a potentially valuable cell type for

stem cell therapy," said Dr. Ron Worton, scientific director of Canada's Stem Cell Network. "The Stem Cell Network is pleased to have supported this work in Dr. Miller's laboratory."

The co-lead authors of the paper were Dr. Karl Fernandes, a postdoctoral fellow in Dr. Miller's lab who holds a Canadian Institutes of Health Research/Canadian Neurotrauma Research Program fellowship, and Ian McKenzie, a graduate student in Dr. Miller's lab from McGill University. Other members of the research team included Pleasantine Mill, Kristen Smith, Mahnaz Akhavan, Fanie Barnabé-Heider, Jeff Biernaskie, Nao Kobayashi, Jean Toma, Dr. David Kaplan and Dr. Chi-Chung Hui, all from Sick Kids, Dr. Victor Rafuse and Adrienne Junek from Dalhousie University, and Dr. Patricia Labosky from the University of Pennsylvania.

This research was supported by the Stem Cell Network, the Canadian Institutes of Health Research (CIHR), the National Cancer Institute of Canada, the Natural Sciences and Engineering Research Council of Canada, the Parkinson Foundation of Canada, the Christopher Reeve Paralysis Foundation, the Canada Foundation for Innovation, the Ontario Innovation Trust, and Sick Kids Foundation. Dr. Miller was a holder of a CIHR Senior Investigator Award.

The Hospital for Sick Children, affiliated with the University of Toronto, is Canada's most research-intensive hospital and the largest centre dedicated to improving children's health in the country. Its mission is to provide the best in family-centred, compassionate care, to lead in scientific and clinical advancement, and to prepare the next generation of leaders in child health.

University of Toronto Public release date: 31-Oct-2004