

Cancer scientists discover novel way gene controls stem cell self-renewal

Stem cell scientists at the Princess Margaret Cancer Centre have discovered the gene GATA3 has a role in how blood stem cells renew themselves, a finding that advances the quest to expand these cells in the lab for clinical use in bone marrow transplantation, a procedure that saves thousands of lives every year.

The research, published online today in *Nature Immunology*, provides an important piece in the puzzle of understanding the mechanisms that govern the blood stem cell self-renewal process, says principal investigator Norman Iscove, Senior Scientist at the Princess Margaret, University Health Network (UHN). Dr. Iscove is also an investigator at UHN's McEwen Centre for Regenerative Medicine and a Professor in the Faculty of Medicine, University of Toronto.

"Researchers have known for a long time that stem cells can increase their numbers in the body through self-renewal; however, it has proven very difficult to establish conditions for self-renewal in the laboratory," says Dr. Iscove. Indeed, he explains, the quest to do so has been a [holy grail](#) for stem cell researchers because the very effectiveness, safety and availability of the [transplantation procedure](#) depend on the number of stem cells available to transplant.

In the lab and using genetically engineered mice, the Iscove team zeroed in on GATA3 and determined that interfering with its function causes stem cells to increase their self-renewal rate and thereby results in increased numbers of stem cells. Dr. Iscove expects scientists will be able to use this new information to improve their ability to grow increased numbers of blood stem cells for use in bone marrow transplantation and possibly, gene therapy.

Dr. Iscove's research is a new page in the growing volume of stem [cell science](#) that began here in 1961 with the ground-breaking discovery of blood-forming [stem cells](#) by Drs. James Till and the late Ernest McCulloch. Their discovery changed the course of [cancer research](#) and laid the foundation for [bone marrow transplantation](#) in leukemia patients, as well as for many other types of current disease research. The research published today was funded by the Terry Fox Foundation, the Canadian Cancer Society Research Institute, the Canadian Institutes of Health Research, the Stem Cell Network, the McEwen Centre for Regenerative Medicine, The Princess Margaret Cancer Foundation, The Campbell Family Institute for Cancer Research and the Ontario Ministry of Health and Long-term care.

More information: GATA-3 regulates the self-renewal of long-term hematopoietic stem cells, [DOI: 10.1038/ni.2692](#)

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