

Study shows that blood stem cells are influenced by their offspring

November 29 2010



Dr. Carolyn de Graaf, from the Walter and Eliza Hall Institute in Melbourne, Australia, has shown that mature blood cells can communicate with, and influence the behavior of, their stem cell "parents." Credit: Cameron Wells, Walter and Eliza Hall Institute

A new study by researchers at the Walter and Eliza Hall Institute in Melbourne, Australia, has shown that mature blood cells can communicate with, and influence the behaviour of, their stem cell 'parents'.

The discovery of a blood cell 'feedback loop' in the body opens up new avenues of research into diseases caused by stem cell disorders, and the potential for new disease treatments.

Dr Carolyn de Graaf and Professor Doug Hilton from the Molecular



Medicine division and Professor Warren Alexander from the Cancer and Haematology division led the research.

Professor Hilton said the findings, published today in the <u>Proceedings of</u> <u>the National Academy of Sciences</u>, revealed a relationship between the blood cells that wasn't known to exist until now.

"We know that blood <u>stem cells</u> give rise to all the mature blood cells, but the standard assumption was that external factors control blood cell production and the two populations exist in isolation," Professor Hilton said.

"This study shows that the <u>mature cells</u> actually communicate back to the stem cells, changing their gene expression and influencing their behaviour."

The researchers found that blood cell disorders can cause disturbances in the feedback loop, with profound effects on the blood stem cells.

The discovery was made while studying the effect of the loss of Myb, a transcription factor that represses platelet production, in animal models.

Dr de Graaf said the loss of the Myb gene meant the animals had very high numbers of platelets in their blood, which caused changes in the signaling pathways that control stem cell maintenance.

"The stem cells, rather than being maintained in a 'resting state' until needed, were being told to continually cycle and produce mature blood cells," Dr de Graaf said. "The stem cells were eventually exhausted and blood disorders developed because there were not enough stem cells to produce new red and <u>white blood cells</u>."

The team used new generation genomic technologies to identify gene



signatures in the blood stem cells that were caused by the defective signaling, these gene signatures could be used in the future to diagnose and help treat disease.

"If we can understand the genes important for stem cell maintenance and blood cell production, then we can start to look at ways of improving transplantation techniques and therapies for blood disorders," Dr de Graaf said.

Professor Hilton said that patients with stem cell failures could also potentially benefit.

"What we would like to do is to determine whether some of these stem cell failures are due to miscommunication between mature <u>blood cells</u> and stem cells, with the possibility of finding new ways to treat these disorders down the track," he said.

Provided by Walter and Eliza Hall Institute

Citation: Study shows that blood stem cells are influenced by their offspring (2010, November 29) retrieved 28 April 2024 from <u>https://phys.org/news/2010-11-blood-stem-cells-offspring.html</u>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.