

Different stem cell types defined by exclusive combinations of genes working together

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In the new issue of *Cell Stem Cell*, scientists report that the same transcription factor, which is crucial for the survival of different stem cell types, can behave differently.

This study clearly showed for the first time that different types of stem cells are defined by exclusive combinations of genes working together, and this is under the influence of a single key stem cell factor (called Sall4).

The finding is timely since other researchers have recently revealed that specific genetic recipes can be used to turn non-stem cells into different stem cells that can be useful clinically.

This finding reveals important insights about how scientists may be able to manipulate and engineer different stem cells for the treatment of human degenerative disorders.

Understanding the behaviour of transcription factors, a class of gene regulators, helps pave the way for important advancements in stem cell technology and clinical research.

Stem cells are important for the cell-based therapy of many degenerative tissue disorders. Each type of body tissue has its own unique type of stem cells whose behaviour is controlled by different sets of genes.

Given the enormous complexity of each stem cell type and the

underlying genetic bases for their unique purpose, it has been a major challenge for scientists to unravel the similarities and differences between the different stem cells.

The latest research, led by Bing Lim, Senior Group Leader at the Genome Institute of Singapore (GIS), focused on identifying and understanding the functions of powerful genetic molecules, also known as "stem cell factors".

Dr. Bing Lim said, "This new discovery has provided us with important new leads and ideas on how to grow and expand various stem cells for clinical research and treatment needs."

Dr. Daniel Tenen, Professor of Medicine at Harvard Medical School, and Director for Cancer Research Centre of Excellence at the National University of Singapore, said, "These studies are of great significance, as they provide important clues as to how a single transcription factor might regulate different targets in different stem cells."

Interestingly, this stem cell factor also appeared to be associated with certain diseases, particularly leukemia.

Dr. Li Chai, Instructor at the Department of Pathology at the Harvard Medical School, added that, "as Sall4 plays an important role in both normal hematopoietic stem cell function and in leukemia stem cells, these findings may have clinical relevance; they may lead to understanding differences between normal and cancer stem cells."

Source: Agency for Science, Technology and Research (A*STAR), Singapore

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