

Physical environment influences stem cell development

September 7 2010

A researcher at the Hebrew University of Jerusalem, together with Israeli and foreign collaborators, has revealed how physical qualities -- and not only chemical ones - may have an influence in determining how adult stem cells from the bone marrow develop into differentiated ones. This represents an important step in understanding the mechanisms that direct and regulate the specialization of stem cells from their undefined state.

Scientists around the world are involved in studying, describing and even manipulating the development of stem cells on their path into becoming specialized cells, such as heart, muscle, brain or any other tissue. This research has tremendous implications for the future utilization of stem cells as a new tool of medical treatment.

In an article published in [Nature Physics](#), Dr. Assaf Zemel of the Institute of Dental Sciences at the Hebrew University and his fellow researchers, Prof. Samuel Safran from the Weizmann Institute of Science, Dr. Florian Rehfeldt from Gottingen University in Germany, and Dr. Andre Brown and Prof. Dennis Discher from the University of Pennsylvania, tell how they have developed a theoretical model and carried out experiments on stem cells to propose a mechanism for the recently discovered sensitivity of [stem cell differentiation](#) to the rigidity of their surroundings.

They described the physical changes that take place in stem cells that are layered on supporting foundations of differing rigidities. They showed

that on a supporting matrix whose rigidity mimics that of muscle tissue, the cells become elongated and filled with aligned muscle-like fibers. The authors explain how this situation is fundamentally different from the case where the supporting substance is made either softer (to mimic [brain tissue](#)) or harder (to mimic [bone tissue](#)), in which case the cells adopt more symmetric structures and differentiate into brain and [bone cells](#), respectively.

These findings shed new light on our understanding of the mechanisms that govern the differentiation of stem cells and may have important implications for the design of artificial tissues and the development of novel therapeutic strategies, says Dr. Zemel.

Provided by Hebrew University of Jerusalem

Citation: Physical environment influences stem cell development (2010, September 7) retrieved 23 April 2024 from <https://phys.org/news/2010-09-physical-environment-stem-cell.html>

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.