Aging-related degeneration caused by defects of energy metabolism in tissue stem cells?

January 3 2012

Aging-related tissue degeneration can be caused by mitochondrial dysfunction in tissue stem cells. The research group of Professor Anu Suomalainen Wartiovaara in Helsinki University, with their collaborators in Max Planck Institute for Biology of Aging, Karolinska Institutet and University of Wisconsin reported on the 3rd January in *Cell Metabolism* their results on mechanisms of aging-associated degeneration.

Stem cells are called the spare parts for tissues, as they maintain and repair tissues during life. They are multipotent and can produce a variety of different cell types, from blood cells to neurons and skin cells. Mitochondria are the cellular engine: they transform the energy of nutrients to a form that cells can use, and in this process they burn most of the inhaled oxygen. If this nutrient 'burning' is inefficient, the engine will produce exhaust fumes, oxygen radicals, which damage cellular structures, including the genome. Antioxidants target to scavenge these radicals.

Already in 2004 and 2005 a research model was created in Sweden and USA, which accumulated a heavy load of mitochondrial genome defects. This led to symptoms of premature aging: thin skin, graying of hair, baldness, osteoporosis and anemia.

In the current publication, scientist Kati Ahlqvist in Professor Suomalainen Wartiovaara's group showed that these symptoms were partially explained by stem cell dysfunction. The number of stem cells did not reduce, but their function was modified: the progeny cells in

blood and the nervous system were dysfunctional. The researchers also found out that these defects could be partially prevented by early antioxidant treatment.

"This suggests that oxygen radicals can regulate stem cell function and that these cells are very susceptible for mitochondrial dysfunction. These findings may also be important to understand mechanisms of mitochondrial disease", Professor Suomalainen Wartiovaara says.

The results are a breakthrough in revealing the unexpected importance of energy metabolism in regulating stem cell function and tissue maintenance. These findings increase the understanding of mechanisms of aging-related degeneration.

Provided by University of Helsinki

Citation: Aging-related degeneration caused by defects of energy metabolism in tissue stem cells? (2012, January 3) retrieved 17 April 2024 from https://phys.org/news/2012-01-aging-related-degeneration-defects-energy-metabolism.html