MedicalXpress

Circadian rhythms in skin stem cells protect us against UV rays

October 10 2013

Human skin must cope with UV radiation from the sun and other harmful environmental factors that fluctuate in a circadian manner. A study published by Cell Press on October 10th in the journal *Cell Stem Cell* has revealed that human skin stem cells deal with these cyclical threats by carrying out different functions depending on the time of day. By activating genes involved in UV protection during the day, these cells protect themselves against radiation-induced DNA damage. The findings could pave the way for new strategies to prevent premature aging and cancer in humans.

"Our study shows that human skin stem cells posses an internal clock that allows them to very accurately know the time of day and helps them know when it is best to perform the correct function," says study author Salvador Aznar Benitah an ICREA Research Professor who developed this project at the Centre for Genomic Regulation (CRG, Barcelona), and who has recently moved his lab to the Institute for Research in Biomedicine (IRB Barcelona). "This is important because it seems that tissues need an accurate internal clock to remain healthy."

A variety of cells in our body have internal clocks that help them perform certain functions depending on the time of day, and skin cells as well as some stem cells exhibit circadian behaviors. Benitah and his collaborators previously found that animals lacking normal circadian rhythms in skin stem cells age prematurely, suggesting that these cyclical patterns can protect against cellular damage. But until now, it has not been clear how circadian rhythms affect the functions of human skin

stem cells.

To address this question, Benitah teamed up with his collaborators Luis Serrano and Ben Lehner of the Centre for Genomic Regulation. They found that distinct sets of genes in human skin stem cells show peak activity at different times of day. Genes involved in UV protection become most active during the daytime to guard these cells while they proliferate—that is, when they duplicate their DNA and are more susceptible to radiation-induced damage.

"We know that the clock is gradually disrupted in aged mice and humans, and we know that preventing stem cells from accurately knowing the time of the day reduces their regenerative capacity," Benitah says. "Our current efforts lie in trying to identify the causes underlying the disruption of the clock of human skin stem cells and hopefully find means to prevent or delay it."

More information: *Cell Stem Cell*, Janich et al.: "Human epidermal stem cell function is regulated by circadian oscillations." dx.doi.org/10.1016/j.stem.2013.09.004

Provided by Cell Press

Citation: Circadian rhythms in skin stem cells protect us against UV rays (2013, October 10) retrieved 25 April 2024 from https://medicalxpress.com/news/2013-10-circadian-rhythms-skin-stem-cells.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.