MedicalXpress

Study: The epigenome of newborns and centenarians is different

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What happens in our cells after one hundred years? What is the difference at the molecular level between a newborn and a centenary? Is it a gradual or a sudden change? Is it possible to reverse the aging process? What are the molecular keys to longevity? These central questions in biology, physiology and human medicine have been the focus of study by researchers for decades.

Today, the international journal Proceedings of the National Academy of Sciences (*PNAS*) publishes an international collaborative research led by Manel Esteller, director of the Epigenetics and Cancer Biology Program at the Bellvitge Biomedical Research Institute (IDIBELL), professor of Genetics at the University of Barcelona and ICREA researcher, which provides a vital clue in this field: the epigenome of newborns and centenarians is different.

While the genome of every cell in the human body, regardless of their appearance and function, is identical, chemical signals that regulate it, known as epigenetic marks, are specific to each human tissue and every organ. This means that all our components have the same alphabet (genome), but the spelling (epigenome) is different in every part of our anatomy. The surprising result of the work led by Dr. Esteller is that the epigenome varies depending on the age of the person, even for the same tissue or organ.

In the study published in PNAS, epigenomes from white blood cells of a newborn, a man of middle age and a person of 103 years have been fully

sequenced. The results show that the centenary presents a distorted epigenome that has lost many switches (methyl chemical group), put in charge of inappropriate gene expression and, instead, turn off the switch of some protective genes.

"Extending the results to a large group of neonates, individuals at the midpoint and nonagenarians or centenarians we realized that this is an ongoing process in which each passing day goes by twisting the epigenome" explains the researcher. However, Dr. Esteller noted that "epigenetic lesions, unlike genetic ones, are reversible and therefore modifying the patterns of DNA methylation by dietary changes or use of drugs may induce an increase in lifetime."

More information: Heyn H, Li N, Ferreira HJ, Moran S, Pisano DG, Gomez A, Diez J, Sanchez-Mut JV, Setien F, Carmona FJ, AA Pucaf Sayols S, Pujana MA, Serra-Musach J, Iglesias-Plata I, Formiga F, Fernandez AF, Fraga MF, Heath S, Valencia A, Gut IG, Wang J, Esteller M. The Distinct DNA Methylomes of Newborns and centenarians. *Proc Natl Acad Sci*, 2012.

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