Asian Journal of Emerging Research
Volume 1(2): 63-64, 2019
https://doi.org/AJERPK.2019.63.64

AJER

News

Do You Know the Age of Your Organs? Let's Find Out!

Scientists assumed the neurons or the heart cells as the oldest but; Salk Institute researchers examined brain, liver and pancreas of mouse and observed longevous cells and proteins. The study, demonstrating "age mosaicism," was published in *Cell Metabolism* on June 6, 2019. The same approach could be exerted to any tissue to get information about long-lasting functions of whole cells and cell structures while aging.

"We were quite surprised to find cellular structures that are essentially as old as the organism they reside in," said Salk Vice President, Chief Science Officer Martin Hetzer, senior author and professor. "This suggests even greater cellular complexity than we previously imagined and has intriguing implications for how we think about the aging of organs, such as the brain, heart and pancreas."

Inside the brain, most neurons are long-term as they don't divide during adulthood. However, outside cells life-span is yet uncertain due to technology limitations.

"Biologists have asked -- how old are cells in an organism? There is this general idea that neurons are old, while other cells in the body are relatively young and regenerate throughout the organism's lifetime," said Rafael Arrojo e Drigo, first author and Salk staff scientist. "We set out to see if it was possible that certain organs also have cells that were as long-lived as neurons in the brain."

As researchers already knew that most neurons don't substitute in their lifetime, they use them as 'age baselines' and compared with other non-dividing cells. Team merged both electron isotope labeling and hybrid imaging method (MIMS-EM) to identify and quantify the age of cell and protein in the brain, pancreas and liver from old and young rodent models.

To ratify their procedure, scientists resolute the age of neurons and identified that the age of neurons is the same as of the organism. Inclusively, endothelial cells that line the blood vessels were also as old as neurons. Resulting, many neurons don't duplicate throughout their life-span.

Also, cells of various ages were observed in the pancreas. In islets of Langerhans; small portion of pancreas, perplexed young and old cells were observed. Few insulin discharging beta cells were observed replicating and young as compared to non-duplicating cells like neurons. Apart from them, another type named as delta cells were observed as non-replicating. The pancreas was a notable example of 'age mosaicism' i.e; a population of twining cells that vary in life-spans.

It was examined that liver has the ability to revive during adulthood, that's why the researchers were expecting to look for young cells in to it. The fact astonished them that majority of cells in the adult mice were as old as the organism, however, endothelial cells and stellate-like cells, another type of liver cell, with fleeted life-span were observed. Hence, liver also demonstrated 'age mosaicism'.

A group of long-lived cells containing protein complexes reflecting age mosaicism were displayed on a molecular scale. For example, cilia of beta cells present in the pancreas and neurons displayed variety of life-spans. In contrast, short-lived cells were examined.

"Thanks to new visualizing technologies we are able to pinpoint the age of cells and their supramolecular complexes more accurately than ever before. This opens new doors for studying all cells, tissues and organs in normal and in

 https://doi.org/10.21124/AJERPK.2019.63.64

disease states," said Mark Ellisman, Distinguished Professor of Neurosciences at UC San Diego's School of Medicine and co-leader of the study with Hetzer. His laboratory, the National Center for Microscopy and Imaging Research, developed and provided with the new tissue imaging techniques for interlinked multi-scale and multi-modal microscopy. This study was held using technologies encoded these methods and programs.

"Determining the age of cells and subcellular structures in adult organisms will provide new insights into cell maintenance and repair mechanisms and the impact of cumulative changes during adulthood on health and development of disease," added Hetzer. "The ultimate goal is to utilize these mechanisms to prevent or delay age-related decline of organs with limited cell renewal."

In future, authors expected to further elaborate the difference in life-spans of nucleic acids and lipids, and uncover the facts that how age mosaicism link with health and diseases as in case of diabetes, type 2.

Keywords:
Age mosaicism, life-span, electron isotope labeling, endothelial cells, neurons

 https://doi.org/10.21124/AJERPK.2019.63.64