Resurrection of Dormant Retroviruses Contributes to the Aging Process

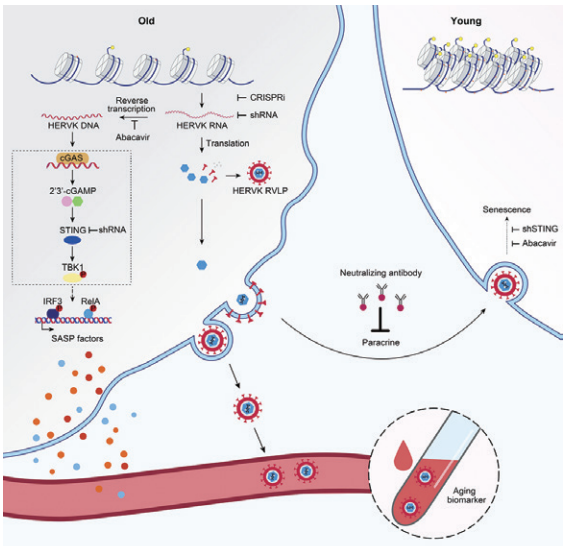
By YAN Fusheng (Staff Reporter)

In a report published in *Cell* on January 6, a team of CAS scientists led by Dr. LIU Guanghui and Dr. QU Jing at the Institute of Zoology and Dr. ZHANG Weiqi at the Beijing Institute of Genomics discovered a surprising connection between endogenous retroviruses (ERVs) and aging. This discovery offers new insights into the molecular changes and mechanisms behind aging and could potentially pave the way for the development of therapeutic strategies to treat aging-related disorders.

ERVs are ancient retroviral infections that have integrated into our DNA over time and make up around 8% of the human genome. They are believed to have played a role in human evolution, and their elements within the human genome have been co-opted to perform essential functions, such as the formation of the placenta.

While most ERVs are inactive, some evolutionarily young subfamilies, such as the human endogenous retrovirus-K (HERV-K, also known as HML-2) subgroup, can still produce viral proteins, and have been linked to a variety of diseases, including cancer.

Utilizing cross-species models and multiple techniques, the researchers found that the expression of endogenous retroviruses is associated with cellular and tissue aging. Furthermore, the accumulation of HERV-K retrovirus-like particles (RVLPs) has been shown to promote aging in recipient cells, suggesting a potential role in the pathogenesis of aging-related disorders.



In human senescent cells, the most recently integrated human ERVs, HERV-K, become unlocked, transcribing viral genes and producing retrovirus-like particles (RVLPs). These RVLPs can transmit a message to young cells, causing them to exhibit senescence phenotypes. This effect can be blocked by neutralizing antibodies. (Image by CAS)

The study showed that the aging-promoting effects of endogenous retroviruses can be blocked by using neutralizing antibodies, which leads to a decrease in cell aging and tissue damage in living organisms.

The unexpected link between ERVs and aging offers new insights into the molecular changes and mechanisms underlying aging, opening up avenues for potential therapeutic strategies to address aging-related disorders.

Reference

Liu, X., Liu, Z., Wu, Z., Ren, J., Fan, Y., Sun, L., . . . Liu, G. H. (2023). Resurrection of endogenous retroviruses during aging reinforces senescence. *Cell, 186*(2), 287-304.e226. doi:10.1016/j.cell.2022.12.017