AGE LINES

The human genome is riddled with long interspersed nuclear element-1 (LINE-1 or L1) retrotransposons, with more than 500,000 copies throughout its length. While most of these are inactivated as a result of mutation, some 100 or so L1 elements retain their ability to copy and paste themselves among the chromosomes, posing diverse dangers to our cells and possibly contributing to age-related deterioration.

SIRT6, an enzyme encoded by a well-known longevity-related gene, represses the expression of L1 by binding to the 5' untranslated region (5' UTR) of the retrotransposons and packaging them into transcriptionally repressive heterochromatin.

In older cells, SIRT6 becomes depleted from the L1 5'UTR, perhaps as a result of being called to the site of DNA damage to aid in the repair process. As a result, L1 becomes transcriptionally active, able to copy itself and jump to new positions throughout the genome, causing mutations, inflammation, and other damage that may be linked to age-related phenotypes and pathologies.