Autophagy, Hayflick's limit, telomerase

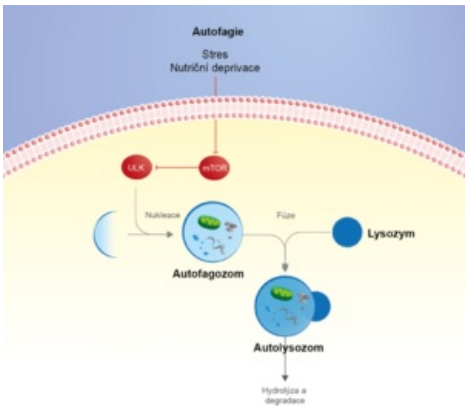
A cell for immortality needs to meet three conditions:

1. They must divide, diluting non-degradable proteins, or be asleep in a hypoxic environment.
2. Must have telomerase.
3. It must not have any (or must be turned off) mitochondria, as specialized postmitotic nerve cells and heart and skeletal muscle cells age the most.

However, cell immortality would still be only biological. Because neurons and their pathways would be restored, memory, personality, and other similar characteristics could not be preserved.

Autofagie

Autophagy is used to remove unnecessary proteins and organelles. We distinguish between **macroautophagy** (organophagous autophagy), in which whole organelles are eliminated, and **microautophagy** (macromolecular autophagy), in which macromolecules and unnecessary organelles are removed. Another type of autophagy may be **chaperones mediated autophagy**(chaperones mediate phagocytosis and lysosome fusion), where KFERQ proteins are eliminated. The last type is the so-called "abnormal autophagy", which leads to apoptosis.



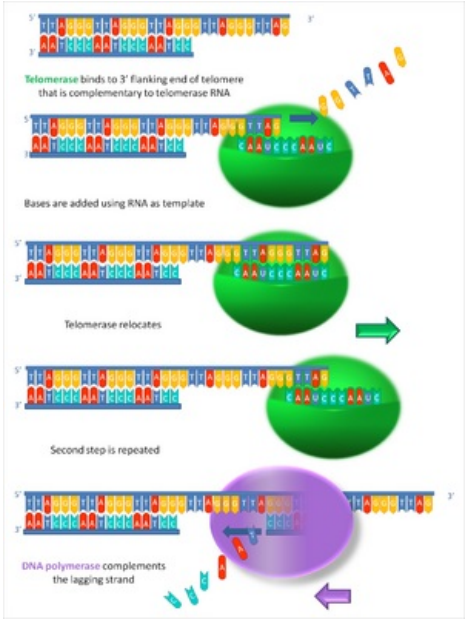
Autofagie

Hayflick's limit

The Hayflick limit sets the **maximum number of divisions** a cell goes through before its extinction. Human fibroblasts in culture can divide a maximum of 50-70 times, then age and die. The Hayflick limit applies to all somatic cells, but does not apply to tumor cells. It also depends on the current age of the cell and the (non) presence of telomerase; for cells isolated from the elderly, the number of divisions is smaller. Most somatic cells, especially fibroblasts and epithelial cells, never reach the Hayflick limit during their existence because it is very high.

Telomerase

Telomerase is a ribonucleoprotein with its own RNA primer that complements the ends of chromosomes during replication - it supplies repetitive sequences to the end of the helix, called telomeres. Most cells in the human body do not need telomerase because they divide little or not at all. Telomerase is present in **stem, germline and activated** immune cells. However, telomerase is not a recipe for immortality either, although mouse somatic cells have it, mice still live shorter than humans, but experimental knockout of the mouse telomerase gene has led to premature aging.



Principle of telomerase function

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Source

- ws:Autofagie, Hayflickův limit, telomeráza
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