

# Abstract

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## Telomere shortening and ageing of the immune system.

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**BACKGROUND:** Telomeres are protein-DNA complexes localized at the ends of linear chromosomes constituted by short, tandem G-rich hexanucleotide repeats and associated proteins. Their length shortens with each cell division and correlates inversely with age. It can be modified by genetic and epigenetic factors, sex hormones, reactive oxygen species and inflammatory reactions. A critical minimum length of telomeres triggers a cell cycle arrest or senescence of the cell.

**DISCUSSION:** The immune system is highly sensitive to shortening of telomeres as its competence depends strictly on cell renewal and clonal expansion of T- and B-cell populations. Cells of the immune system are unique among normal somatic cells as they can up-regulate telomerase, the telomere extending enzyme, and limit telomere attrition in the process of cell proliferation undergoing in activated cells. Telomere length is highly variable among humans.

**RESULTS:** Lineage-specific telomere shortening with different kinetics of telomere attrition was observed in CD4+, CD8+ T lymphocytes, B lymphocytes, granulocytes, monocytes and NK cell population. Immunosenescence is characterized by a special remodeling of the immune system induced by antigen exposure and oxidative stress.

**CONCLUSION:** In ageing immune system adaptive immunity deteriorates because of a progressive decline of naive T and B cells and decrease of absolute numbers of T and B lymphocytes. The innate compartment of the immune system is relatively well preserved although some age-dependent alterations can be also observed. Nonagenarians or centenarians represent phenomenon of successful ageing of the immune system as most of their immune parameters are well preserved.

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