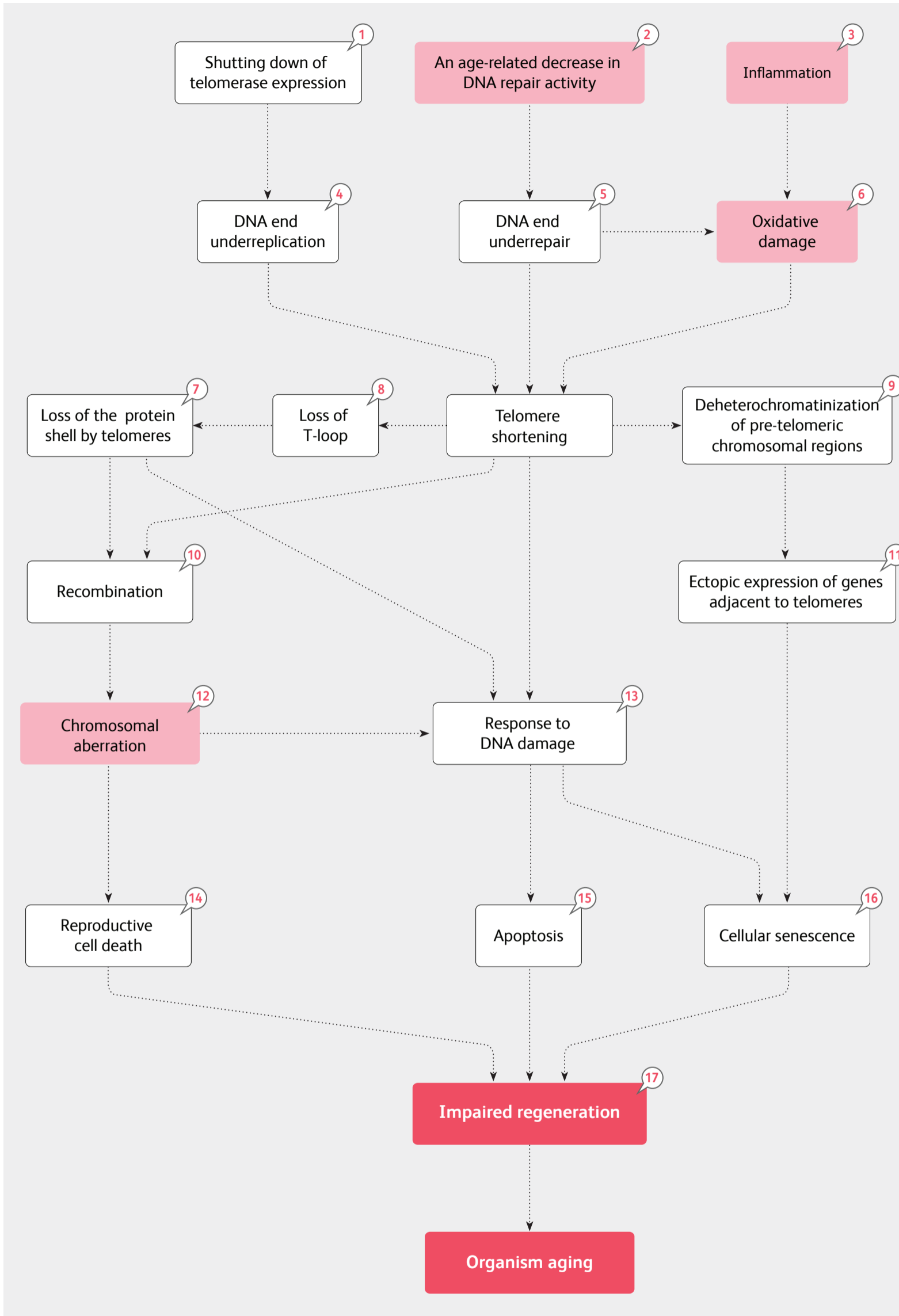


Telomeres and aging



Explanatory notes to the diagram:

- 1 **Telomerase** is the enzyme that extends telomeres by adding repetitive DNA sequences *TTAGGG*
- 2 **An age-related decrease in DNA repair activity** refers to deregulation of repair of DNA lesions that occur with age
- 3 **Inflammation** is a complex local and generalized pathological process that involves a network of defense reactions in response to nonself agents
- 4 **DNA end underreplication**. Upon repair DNA-polymerase is only able to incorporate the first nucleotide to the existing 3' hydroxyl group of a primer (RNA oligonucleotide), followed by its cleavage. This results in shortening of telomeric ends of the daughter DNA chain by the length of the primer
- 5 **End underrepair** is incomplete repair of chromosomal ends
- 6 **Oxidative damage** is cell damage induced by oxidation
- 7 **Loss of the protein shell by telomeres** results from changes in the protein shell surrounding telomeres
- 8 **T-loop (telomere loop)** is a heteroduplex formed by the telomeric single-stranded G-end with a telomeric DNA sequence that distinguishes it from a common double-stranded break recognized by repair proteins
- 9 **Deheterochromatinization** is the decondensation of chromosomal segments in the interphase nucleus, accompanied with gene activation
- 10 **Recombination** is the rearrangement of genetic information by physical exchange of DNA sequences between conjugating chromosomes
- 11 **Ectopic expression of genes adjacent to telomeres** - the pathological activation of silent genes that are located adjacent to pre-telomeric chromosomal regions
- 12 **Chromosomal aberration** is a change in the chromosomal structure induced by breakage followed by rearrangement, deletion, or duplication of genetic material. The occurrence of dicentric chromosomes could be lethal for the cell or lead to genetic instability
- 13 **Response to DNA damage** is a sequence of events involving recognition of DNA lesions, activation of specific protein kinases and transcription factors responsible for expression of genes that arrest the cell cycle, repair DNA, or trigger apoptosis
- 14 **Reproductive cell death (mitotic catastrophe)** is the blockage of cells having corrupted chromosomes during mitosis, followed by caspase activation and cell death. Inhibition of mitotic catastrophe produces aneuploid cells and increases the likelihood of tumorigenesis
- 15 **Apoptosis** is a programmed cell death in response to external or internal signals
- 16 **Cellular senescence** is irreversible cell cycle arrest
- 17 **Impaired regeneration** is the gradual loss of the ability of all living organisms to recover damaged tissues

The key of colors

