

Developmental biology
cellular and extra cellular aging
iii M.Sc zoology

Remya varghese (assistant professor
on contract)

Cellular and extracellular aging

Cellular aging

- Cellular aging is the result of a decline in the proliferation capacity and lifespan of cells and the effects of continuous exposure to exogenous factors that cause accumulation of cellular and molecular damage.

- Normal life span - brain cells live as long as you do and the neurons in CNS once formed by age 6 do not divide. RBC live only 120 days
- Gender differences - women live longer than men 78 vs 81 years may be due to genetic superiority
- Different speeds with which mortality increases with age correspond to different maximum life span among species.
- For example, a mouse is elderly at 2 years, while a human is elderly at 80 years.

Intracellular changes

- With advancing age nucleus shrinks and stains deeply this is due to the condensation of the nuclear material
- Aging accelerated by chromosomal aberrations and somatic gene mutations
- Degeneration of cytoplasmic organelles.

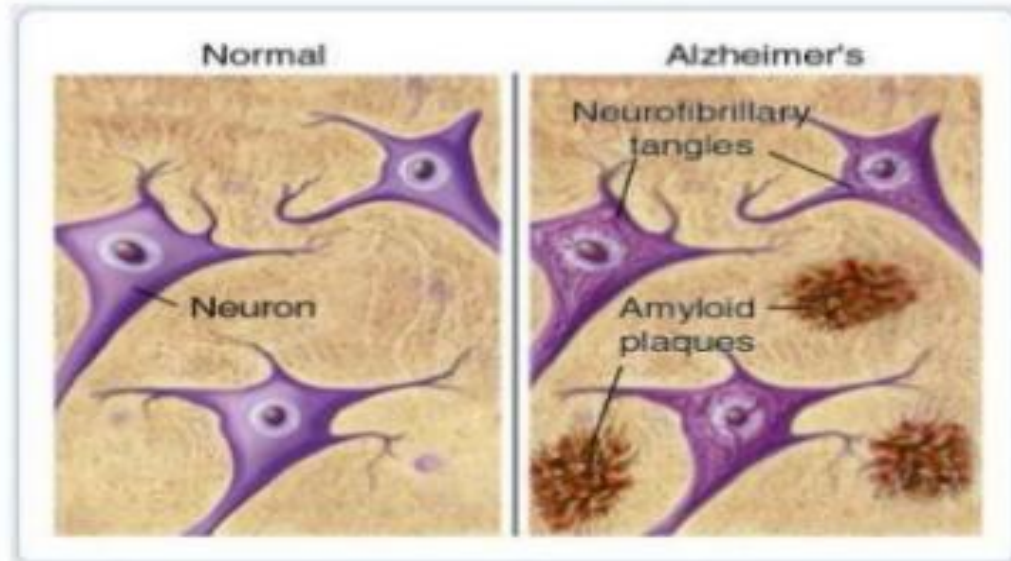
- Telomere shortening
- Accumulation of aging pigments
- Accumulation of free radicles
- Weakened immune system
- Decrease in rate of cell division

Extracellular changes

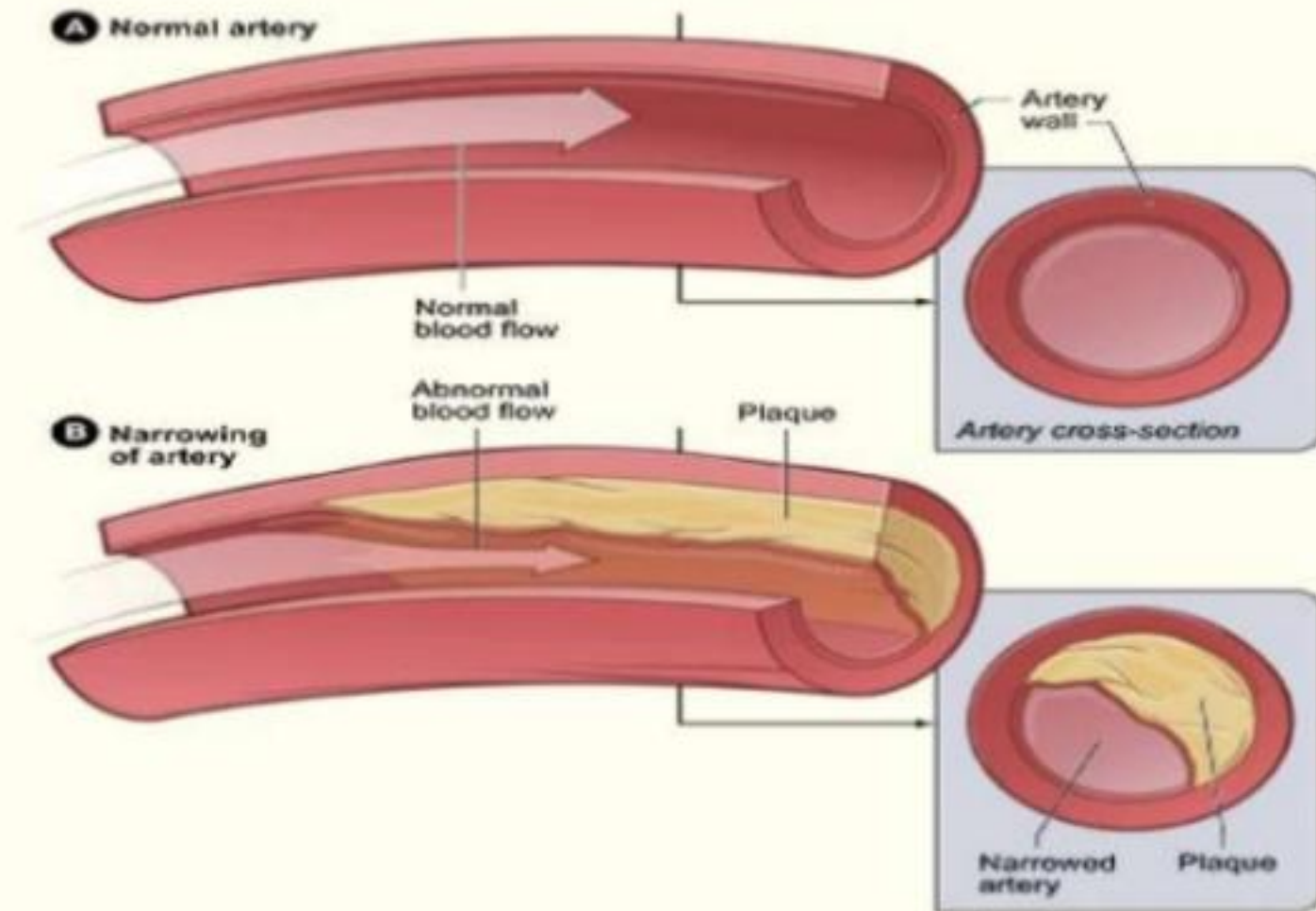
- Changes occur in the intra cellular spaces and in the lumen of blood vascular system are examples.
- Dementia : serious loss of cognitive ability
- Alshaimers disease
- Artherosclerosis

Alzheimer's disease

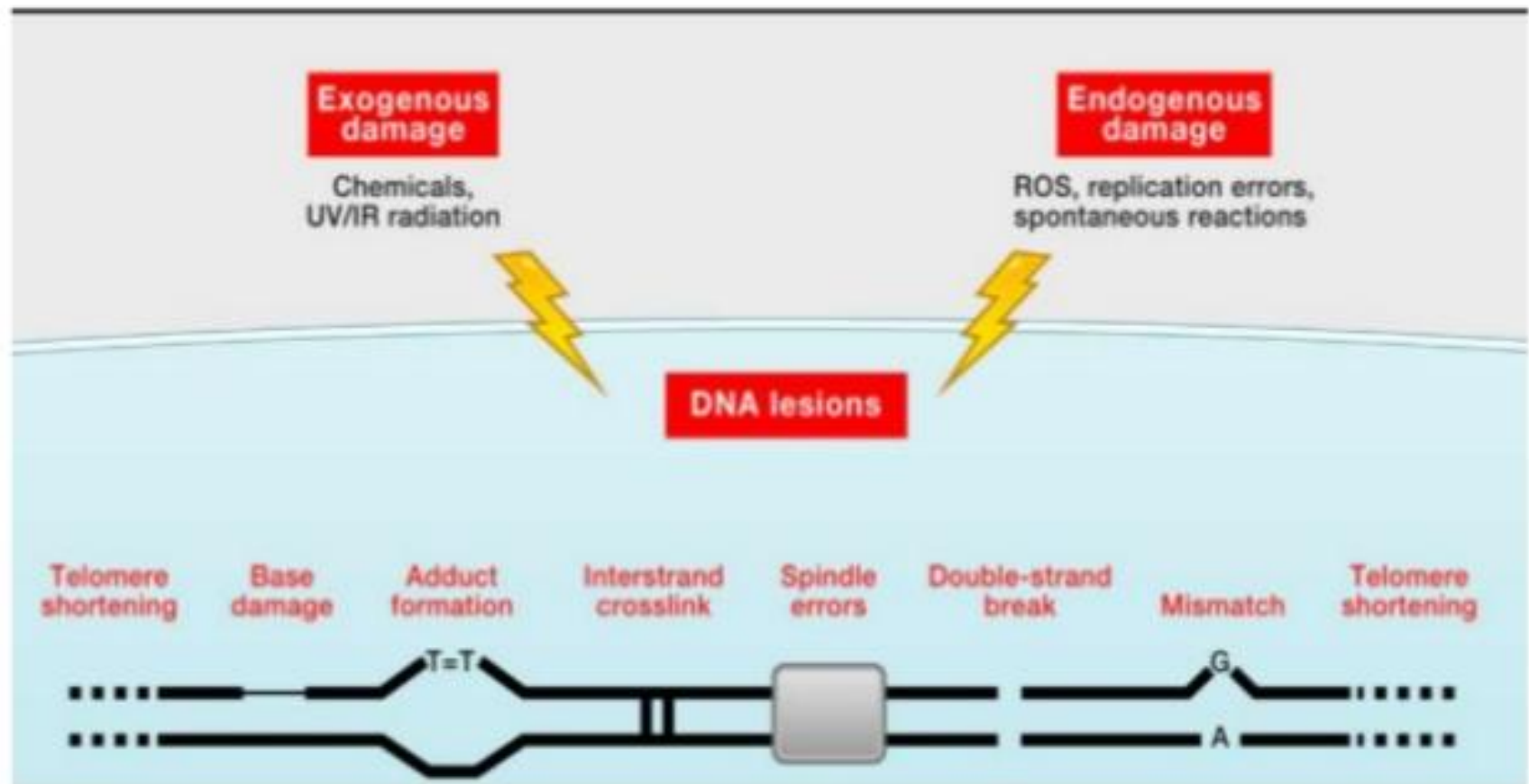
In Alzheimer's disease, a substance called **amyloid** builds up and causes the early death of brain cells, which results in a progressive loss of memory and other brain functions.



Atherosclerosis



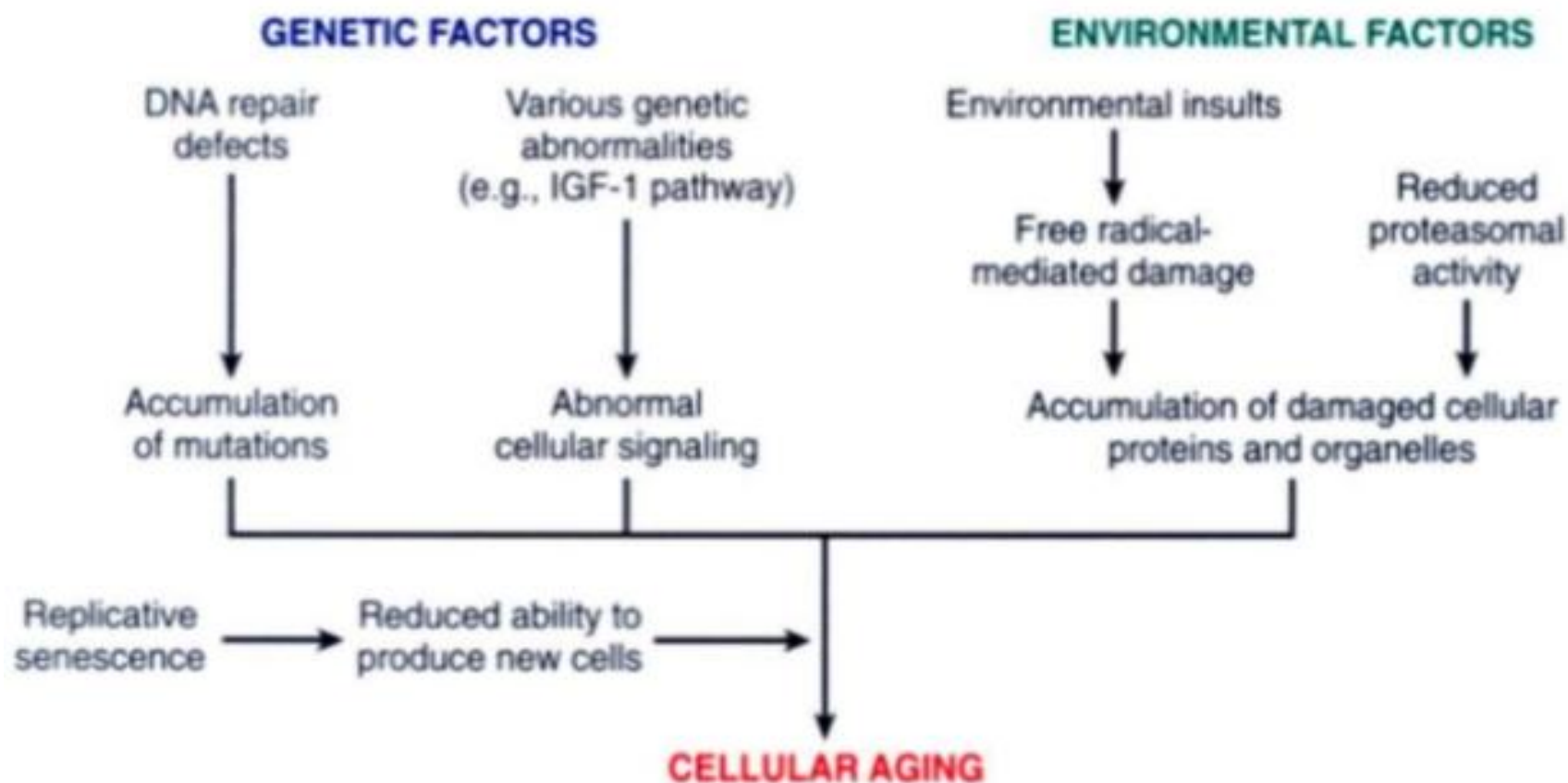
• Genomic Alterations



The Hallmarks of Aging



Mechanisms of cellular aging. Genetic factors and environmental insults combine to produce the cellular abnormalities characteristic of aging



Changes in collagen

- There is an increase in the amount of collagen proteins deposition in the intercellular spaces.
- This influences the permeability of cell membranes, affects the speed of diffusion of substances in and out and significantly influences the process of aging.

Wrinkles and Ageing

- Wrinkles are a by-product of the aging process.
- With age, skin cells divide more slowly, and the inner layer, called the dermis, begins to thin.
- The network of elastin (the protein which causes skin to stretch) and collagen fibers (the major structural proteins in the skin), which support the outer layer.
- With aging, skin also loses its elasticity, is less able to retain moisture, oil-secreting glands are less efficient and the skin is slower to heal.