

HOMEOSTASIS → a state of constant internal environment

→ normally (tightly regulated)

→ such as body temperature, pH, sugar level.

Causes of cell injury :-

1 Oxygen Deprivation

A - Hypoxia

→ most common cause of injury

→ ischemia, anemia, lung diseases, CO

→ oxygen deficiency

B - Ischemia

→ most common cause of cell injury

→ reduce blood supply.

→ Arterial obstruction.

2 Toxins

A - Drug → susceptible patients

B - Innocuous substances

H₂O, sugar, salt, O₂

C - air pollutant, CO, asbestos

cigarette smoke, ethanol & insecticides

6 Genetic abnormalities

* Sickle cell anemia

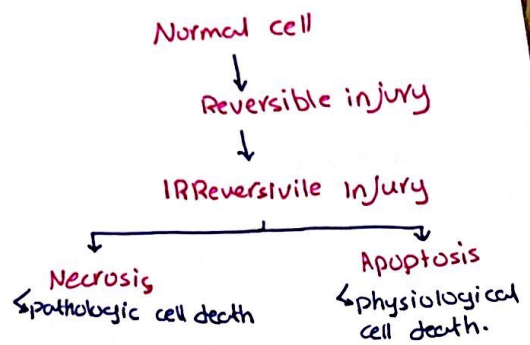
Glu → Val

O C
RBC RBC

* DOWN syndrome

8 Aging

↳ ↓ ability of cell to respond to stress
death of cell & organ ← consequence



3 Infectious Agent

4 physical Agent.

5 Immunologic Reactions

A - Autoimmune reaction

B - Allergic reaction.

↳ innocuous substances.

C - excessive response to microbe

↳ inflammatory reaction

7 Nutritional Imbalances

A - ptn. - calorie insufficiency.
countries in poverty.

B - specific vitamin deficiency

C - excessive dietary intake

↳ Obesity & DM-2, MI, stroke
atherosclerosis

CELL INJURY

REVERSIBLE

- The injured cell can return to normal if the damaging stimulus is removed.

morphological abnormalities

Cellular Swelling.
- Result from failure of $(Na^+ - K^+ \text{ pump})$ due to ATP depletion

- Gross \rightarrow microscope

- Gross \rightarrow pallor, \uparrow turgor, \uparrow weight.

- Microscopy \rightarrow small clear vacuoles

- organelles within the cell also swollen EPR

2) Fatty change

- Result from Hypoxic injury, toxic & metabolic injury.

- Seen mainly in organ that involved in fat metabolism

LIVER, HEART

- Microscopy \rightarrow lipid (Triglyceride) vacuole in the cytoplasm

ULTRA structure

- plasma membrane alteration
blebbing, blunting.
- Mitochondrial swelling.
- Dilation of ER
detachment of ribosomes

- Clumping of nuclear chromatin

- Cytoplasmic Myelin

IRREVERSIBLE

- If the stress severe, persistent, rapid in onset.

Pneumonia

\rightarrow inability to restore mitochondria function even after resolution of the original injury.

\rightarrow plasma membrane + intracellular loss of structure & function

\rightarrow loss of DNA & chromatin structural integrity.

cell death
MI
20-30 m

ULTRA structural change
 \downarrow
2-3 m

Light microscopic change
 \downarrow
6-12 h

Gross change
 \downarrow
1-2 m \rightarrow non-contraction
12-24 h