

HIGH YIELD



what is pathology ?

The study of the structural & functional changes in cells, tissues, & organs that underlies diseases. It involves the examination of surgically removed organs, tissues (biopsy samples), bodily fluids, and, in some cases, the whole body (autopsy).

Cell injury

Cells actively interact with their environment, constantly adjusting their structure and function to accommodate changing demands and extracellular stresses.

The intracellular milieu of cells is normally tightly regulated such that it remains fairly constant, a state referred to as homeostasis.

physiologic stresses (such as increased workload in the heart) potentially injurious conditions (such as nutrient deprivation).



The cells undergo adaptation: new steady state with preserving viability and function.



If the adaptive capability is exceeded or if the external stress is inherently harmful or excessive, cell injury develops

Anatomical pathology
+**Cytopathology**
+**Dermatopathology**
+**Forensic pathology**
+**Histopathology**
+**Neuropathology**
+**Pulmonary pathology**
+**Renal pathology**
+**Surgical pathology**
Clinical pathology
+**Hematopathology**
+**Immunopathology**
+**Radiation pathology**
Molecular pathology

+ General pathology: basic concepts that are shared among various disease in multiple organs/systems (Ex: Inflammation, cell injury and neoplasia)
+ Systematic Pathology: discuss pathology of diseases of a specific organs/systems

Causes of cell injury

- Oxygen Deprivation (Hypoxia Vs ischemia)
 - : most common causes of injury
 - Toxins: smoking, alcohol
 - Infectious Agents
- Immunologic Reactions : autoimmune disease
 - Genetic Abnormalities
 - Nutritional Imbalances :
 - Overintake: obesity, diabetes
 - Insufficiency: protein, vitamins
- Physical Agents : trauma, burn
 - Aging

Ischemia and Hypoxia

♥ **Ischemia is insufficient blood flow to provide adequate oxygenation.**

♥ **Usually caused by arterial thrombus formation or vasospasm.**

♥ **hypoxia : oxygen deficiency, can be caused by: Ischemia, anemia, lung disease, CO poisoning.**

♥ **Ischemia results in hypoxia; however, hypoxia can occur with normal (or elevated) blood flow if, for example, the oxygen content of the arterial blood is decreased by anemia.**

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Morphological of reversible cell injury;

1. Cellular Swelling

- Reversible process results from failure of the sodium potassium pump (energy-dependent ion pumps) due to ATP depletion.

Gross: pallor, turgor. Microscopy:

- Cellular swollen.
- hydropic change.

SEQUENCE OF EVENTS IN CELL INJURY AND CELL DEATH..

♥ Reversible Cell injury:

- the stage of cell injury at which the deranged function and morphology of the injured cells can return to normal if the damaging stimulus is removed

♥ Irreversible Cell injury:

- the stage of cell injury at which the injured cells pass a nebulous "point of no return" and undergo cell death.
- Occur if the stress is severe, persistent, or rapid in onset.

2. Fatty change

It is reversible process, seen mainly in organs that involved in fat metabolism like Hepatocytes and myocardial cells . Occurs mainly in hypoxic injury, toxic and metabolic injury.

Microscopy:

- lipid (triglyceride) vacuoles in the cytoplasm

Irreversible cell injury consistently characterized by three phenomena:

- ♥ The inability to restore mitochondrial function even after resolution of the original injury
- ♥ Loss of structure and functions of the plasma membrane and intracellular membranes
- ♥ Loss of DNA and chromatin structural integrity.

Depending on the nature and severity of the insult, cellular death may in form of:

- ♥ Necrosis
- ♥ Apoptosis
- ♥ necroptosis

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