



الكلية : الطب

القسم او الفرع : الامراض والطب العدلي

المرحلة: الثالثة

أستاذ المادة : امراض

اسم المادة باللغة العربية : علم الامراض النسيجي

سم المادة باللغة الإنكليزية : pathology

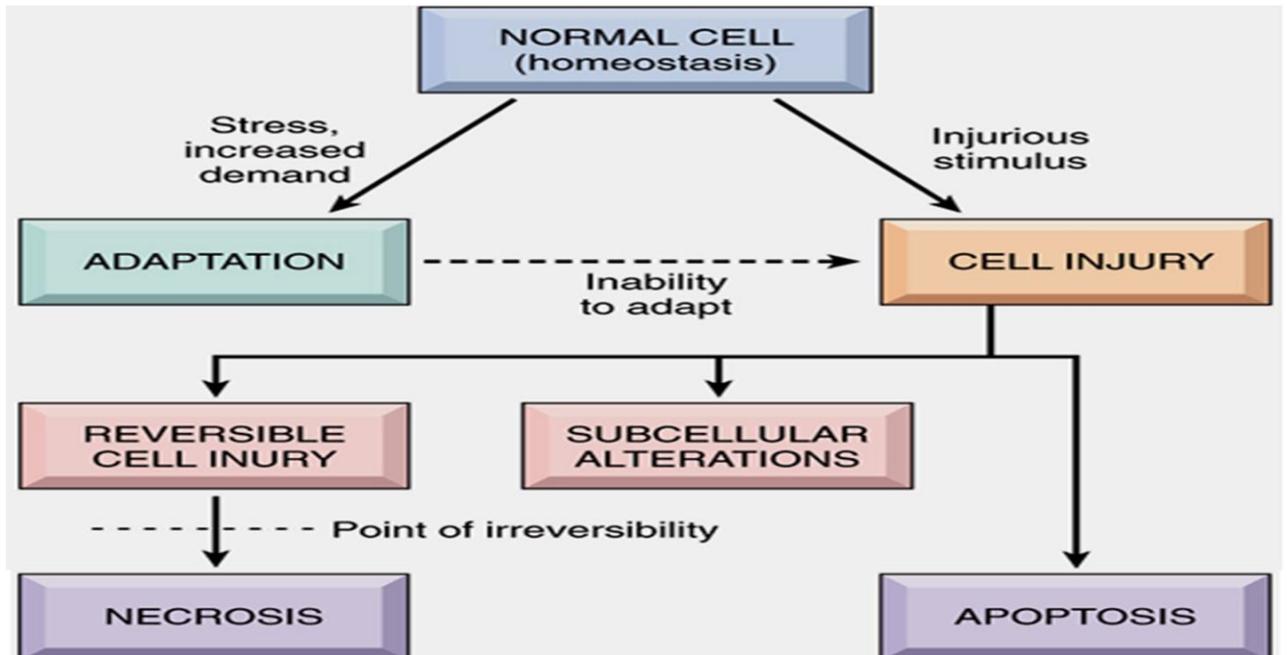
اسم المحاضرة الأولى باللغة العربية: اصابة الخلية/ المحاضرة الاولى

اسم المحاضرة الأولى باللغة الإنكليزية : cell injury

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Cellular responses to stress & noxious stimuli

- In normal state, cells are remained in homeostasis structurally and functionally.
- Exposure to injurious or stressful stimuli can lead to cells adaptation.
- Adaptation is structural and functional changes that achieved by cells after exposure to stressful stimuli to preserve viability and function.
- If the adaptive capabilities exceeded or stressful stimuli is severe from start cell injury develops.
- Cell injury is either reversible or irreversible.



Causes of cell injury

- Toxins :CO, asbestos, cigarette smoke ,drugs.
- Infectious agents : virus ,bacteria ,fungi ,protozoa's
- Immunological reaction
- Genetic abnormalities
- hypoxia and ischemia
- Nutritional imbalance; protein deficiency , vit. deficiency
- Physical agents: trauma ,extremes temperature ,radiation
- Aging

Cell injury

Cell injury is divided into :

1. Reversible cell injury.

2. Irreversible cell injury.

1- Reversible cell injury: indicates that the changes will regress and disappear when the injurious agent is removed; the cells will return to normal, morphologically and functionally.

eg. angina pectorals (few minutes)

2- Irreversible cell injury: occurs when the injury persists or when it is severe from the start. Cell alterations reach the point of no return and progression to cell death is inevitable.eg. **Myocardial infarction**

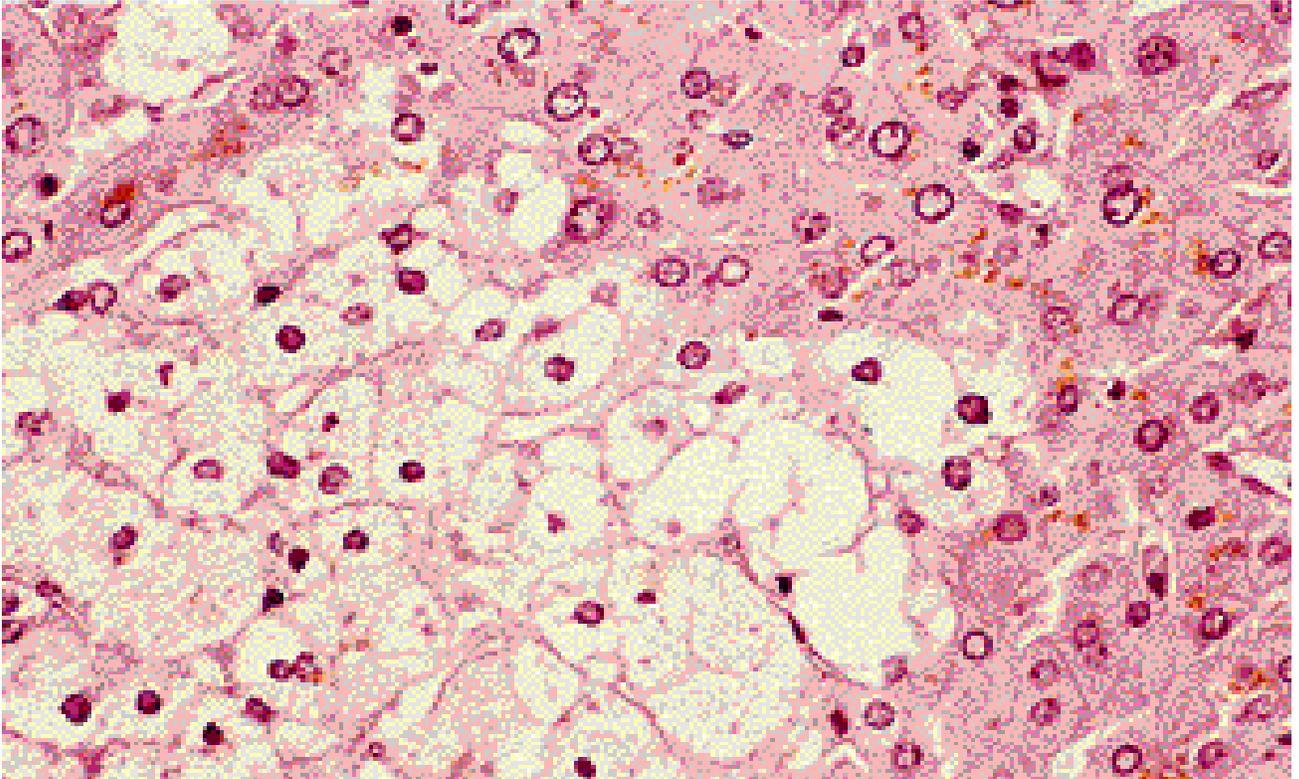
Examples of reversible cell injury

1. Acute cellular swelling (hydropic change, hydropic degeneration)

This is an early change in many examples of reversible cell injury. The extra-fluid may be seen by light microscopy as an increase in the size of the cell with pallor

of the cytoplasm (**cloudy swelling**). With further water accumulation clear vacuoles are created within the cytoplasm (**vacuolar degeneration**).

2. Fatty change (see later).

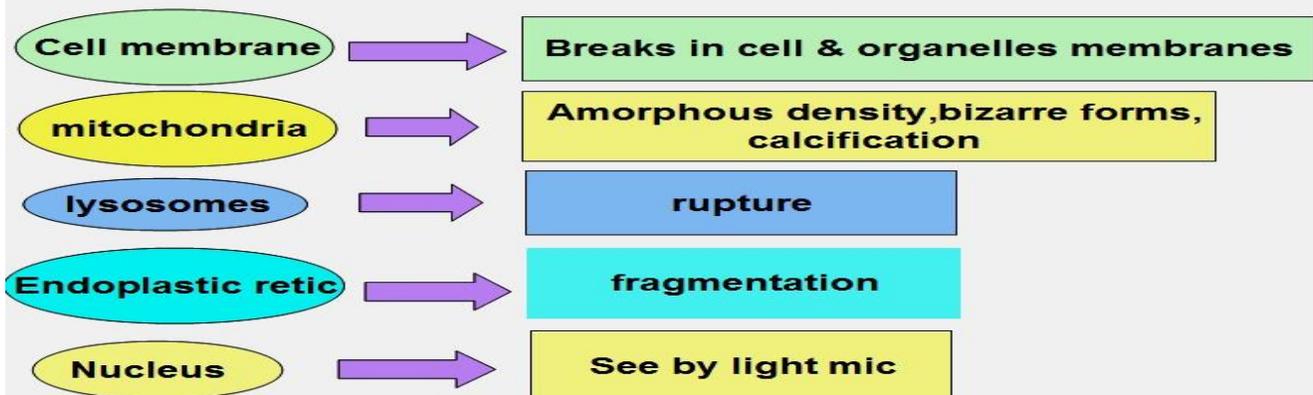


Morphology of reversible cell injury

acute cellular swelling/ hydropic vacuolation

- **EM changes**
 - dilatation of ER
 - detachment of ribosomes & dissociation of polysomes into monosomes
 - cytoplasmic blebs & loss of microvilli
 - myelin figures
 - whole cell swollen
- **LM**
 - large pale cytoplasm + clumping of chromatin
- **Gross**
 - pale heavy organ

Ultra structural changes in irreversible injury



Irreversible cell injury

- **Mitochondrial damage is one of the most reliable early features** of this type of injury.

- **Damage to cell membranes is more severe** than in reversible injury, resulting in **leakage of the cellular constituents** outside their normal confines.

- **liberation and activation of lysosomal enzymes** (proteinases, nucleases etc.), which are also normally bounded by membranes.

These liberated and activated enzymes digest both cytoplasmic and nuclear components (**autolysis**).

The end result is total cell necrosis, which is the morphological expression of cell death.