



[A QUICK SUMMARY]

[pathology, 1st lec]



OCTOBER 17, 2020
[DONE BY: OLA ALAHDAB & AYSHA SALAMEH]

ADAPTATION

PHYSIOLOGIC

PATHOLOGIC

FORMS OF ADAPTATIONS

INCREASE IN CELL SIZE

INCREASE IN NNNO. OF CELLS

DECREASE IN CELL SIZE

CHANGE INTO ANOTHER type OF CELLS

When adaptation occurs, the functions can be affected, but the cell is still functional.

ADAPTATION MACHANISIMS:

HYPER**T**ROPHY

- An increase in cell **size** and functional capacity
- It can be: **PURE** (without hyperplasia)
Eg: cardiac muscles & skeletal muscles.
Or **MIXED** (with hyperplasia)
Eg: smooth muscles of uterus.

➤ Causes:

- 1- **Hormonal** stimulation.
- 2- **Growth factor** stimulation.
- 3- Increased **functional demand**.

IT CAN BE

PATHOLOGIC

PHYSIOLOGIC

Eg: -**The hypertrophy of the cardiac muscles (pure)**, as a response to hypertension or aortic valve stenosis (it can make cell injury).

Eg: -**The smooth muscles of uterus** (they can also go hyperplasia (mixed))

- **The Skeletal muscles of athlete (pure).**

HYPER**P**LASIA

- An increase in NNNo. of cells size (and increase in the size of the organ).
- It can be: **PURE** Or **MIXED**.

IT CAN BE

PATHOLOGIC

PHYSIOLOGIC

➤ Causes:

- Excessive **hormonal** stimulation.
- Viral** infections.

Eg: -**Endometrial hyperplasia** (due to over estrogenic stimulation)
- **Benign prostatic hyperplasia** (androgenic stimulation in males)
- **Warts (HPV).**

- Pathologic hyperplasia can lead to cancer

➤ Causes:

- Hormonal** stimulation.
- Compensatory.**

Eg: -Hyperplasia of the **breast glandular tissue**
-Compensatory **hyperplasia of the liver**

Adaptation to stress can progress to cell injury if the stress is not relieved

ATROPHY

- Decreased cell size and function.
- Mechanisms:
 - Decrease protein synthesis. -Increase protein degradation. -Increase in cell autophagy (the newly adaptive cells will eat its own organelles to generate energy)

- Causes:
 - **Decreased workload** (immobilization of a limb after fracture)
 - **Loss of innervations** (cutting a nerve).
 - **Diminished blood supply** (eg: ischemia).
 - **Inadequate nutrition**
 - **Loss of endocrine stimulation**
 - **Aging (senile atrophy)**

IT CAN BE

PHYSIOLOGIC

Eg:
Loss of hormonal stimulation in menopause
(endometrial atrophy).

PATHOLOGIC

Eg:
-**Denervation injury.**
-**Chronic ischemia** (like the skin of lower limb in patients who have arteriosclerosis or diabetes)

Adaptation to stress can progress to cell injury if the stress is not relieved

NOTE:

ENDOMETRIAL HYPERPLASIA = PATHOLOGIC
ENDOMETRIAL ATROPHY = PHYSIOLOGIC

- **ISCHEMIA OR MYOCARDIAL INFRACTION ----> CELL DEATH**
- **NO OXYGEN ----> CELL INJURY**

METAPLASIA

- Change from one cell *type* to another
Happens in **stem cells** (not differentiated ones).
- Persistent change can cause **cancer**
- New cell type copes better with stress but function less.

- Causes:
 - **Smoking**
 - **GERD** (Gastroesophageal reflux disease)
 - **Vitamin A deficiency** (Vitamin A is needed for normal epithelial differentiation, deficiency leads to squamous metaplasia of the bronchi)

CAUSES OF CELL INJURY

- **CHEMICAL AGENTS**
- **INFECTIOUS AGENTS**
- **IMMUNOLOGIC REACTIONS**
- **GENETIC FACTORS**
- **NUTRITIONAL IMBALANCES**
- **PHYSICAL AGENTS (EG: TRAUMA & SHOCKS)**
- **AGING**
- **OXYGEN DEPRIVATION (HYPOXIA VS ISCHEMIA)**

The main mechanism of ischemia in causing cell injury is the **lack of blood supply** (because of the occlusion of an artery) which leads to lack of oxygen supply.

- **NO OXYGEN ----> CELL INJURY**

PULMONARY DISEASES can also cause lack of oxygen, such as

- **pulmonary hypertension**
- **emphysema**
- **obstructive pulmonary diseases.**

اللي بتصير بالقلب