INTRODUCTION TO STUDY OF PATHOPHYSIOLOGY

- **Pathophysiology - definitions /Pa-Phys/ :** is a biomedical science dealing with functional changes in diseased organism
- Pathophysiology deals with temporal زمانيا and spatial مكانيا dynamics in the intensity of pathological processes
- Pathophysiology belongs to core subjects of undergraduate medical education
- Pathophysiology deals with logic of life under pathological conditions
- Pathophysiology help us to understand the logic of life during development of pathological processes
- Pathophysiology creates a bridge between sciences and clinical subjects in undergraduate medical education

THE MAIN TASKS OF PATHOPHYSIOLOGY

1- To teach mechanisms of diseases 2- To help to understand the substance of health

3- To help students to understand the logic of life under pathological conditions

pathophysiolog

1. General pathophysiology

2. Special /organs, systems/ **pathophysiology**

General pathophysiology

It deals with general pathologic processes, and pathomechanisms: -thay are involved in pathogenesis of more than one disease. It also contain explanation of some basic medical terms

- **Examples of general pathological processes –**

inflammation, fever, hyperthermia, hypothermia, shock, stress, edemas, disturbances of control mechanisms, hyperreactivity, hypoactivity, damage of genetic information....

Defensive and adaptive mechanisms –

- non-specific and specific immunity, hypertrophy, atrophy, hyperfunction, hypofunction, homeostasis

● **Incresed predisposition to onset of disease (diathesis, athopy) –** due to genetic or/and environmental factors

CELLULAR PATHOPHYSIO LOGY

Cellular pathology, also known as anatomical (or anatomic) pathology is the branch of pathology that involves the study of body organs and tissues (groups of cells). Cellular pathology is considered one of the diagnostic branches of medicine.

Its roles include determining the cause of certain diseases and the effect(s) that they are having on the body, assisting with the choice of treatment that will be given, aiding in giving a prognosis and determining what may have caused a person's death.

There are two main subdivisions within cellular pathology.

1. Histopathology
2. Cytopathology (cytology)

Histopathology

Histopathology (or histology) involves the examination of sampled whole tissues under the microscope. Three main types of specimen are received by the pathology laboratory.

1- Larger specimens include whole organs or parts thereof, which are removed during surgical operations. Examples include a uterus after a hysterectomy, the large bowel after a colectomy or tonsils after a tonsillectomy.

2- Pieces of tissue rather than whole organs are removed as biopsies, which often require smaller surgical procedures that can be performed whilst the patient is still awake but sedated. Biopsies include excision biopsies, in which tissue is removed with a scalpel (e.g. a skin excision for a suspicious mole) or a core biopsy, in which a needle is inserted into a suspicious mass to remove a slither or core of tissue that can be examined under the microscope (e.g. to investigate a breast lump).

3- Fluid and very small pieces of tissue (individual cells rather than groups of cells, e.g. within fluid from around a lung) can be obtained via a fine needle aspiration (FNA). This is performed using a thinner needle than that used in a core biopsy, but with a similar technique. This type of material is usually liquid rather than solid, and is submitted for cytology rather than histology

Specimens received by the pathology laboratory require tissue preparation then are treated and analyzed using techniques appropriate to the type of tissue and the investigation required. For immediate diagnosis during a surgical procedure a frozen section is performed.

Special techniques in histopathology

Many additional methods of tissue analysis are available to assist in diagnosis if routine processing and microscopy do not give a definitive answer.

- Staining
- Immunohistochemistry
- Electron microscopy
- Flow cytometry
- Cytogenetics

Cytopathology

Cytology is the study of individual cells . Sampled fluid/ tissue from a patient is smeared onto a slide and stained (see techniques, below). This is then examined under the microscope by the anatomical pathologist to look at the number of cells on the slide, what types of cells they are, how they are grouped together and what the cell details are (shape, size, nucleus etc). This information is useful in determining whether a disease is present and what is the likely diagnosis.

Cytology is most often used as a screening tool; to look for disease and to decide whether or not more tests need to be performed. An example of screening would be the investigation of a breast lump.

In combination with examination by the clinician and imaging tests, a needle aspirate of the lump submitted for cytology will show whether the breast cells are suspicious for cancer or look bland/ benign.

If they look suspicious, a core biopsy with a larger needle may be performed which takes more tissue, allowing for a definitive diagnosis to be made before deciding what type of surgery is required (local removal of the lump or removal of the whole breast).

Cellular Adaptations

A. Physiologic vs. Pathologic

1. size

- Atrophy: decrease in size of a normally developed organ or tissue
- hypertrophy: organ or tissue cells rise in size

2. number

- hyperplasia: organ or tissue cells rise in number

3. cell type

- metaplasia: abnormal change in the nature of a tissue
- dysplasia: tissue develops large number of immature cells

II Cell Injury

A. Causes 1-environmental toxins which is :- biological or non biological

the non- biological like chemicals and ionizing radiation (free radicals)

2. Trauma a. Pressure b. Temperature c-antibodies

3.deficiencies a. nutrients b. enzyme *c. oxygen (hypoxia)*

B. Reversibility

III Cell Death

A. Apoptosis: cell death without inflammation or scarring

B. Necrosis : cell death by injury/ disease of many types:- coagulative, liquefaction, caseous,

Fatty and gangrene which is either dry, wet or gas gangrene