

INTRODUCTION TO PATHOLOGY

I. pathology

- **Pathology** is the study of disease by scientific methods.
- The word pathology came from the Latin words “patho” & “logy”. ‘Patho’ means disease and ‘logy’ means study,
- Therefore pathology is a scientific study of disease.
- Diseases may, in turn, be defined as an abnormal variation in structure or function of any part of the body

Pathology gives explanations of a disease by studying the following four aspects of the disease.

1. Etiology,
2. Pathogenesis,
3. Morphologic changes and
4. Functional derangements and clinical significance.

1. Etiology

- Etiology of a disease means the cause of the disease.
- If the cause of a disease is known it is called primary etiology.
- If the cause of the disease is unknown it is called idiopathic.
- Knowledge or discovery of the primary cause remains the backbone on which a diagnosis can be made, a disease understood, & a treatment developed.
- There are two major classes of etiologic factors: genetic and acquired (infectious, nutritional, chemical, physical, etc).

2. Pathogenesis

- Pathogenesis means the mechanism through which the cause operates to produce the pathological and clinical manifestations.
- The pathogenetic mechanisms could take place in the latent or incubation period. Pathogenesis leads to morphologic changes.

3. Morphologic changes

- The morphologic changes refer to the structural alterations in cells or tissues that occur following the pathogenic mechanisms.
- The structural changes in the organ can be seen with the naked eye or they may only be seen under the microscope.
- Those changes that can be seen with the naked eye are called gross morphologic changes & those that are seen under the microscope are called microscopic changes.
- Both the gross & the microscopic morphologic changes may only be seen in that disease, i.e. they may be specific to that disease.
- Therefore, such morphologic changes can be used by the pathologist to identify (i.e. to diagnose) the disease.
- In addition, the morphologic changes will lead to functional alteration .

4. Functional derangements and clinical significance

The morphologic changes in the organ influence the normal function of the organ. By doing so, they determine the clinical features (symptoms and signs), course, and prognosis of the disease.

II. Diagnostic techniques used in pathology

The pathologist uses the following techniques to the diagnose diseases:

- a. Histopathology
- b. Cytopathology
- c. Hematopathology
- d. Immunohistochemistry
- e. Microbiological examination
- f. Biochemical examination
- g. Cytogenetics
- h. Molecular techniques
- i. Autopsy

A. Histopathological techniques

- Histopathological examination studies *tissues* under the microscope.
- During this study, the pathologist looks for abnormal structures in the tissue.
- Tissues for histopathological examination are obtained by biopsy.
- **Biopsy** is a tissue sample from a living person to identify the disease.
- **Autopsy** is a tissue sample from a dead person to identify the disease.
- The Hematoxylin/Eosin stain is usually abbreviated as H&E stain.
- The H&E stain is routinely used. It gives the nucleus a blue color & the cytoplasm & the extracellular matrix a pinkish color.
- Then the pathologist will look for abnormal structures in the tissue.
- And based on this abnormal morphology he/she will make the diagnosis.

The aims of study histopathology:

1. Diagnosis the disease.
2. Scientific research and discovery.
3. Application the drugs to scientific researches.

III. The causes of disease :

Diseases can be caused by either environmental factors, genetic factors or a combination of them both.

A. Environmental factors

Environmental causes of disease are many and are classified into:

1. Physical agents: These include trauma, radiation, extremes of temperature, and electric power. These agents apply excess physical energy, in any form, to the body.

2. Chemicals: With the use of an ever-increasing number of chemical agents such as drugs, in industrial processes, and at home, chemically induced injury has become very common. Their effects vary:

- Some act in a general manner, for example cyanide is toxic to all cells.
- Others act locally at the site of application, for example strong acids and caustics.

3. Nutritional deficiencies & excesses: defect in absorption of food may causes anemia.

4. Infections & infestations: like infection with Viruses, bacteria, fungi, parasite,

5. Immunological factors: like : Hypersensitivity reaction , Immunodeficiency and Autoimmunity

6. Psychogenic factors: like stress.

Cellular Response to Stress & Injuries

Stimulus

NORMAL CELLS

stress
overload

injurious
stimulus

Adaptation

in ability to adapt

Cell injury

Irreversible

Reversible

Necrosis

Apoptosis