Introduction to pathology

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Pathology: is the study of structural and functional abnormalities that are expressed as diseases of organs and systems by scientific methods.

Traditionally, the study of pathology is divided into:

1. **General pathology**: which concerned with the basic reactions of cells and tissues to abnormal stimuli that underlie all diseases.
2. **Special or systemic pathology**: which examines the specific responses of specialized organs and tissues to more or less well-defined stimuli.

The final goal of pathology is the identification of the cause / causes of the disease (etiology) that can eventuate in disease prevention &/or successful therapy.

Pathology focus on four aspects of disease process that form the core of pathology:

1. Its cause (Etiology).
2. Mechanisms of its developments (Pathogenesis).
3. Structural alterations induced in the cells and organs of the body (morphologic changes).
4. Functional consequences of the morphologic changes that are observed clinically.

1. Etiology: there are two major classes of etiologic factors:

- Genetically determined disease is due to some abnormalities in the DNA of the fertilized ovum that is inherited from one or both parents.
- Acquired disease is due to effect of some environmental factors like:

1. Deficiency disease e.g., iron deficiency anemia

2. Physical agents e.g., trauma, heat, cold, electricity, irradiation….etc.
3. Chemical factors e.g., poison, toxins…..etc.
4. Infective organisms e.g., bacteria, virus, fungi ….etc.
5. Immunological factors e.g. hypersensitivity.
6. Psychogenic factors e.g., depression, psychosomatic disorders like essential hypertension.
7. Endocrine factors e.g., diabetes.

2. Pathogenesis: refers to the sequence of events in response (of the cells or tissue) to the etiologic agents from the initial stimulus to the ultimate expression of the disease.

3. Morphologic changes: refers to the structural alterations in the cells or tissues that are either characteristic of the disease or diagnostic of the etiologic process. Morphologic changes could be studied grossly or microscopically.

4. Functional derangement and clinical significance: the nature of the morphologic changes and their distribution in different organs or tissues influence normal function and determine the clinical features (signs and symptoms), course and prognosis of the disease.

Disease: is any illness or abnormal state of health either of the whole body or specific parts of organs having characteristic symptoms. It is due to distribution, alteration, or impairment of function or structure or both.

Diseases may be classified into:

1. Those which develop during fetal life (Congenital).
2. Those arise at any time thereafter during postnatal life (Acquired), and those could be:

- Contagious disease that is communicable by means of direct contact or through an intermediate agent.
- Deficiency disease that is caused by absence or shortage of some element vital to bodily health.
- Degenerative disease: a process of general degeneration with no specific cause commonly found in old age.
- Infectious disease which is caused by pathogenic microorganisms.
- Epidemic disease which is an illness that attacks a considerable number in community.
- Endemic disease which is a malady that prevails in certain region or locality or among a particular class of persons.

Lesion:

1- Any injury or wound.
2- Any single patch or area of abnormal tissue.
3- Morbid alteration in tissue function.

Sign: an objective indication of disease, especially some evidence discovered during physical examination.

Symptoms: any indication of the presence or course of a disease, either by functional or other changes occurring in the patient (described by the patient).

Diagnosis: is the recognition of a disease or the location of an injury from observation of signs or symptoms. Diagnosis focuses on the determination of the nature, location and cause of a disease. It could be either

- **Clinical diagnosis**: which is based upon objective symptoms.
- **Pathologic diagnosis**: the recognition of structural lesion in a disease.
- **Differential diagnosis**: distinguishing a disease from another closely related one by the comparison of symptoms.

Clinical features: is the manifestation of certain symptoms on the person due to a disease condition.

Prognosis: a prediction as to the progress, course and outcome of a disease.

Syndrome: is a complex of symptoms occurring together, which characterized on disease or lesion. OR it is a complete group of symptoms which occur together and present a definite basis foe accurate diagnosis.

Hisotpathology: is the study of pathological changes within the structure of tissue or it is the study of cellular changes microscopically.

Haematology: is the study of blood diseases.

Experimental pathology refers to the observation of the effects of manipulations on animal models or cell cultures regarding researches on human diseases.

Clinical pathology: the approach to the patient's illness clinically is based on the following sequence of steps; Patient's history _Examination_Investigations _Diagnosis _Treatment

Chemical pathology: concerned with chemical analysis.

Immunopathology: is the study of immunological diseases.

Cytopathology: is the study of diseases and resulted changes of cells.

Immunohistochemistry and immunofluorescence These techniques employ antibodies (with antigen specificity) to visualize substances (for e.g. cellular proteins or surface receptors) in tissue sections or cytological cell preparations.

Molecular pathology is an emerging discipline within pathology which is focused in the study and diagnosis of disease through the examination of molecules within organs, tissues or bodily fluids.

Molecular pathology is the study of disease at the level of the molecule. These molecules refer to the substances that make up organ tissues and body fluids.

MORBID ANATOMY (AUTOPSY) An autopsy, also known as a post-mortem examination or necropsy. It is a procedure that consists of a thorough examination of a dead body to determine the cause and manner of death and to evaluate any disease or injury that may be present