INTRODUCTION TO PATHOLOGY
Objectives

- Introduction to pathology
- Define the terms: 
  - pathology
  - Autopsy
  - Biopsy
  - Disease
- Describe Autopsy and its advantages
- List the fields of pathology
- Describe the techniques of pathology.
- State the methods of learning pathology.
Introduction to Pathology

Learning Resources:

a) Textbooks:
   - Robbins. Basic Pathology.
     (Required Text Book)
   - Robbins. Pathologic basis of disease.
     (Reference)

b) laboratory
   - Glass slides
   - Museum for gross examination of organs
Objectives

Define the terms:

- pathology
- sign
- symptom
- lesion
Definition: study of disease

Provide an understanding of disease processes encountered, their incidence, causes (aetiology), pathogenesis, clinical effects (sign and symptom), prognosis and their morphological appearance.

Pathology constitutes a logical and scientific basis of medicine.
- **Incidence:** is a measure of the risk of developing some new condition within a specified period of time.

- **Etiology:** (alternatively aetiology) is the study of causation.
  - The word "aetiology" is mainly used in medicine, where it is the science that deals with the causes or origin of disease, the factors which produce or predispose toward a certain disease or disorder.

- **Pathogenesis:** The development of a disease. The origin of a disease and the chain of events leading to that disease.
A **sign** is an indication of some fact or quality; and a **medical sign** is an objective indication of some medical fact or quality that is detected by a physician during a physical examination of a patient.

A **symptom** is a departure from normal function or feeling which is noticed by a patient, indicating the presence of disease or abnormality. A symptom is subjective, observed by the patient, and not measured.

A **lesion** is any abnormal tissue found on or in an organism, usually damaged by disease or trauma. Lesion is derived from the Latin word laesio which means injury.

**Prognosis** is a medical term denoting the doctor's prediction of how a patient's disease will progress, and whether there is a chance of recovery. This word is often used in medical reports dictating a doctor's view on a case.
Biopsy

1- Excisional biopsy

2- Incisional biopsy
Fields of pathology

1- Experimental pathology

2- Clinical pathology
Subdivision of clinical pathology

- **Histopathology**: concerned with the investigation and diagnosis of disease from examination of tissues.
- **Cytopathology**: concerned with the investigation and diagnosis of disease from the examination of isolated cells.
- **Hematopathology**: concerned with the study of disorders affecting the cells and the coagulation system of blood.
- **Microbiology**: concerned with the study of infectious diseases and the organisms responsible for them.
- **Immunopathology**: concerned with the study of disturbances affecting the defense mechanisms of the body, and their contribution to the disease processes.
- **Chemical pathology**: concerned with the study and diagnosis of disease from the chemical changes that occur in tissues and fluids.

- **Medical genetics**: concerned with the study of abnormal chromosomes and genes and their relevance to disease processes.

- **Toxicology**: concerned with the study of the effects of known or suspected poisons on the body.

- **Forensic pathology**: concerned with the application of pathology to legal purposes (e.g. investigations of death in suspicious circumstances). Because of the continuous and rapid advances in the above subjects, it is impossible for one pathologist to cover all these branches.
Anatomic pathology

- General Pathology
- Systemic Pathology
General Pathology

- It explores and explains the development of basic pathologic mechanisms:
  - Introduction to pathology
  - Inflammation, repair and regeneration,
  - Cell injury, degenerations and infiltrations
  - Haemodynamic (circulatory) disorders.
  - Granulomatous inflammations.
  - Growth disorders and neoplasia.
  - Environmental and Nutritional pathology
  - Pediatric Pathology
The pathologic mechanisms discussed in the General Pathology are related to various organ systems:

- Cardiovascular System
- Respiratory System
- Alimentary System
- Hepatobiliary System and Pancreas
- Urinary System
- Genital System
- Lymph nodes and lymphoid tissue
- Central nervous system
- Orthopaedic system
- Dermatopathology
Characteristics of Disease

- Definition
- Epidemiology
- Clinical features
- Etiology
- Pathogenesis
- Differential diagnosis
- Treatment and management
- Prognosis
Objectives

- Introduction to pathology
- Define the terms:
  - pathology
  - sign
  - symptom
  - lesion
- Describe characteristics of disease

Classification of diseases

- Diagnostic pathology
- Autopsy
Classification of Diseases

- Congenital
- Acquired
  - inflammatory
  - vascular
  - growth disorder
  - metabolic
  - degenerative
  - drug induced
  - infective
PATHOLOGY

Subdivisions of pathology:

- Clinical Pathology: include
  - Hematology, microbiology, immunology, toxicology, chemical pathology and genetics
- Anatomic pathology
  - histopathology and cytopathology
- Forensic pathology and autopsy
- Experimental pathology
Techniques in Pathology

- Anatomic Pathology
  - Gross pathology
  - Light Microscopy
  - Immunohistochemistry & immunofluorescence
  - Electron microscopy
  - Molecular pathology
- Biochemical techniques
- Hematological techniques
- Medical microbiology
- Serology
- Flowcytometry
Diagnostic Pathology

- Biopsies
  - needle biopsy
  - endoscopic biopsy
  - incisional biopsy

- Organ resection

- Cytology
  - exfoliate cytology
  - fluid cytology
  - washing cell
  - fine needle aspiration cytology
Diagnostic Pathology

- Blood
  - blood cells
  - plasma
  - serum

- Excretion and secretions
  - urine and faeces
  - sputum
Electron Microscopes (EM) are scientific instruments that use a beam of highly energetic electrons to examine objects on a very fine scale.
Length
• meter(m), millimeter(mm) = 10^{-3}m, micrometer(µm) = 10^{-6} m
• nanometer(nm) = 10^{-9} m, picometer(pm) = 10^{-12} m
• Angstrom = 10^{-10} m

Sizes of living cells
• atom - 0.1 nm
• molecules - 0.5-10 nm
• viruses - 30-80 nm
• bacteria - 2 µm
• animal and plant cells - 10-30 µm
Application of EM to diagnostic Pathology

1. Tumor pathology (histogenesis)
2. Renal pathology (deposits and classification)
3. Skin vesicular disorder
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 (focuses mainly on the sub-microscopic aspects of disease).

Molecular pathology shares some aspects of practice with both anatomic pathology and clinical pathology, molecular biology, biochemistry, proteomics and genetics, and is sometimes considered a "crossover" discipline.

It is a scientific discipline that encompasses the development of molecular and genetic approaches to the diagnosis and classification of human tumours, the susceptibility of individuals of different genetic constitution to develop cancer and the environmental and lifestyle factors implicated in carcinogenesis.
An autopsy, also known as a *post-mortem examination or necropsy*, 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. It is usually performed by a specialized medical doctor called a *pathologist*.

Autopsies are either performed for legal or medical purposes.

- A forensic autopsy is carried out when the cause of death may be a criminal matter.
- Clinical or academic autopsy is performed to find the medical cause of death and is used in cases of unknown or uncertain death, or for research purposes.
Autopsies are useful

- For the determination of the cause of death
- The evaluation of the accuracy of clinical diagnosis (and hence management) before death; thus, postmortems act as a quality control for the medical practice.
- Education tool for medical students (both undergraduates and postgraduates) to learn pathology. It is an opportunity to correlate clinical signs with their underlying pathological changes.
- As a source of research into the causes and mechanisms of different diseases
- For accurate statistics about disease incidence.
Summary

- Introduction to pathology
- Define pathology
- Describe characteristics of disease
- Classification of diseases
- Diagnostic pathology
- Autopsy