

Introduction to Pathology

- Pathology is the study (*logos*) of disease (*pathos*).
- Pathology is devoted to the study of the structural, biochemical, and functional changes in cells, tissues, and organs that underlie disease.
- Techniques to study diseases
 - Morphologic
 - Microbiologic
 - immunologic
 - Molecular

Introduction to pathology continued

- Pathology attempts to explain the whys and wherefores of the signs and symptoms manifested by patients.
- providing a rational basis for clinical care and therapy.
- serves as the bridge between the basic sciences and clinical medicine.
- Pathology is the scientific foundation for all of medicine.

Introduction to pathology continued

- Pathology is divided into general pathology and systemic pathology.
- **General pathology** is concerned with the reactions of cells and tissues to abnormal stimuli and to inherited defects.
- **Systemic pathology** examines the alterations in specialized organs and tissues that are responsible for disorders that involve these organs.

Introduction to pathology continued

- The four aspects of a disease process that form the core of pathology

ETIOLOGY

- Etiology of a disease is its "cause"
- two major classes of etiologic factors: genetic (e.g., inherited mutations and disease-associated gene variants, or polymorphisms) and acquired (e.g., infectious, nutritional, chemical, physical).

The Four aspect of Disease process continued

Pathogenesis

- refers to the sequence of events in the response of cells or tissues to the etiologic agent, from the initial stimulus to the ultimate expression of the disease.
- The mechanisms of its disease development
- The study of pathogenesis remains one of the main domains of pathology.

The Four aspect of Disease process continued

Molecular and Morphologic Changes.

- Morphologic changes refer to the structural alterations in cells or tissues that are either characteristic of a disease or diagnostic of an etiologic process.
- The practice of diagnostic pathology is devoted to identifying the nature and progression of disease by studying morphologic changes in tissues and chemical alterations in patients.

The Four aspect of Disease process continued

- **Functional Derangements and Clinical Manifestations.**
- The end results of genetic, biochemical, and structural changes in cells and tissues are functional abnormalities, which lead to the clinical manifestations (symptoms and signs) of disease, as well as its progress (clinical course and outcome).

The Four aspect of Disease process continued

- Virtually all forms of disease start with molecular or structural alterations in cells.
- Injury to cells and to extracellular matrix ultimately leads to *tissue and organ injury*, which determine the morphologic and clinical patterns of disease.

Introduction to pathology continued

- The DIAGNOSIS is the name given to the particular disease, once it is identified.
- The PROGNOSIS of a disease is the expected outcome for a particular case.
- "Good prognosis" suggests that recovery is likely;
- "poor prognosis" suggests permanent disability or death

Introduction to pathology continued

- The INCIDENCE of a disease is the number of new cases per unit time (usually given as "new cases per 100,000 people per year").
- The PREVALENCE of a disease tells how many people are affected at any one time (typically, "cases per 100,000 people").
- The RISK of a disease is how much your unusual situation (typically some kind of exposure to an uncommon hazard) increases your chance of getting the disease compared with everybody else.

History of Pathology

- Era of Medical Antiquity, the early dominance of animism, diseases caused by mystification
- Era of Morbid Anatomy
Autopsies performed scientifically from about 1500A.D, 19th century in Germany by ROKITANSKY & ASCHOFF

- The application of MICROSCOPY revolutionized medicine, Rudolf Virchow (father of pathology, 1821-1902, introduced CELLULAR PATHOLOGY
- In the late 20th century, molecular techniques made a great impact of pathology in the realm of understanding molecular changes: Cancer and Congenital diseases

Subdivisions of Pathology

- Histopathology: The investigation & diagnosis of disease from the examination of tissues architectural organization
- Cytopathology: The investigation & the diagnosis of disease from the examination of isolated cells
- Haematology: The study of the disorders of the cellular & coagulable components of blood

- Toxicology: The study of the effects of known or suspected poisons
- Forensic pathology: The application of pathology to legal purposes (e.g. investigation of death in suspicious circumstances and criminal assaults)
- Chemical pathology : The study & diagnosis of disease from the chemical changes in tissues & fluids

Techniques of pathology

- Light Microscopy- appreciates the structure of tissues & cells in health & disease
- Histochemistry- is the study of the chemical component and their distribution in tissues
- Immunohistochemistry- is histologic study employing antibodies and antigen reaction to visualize substances in tissues sections or cell preparations

- Electron Microscopy- study of disorders at very high magnification, 1,000,000 times; at organelle level & demonstration of viruses in tissue samples
- Biochemical assays- Fluid & electrolyte homeostasis, serum enzyme assays e.g. raised levels of cardiac enzymes in the blood
- Radioisotope techniques (Autoradiography): Scans diseases using intake of different isotopes eg. Thyroid diseases by iodine isotopes

- Molecular Pathology- Uses advances of new science, molecular pathology eg. in the study of genetic defects, using DNA technology; eg. IN SITU HYBRIDISATION in different diseases e.g.Hg molecule, collagen. etc