General Pathology

DR SAJDA KHAN GAJDHAR
COURSE CO-ORDINATOR
GENERAL PATHOLOGY

LECTURE-2

INTRODUCTION TO PATHOLOGY

DR. SAJDA GAJDHAR

COURSE COORDINATOR

BDS, MDS, ORAL AND MAXILLOFACIAL PATHOLOGY

Introduction to Pathology
(Intended Lecture Learning Outcomes)

By the end of this lecture, students will be able to:

- **Define** pathology and **differentiate** its major branches.
- **Describe** autopsy and **classify** its main types.
- **Explain** the basic **nomenclature and terminology** commonly used in pathology.

INTRODUCTION

- Why to study about the cell?

IT IS THE BASIC UNIT OF THE BODY.

Cells → Tissues → Organs → Bodies

Living bodies are made up of cells

Cells do all the work of life!

CELL STRUCTURE

Cytoplasm
- jelly-like material holding organelles in place

Lysosome
- food digestion
- garbage disposal & recycling

Vacuole & Vesicles
- transport inside cells
- storage

Nucleus
CONTROL CENTER
- protects DNA
- controls cell

Centrioles
- cell division

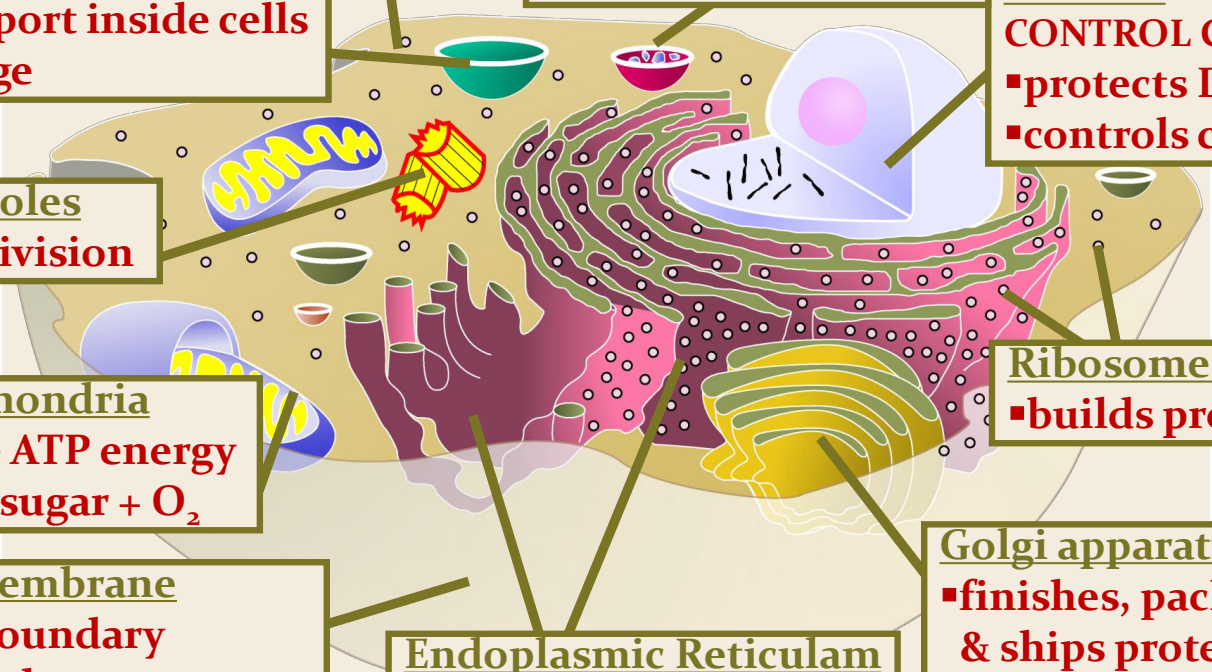
Ribosomes
- builds proteins

Mitochondria
- make ATP energy from sugar + O_2

Golgi apparatus
- finishes, packages & ships proteins

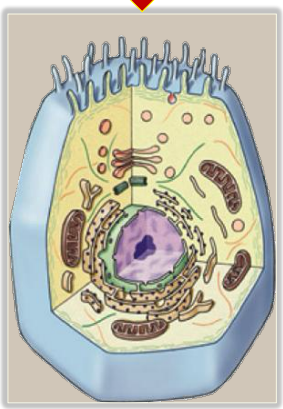
Cell membrane
- cell boundary
- controls movement of materials in & out
- recognizes signals

Endoplasmic Reticulam
- helps finish proteins
- makes membranes

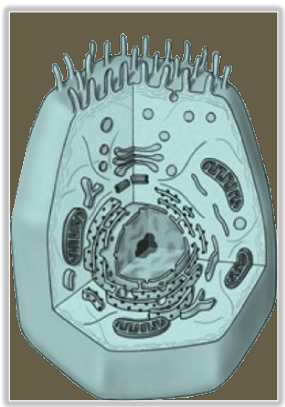


Introduction to Pathology

EXTERNAL STIMULI : Eg BACTERIAL INFECTION



NORMAL CELL



DISEASED or DAMAGED CELL

Study Of Normal Functions of the cells is called **PHYSIOLOGY**

Study of **Diseased** or Damaged cell and its altered **function** is called **PATHOLOGY**

What is Pathology?

- Pathology is a **scientific study (logos) of disease (pathos).** It mainly focuses on the study of the **structural, biochemical and functional changes in cells, tissues and organs** in disease

- **Patho -** *suffering* **logy -** *to Study (Greek)*

"Your practice of medicine (dentistry) will be as good as your understanding of pathology"

– Sir William Osler

BASIC TERMINOLOGIES IN PATHOLOGY

- **Health** – is a condition when the individual is normal and in complete harmony (balance) with the surroundings

- **Disease** – opposite of health….what is not healthy is disease. “State in which an individual exhibits an anatomical, physiological, or biochemical deviation from the normal.

Pathology studies…

What we study in Disease??????

1. ETIOLOGY:

only cause

- Aetiology or etiolgy is the **origin or cause of a disease.**
- **Types**:
  - **Genetic (intrinsic)** → inherited mutations, chromosomal abnormalities.
  - **Acquired (extrinsic)** → infections, chemicals, trauma, nutritional imbalance.

2. PATHOGENESIS:

- The origin of a disease and the **chain of events leading** to that disease.

How the cause cause the disease

- **sequence of events from the initial stimulus to ultimate expression of the disease (mechanisms).**
- Example: TB infection → inhalation of bacilli → alveolar colonization → granuloma formation.

Lesion

- **Definition**: A structural alteration in tissues due to disease.
- Examples:
  - Ulcer on oral mucosa.
  - White patch (leukoplakia).
  - Tumor mass.

Morphological Changes

- **Definition**: Structural alterations in cells/tissues visible under microscope or grossly.

2- Types:

Macroscopic

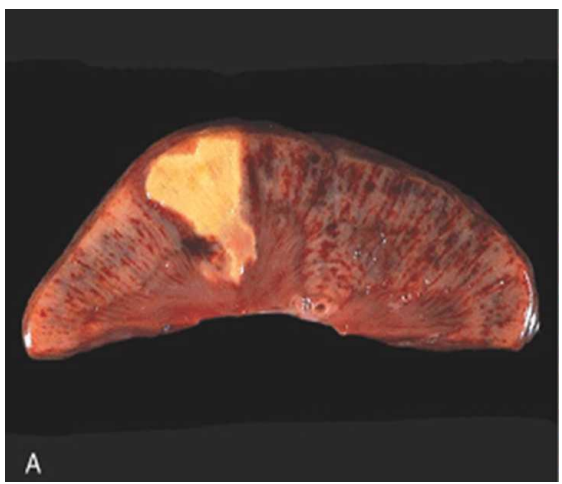
- ✓ **Gross changes** – seen with naked eye (e.g., swelling, ulcer).
- ✓ **Microscopic changes** – seen under light/electron microscope.

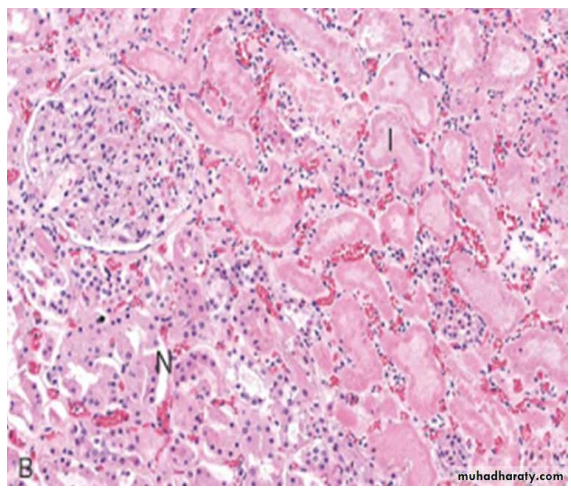
Morphological changes

Gross

Macroscopic appearance visible to the naked eye

Microscopy





Clinical Manifestations

by doctor

- **Signs**: Objective evidence, observed by doctor (e.g., swelling, redness).
- **Symptoms**: Subjective, experienced by patient (e.g., pain, burning).

by patients

many sign, symptoms together

- **Syndrome**: A group of signs & symptoms that occur together (e.g., Down's syndrome).

Diagnosis

Definition: Identification of a disease.

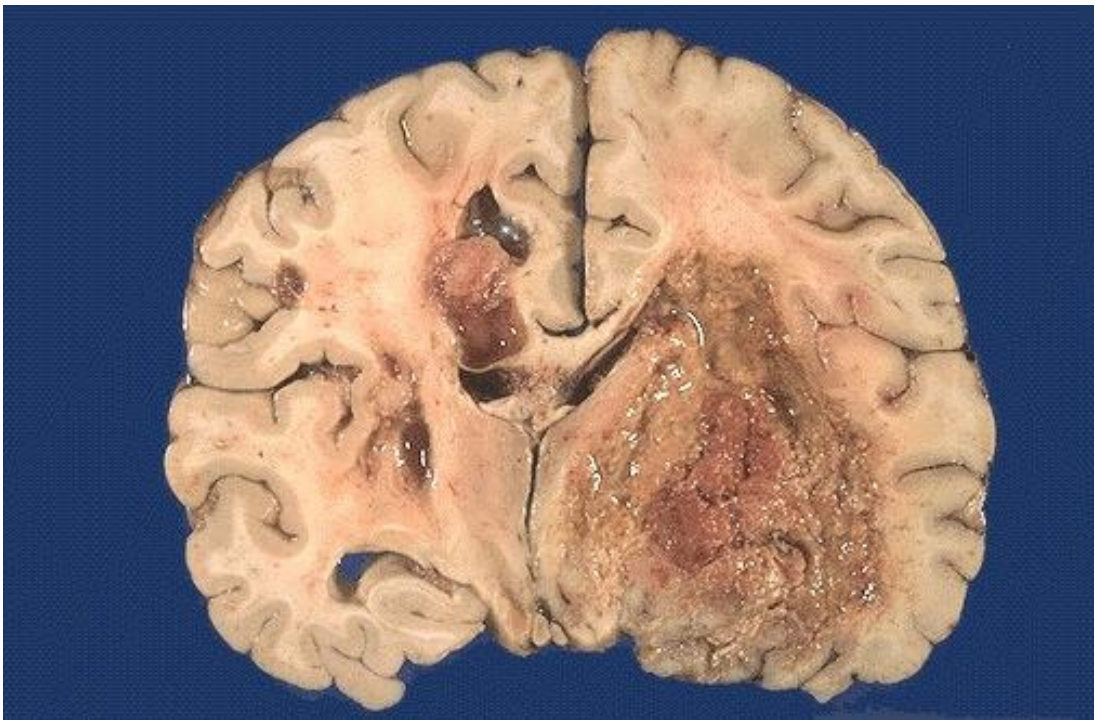
Types:

- ✓ **Clinical diagnosis** – based on history & examination.
- ✓ **Provisional diagnosis** – the most likely working diagnosis made before confirmatory investigations.
- ✓ **Differential diagnosis** – list of possible diseases with similar features.
- ✓ **Laboratory / Histopathological diagnosis** – based on investigations/biopsy.
- ✓ **Final diagnosis** – based on correlation of all findings.

Prognosis

- **Definition**: Prediction of the outcome of a disease (good or poor).
- Example: Oral leukoplakia with mild dysplasia → better prognosis than oral cancer.


Q&A




Q&A


Discussion

Pathology ????

Etiology:

Provisional diagnosis

Prognosis:

Pathogenesis:

Signs

Symptoms

Branches of pathology

- **General Pathology** – basic mechanisms common to all diseases (e.g., inflammation, necrosis, healing).
- **Systemic Pathology** – study of diseases affecting specific organs/systems.
- **Oral Pathology** – diseases affecting oral cavity, jaws, and related structures.
- **Clinical Pathology / Laboratory Medicine** – laboratory investigations of disease.
- **Forensic Pathology** – medico-legal aspects of disease and death.

like crime investigation

General Pathology

- Deals with **basic principles and mechanisms of disease** that are common across all tissues and organ systems.
- Focus areas:
  - ✓ **Cell injury and adaptation**
  - ✓ **Necrosis and apoptosis**
  - ✓ **Inflammation**
  - ✓ **Tissue repair and healing**
  - ✓ **Circulatory disturbances**
- **Importance:** Builds foundation to understand disease mechanisms before studying individual organs.

Systemic Pathology

- Applies the principles of general pathology to **specific organs and systems**.
- Focus areas:
  - ✓ Diseases of cardiovascular system, Respiratory system, Gastrointestinal tract, liver, kidney, CNS, endocrine system, etc.
- **Importance:** Helps understand how diseases manifest in particular organ systems and correlate with clinical features.

Oral Pathology

- A **specialized branch** focusing on the oral cavity, jaws, salivary glands, and maxillofacial region.
- Focus areas:
  - ✓ Developmental anomalies (e.g., cleft lip/palate, odontogenic cysts), Dental caries, pulp and periapical diseases, Periodontal diseases, Oral precancerous lesions and oral cancer, Benign and malignant tumors of oral cavity and jaws.
- **Importance:** Direct relevance to **dentistry** — helps dentists diagnose, prevent, and treat oral diseases.

Clinical Pathology (Laboratory Medicine)

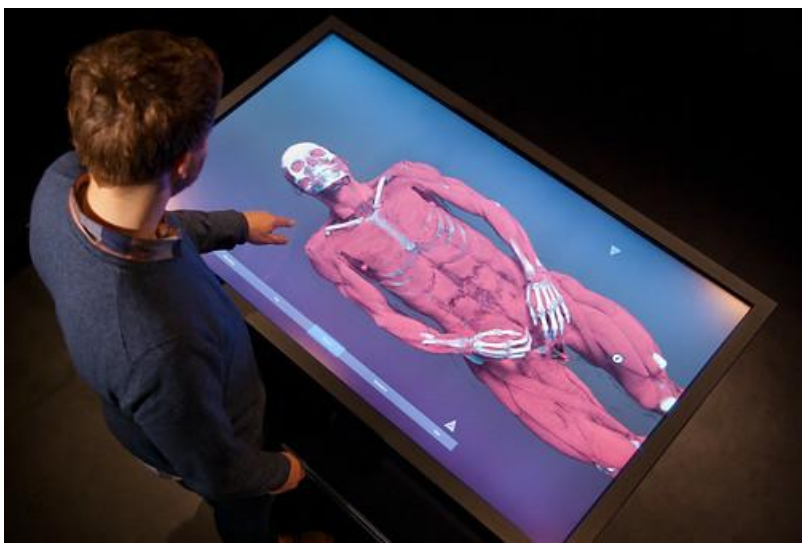
- Involves the study of disease through **laboratory investigations** of body fluids and tissues.
- Subdivisions:
  - ✓ ~~**Hematology**~~ – blood disorders (e.g., anemia, leukemia).
  - ✓ **Clinical chemistry** – biochemical changes in diseases (e.g., diabetes, renal failure).
  - ✓ **Microbiology** – study of infectious agents (bacteria, viruses, fungi, parasites).
  - ✓ ~~**Cytology**~~ – exfoliative cytology, fine-needle aspiration cytology.
- **Importance:** Provides essential diagnostic information to guide patient management.

Forensic Pathology

- Branch of pathology dealing with **medico-legal investigations** of disease, injury, and death.
- Focus areas:
  - ✓ Postmortem examinations (autopsies).
  - ✓ Determination of cause and manner of death (e.g., natural, accidental).
  - ✓ Examination of injuries, poisoning, burns.
  - ✓ Contribution to criminal investigations and legal proceedings.
- **Importance:** Links medical science with law, ensuring justice in medico-legal cases.

Autopsy- post-mortem examination

It is a highly specialized surgical procedure that consists of a thorough examination of a corpse to determine the cause/manner of death and to evaluate any disease or injury that may be present.



TYPES OF AUTOPSIES:

Medico-Legal Autopsy or Forensic :

- They are generally performed, as prescribed by applicable law, in cases of violent, suspicious or sudden deaths, deaths without medical assistance or during surgical procedures.

Clinical or Pathological autopsies :

- They aim to determine, clarify, or confirm medical diagnoses that remained unknown or unclear prior to the patient's death.

Anatomical or academic autopsies :

- They are performed by students of anatomy for study purpose only.

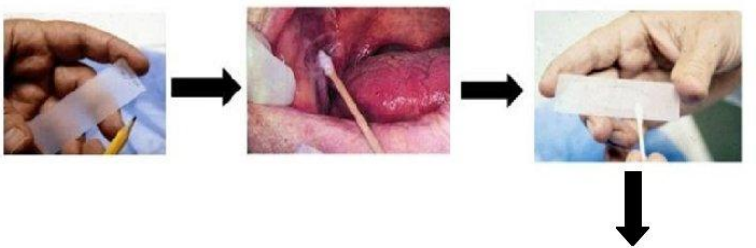
Histopathology

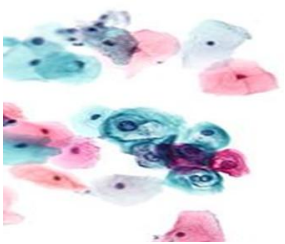
- Study of **tissues under the microscope** to diagnose diseases.
- Uses **biopsy specimens** (incisional, excisional, punch biopsy).
- Routine staining: **Hematoxylin & Eosin (H&E)**.
- Special stains: PAS, Gram, Ziehl–Neelsen, etc.
- Importance:
  - Gold standard for diagnosing tumors (benign vs malignant).
  - Essential for confirming oral lesions (e.g., leukoplakia, squamous cell carcinoma).

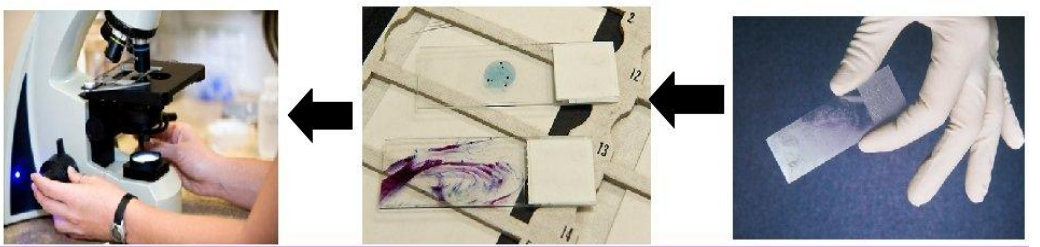
Cytology Cytopathology

- Microscopic evaluation of **individual cells.** damage cells
- Common techniques:
  1- ■ **Exfoliative cytology** (scraping of oral mucosa). كشط
  2- ■ **Fine-needle aspiration cytology (FNAC)** for swellings, lymph nodes, salivary glands. إبرة وانحب
- Importance:
  - Quick, minimally invasive, inexpensive.
  - Useful in **screening** (e.g., oral premalignant lesions, Pap smear for cervical cancer).

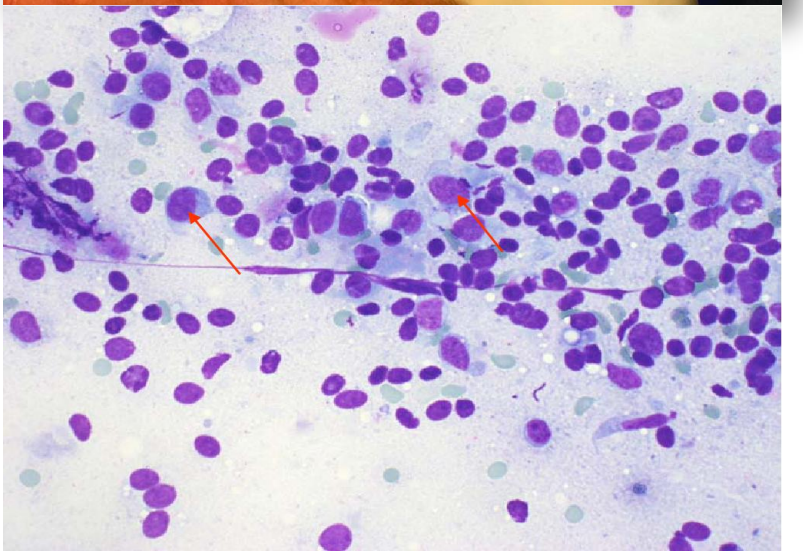
Exfoliative cytology/ Brush biopsy







Fine Needle Aspiration Cytology (FNAC)



Molecular Pathology

- Application of **molecular biology techniques** to study disease mechanisms at **DNA, RNA, and protein levels**.
- Methods include:
  - **PCR (Polymerase Chain Reaction)**
  - **FISH (Fluorescence In Situ Hybridization)**
  - **Immunohistochemistry (IHC)**
  - **Next-Generation Sequencing (NGS)**
- Importance: Detects genetic mutations and biomarkers.

- ✓ Histopathology
- ✓ Biopsy
- ✓ Cytopathology
- ✓ Hematopathology

Essential Learning Resource

- **Harsh Mohan: Essential Pathology for Dental Students** (with Practical Pathology). 5th ed; 2017; Jaypee Brothers Medical Publishers

- **Harsh Mohan: Textbook** of Pathology. 7th ed; 2014; Jaypee Brothers Medical Publishers

- **Kumar: Robbins Basic** Pathology. 10th ed; 2017; Elsevier

ONE MINUTE EVALUATION

WHAT DO YOU UNDERSTAND WITH TERM 'ETIOLOGY'????????

A. Structural changes in disease
B. Cause of the disease
C. Study of the tissues
D. None of above

Success
is dependent on effort.

– Sophocles

All the Best