

# PATHOLOGY

## INTRODUCTION TO GENERAL PATHOLOGY

*отыма теабед*

**□ General pathology** : is the study of the general principles of disease, focusing on:

- **the cause (etiology)**
- **development (pathogenesis)**
- **structural changes (morphologic changes)**
- **functional abnormal cellular and tissue responses to injury and stimuli.**
- **It provides a foundation for understanding how diseases develop, covering fundamental processes like inflammation, cellular injury, repair, genetic and environmental causes of illness.**

- **Etiology:** The cause of disease, which can be genetic or acquired due to environmental factors.
- **Pathogenesis:** The mechanisms by which a disease develops.
- **Morphologic Changes:** The structural alterations that occur in cells and organs as a result of disease.
- **Functional Consequences:** The clinical manifestations and functional outcomes that result from these morphologic changes.

- **The ultimate goal of pathology** is the identification of **the cause** of a disease (etiology) that resulted in **disease prevention** and **successful therapy**.
- The primitive light microscope of **Virchow** (1821-1902), a German pathologist, enabled him to see changes in diseased tissues at a cellular level.
- His observations have had a profound influence on the understanding of many diseases

# PATHOLOGY IS DIVIDED INTO:

- a) **General pathology:** Study of cellular and tissue responses to pathologic stimuli.
- b) **Systemic pathology:** study of the particular responses of **specialized organs**, as oral pathology

- **Disease:** is the abnormal variation in structure or function of any part of the body.
- **Causes of diseases:**
  - A- Genetically determined diseases**
  - B- Acquired diseases**

- **A- Genetically determined disease : Abnormality in the DNA of the fertilized ovum that is inherited from one or both parents.**



# **B- ACQUIRED DISEASES: OCCURS DUE TO ENVIRONMENTAL FACTORS LIKE:**

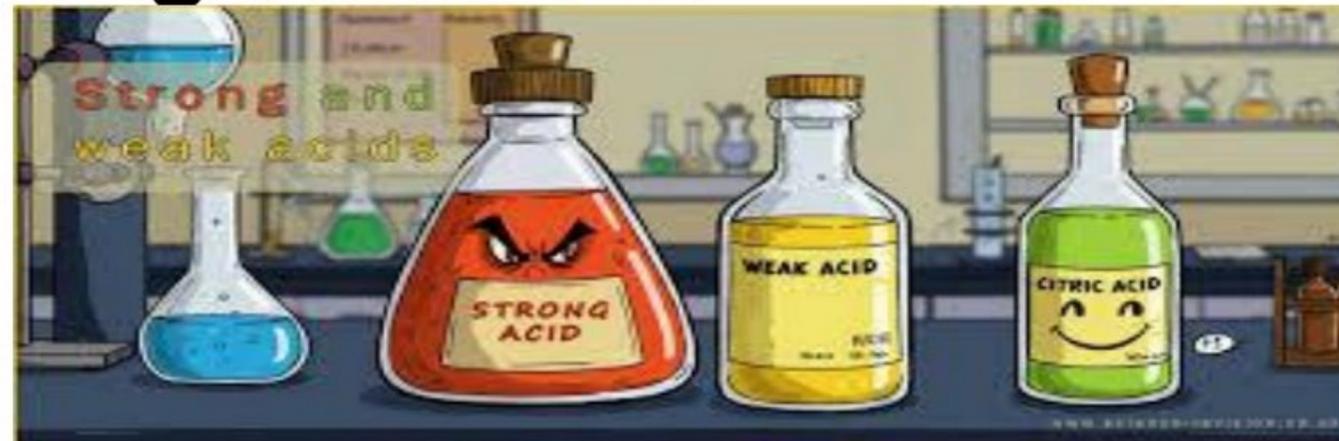
**1- Deficiency disease: iron deficiency anemia**



**2- Physical agents: mechanical injury, heat, cold, irradiation.**

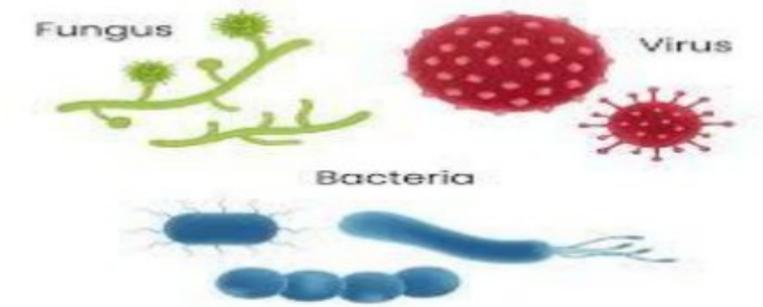


**3- Chemical and drugs: strong acids and alkalis.**



# **B- ACQUIRED DISEASES: OCCURS DUE TO ENVIRONMENTAL FACTORS LIKE:**

**4- Infectious microorganism: bacteria, fungi and viruses.**



**5- Immunological factors: immunity has protection effects against microbes but it also has harmful effects due to some reactions**

**6- Psychological factors: schizophrenia, depression.**

**7- Diseases of addiction (alcohol, tobacco and various drugs)**



# Methods used to study pathology:

- 1- **Histopathology**: Examination of the diseased tissues by microscope.
- 2- **Cytopathology**: Examination of isolated cells by light or electron for diagnosis of the disease.
- 3- **Biochemistry**: Examination of the metabolic disturbances of diseases by evaluation of various compounds in body fluids

**4- Microbiology:** Identification of the causative microorganism of the disease by examination of body fluids, mucosal surfaces and excised tissues using microscopical, cultural and serological techniques.

**5- Haematology:** Microscopical examination of blood

**6- Cytogenetics:** Examination of chromosomal abnormality.

**7- Histochemistry: Detection of cells and tissues constituents using special immunohistochemical techniques.**

**8- Forensic pathology: Examination of tissues taken from autopsy (dead body).**

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



*"There are many questions, of course, that won't be answered till the autopsy."*

# Techniques in Pathology

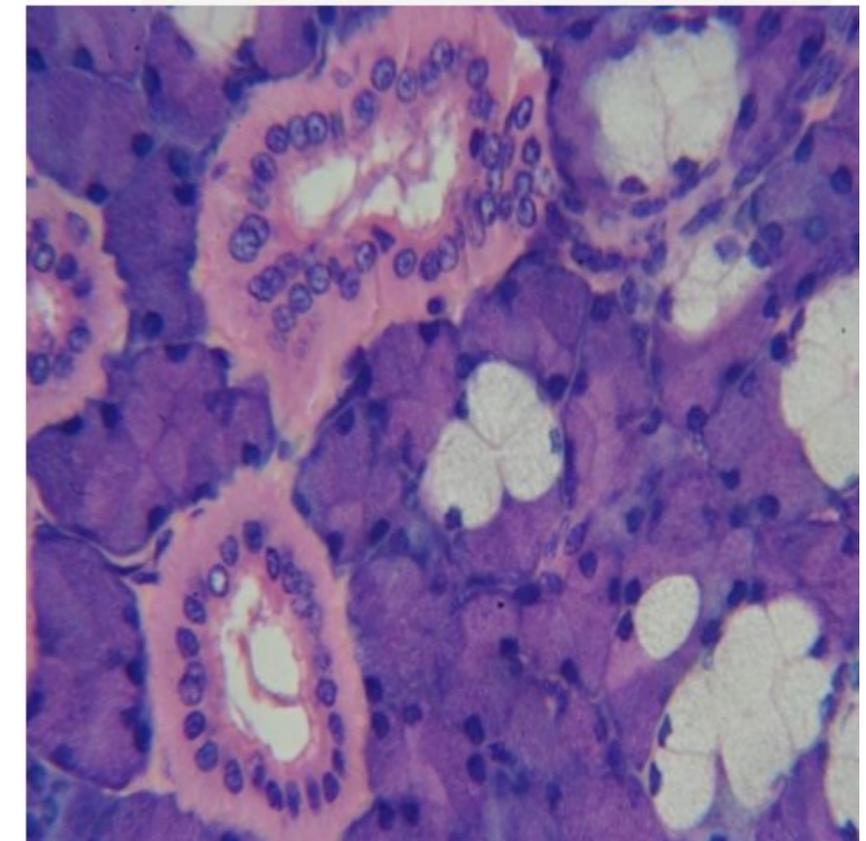
- a) Gross pathology**
- b) Light and electron Microscopy**

# **1-Gross pathology (macroscopic pathology):**

**This refers to the changes affecting various organs and tissues in diseases as evident to the naked eye.**



- **Light microscopy:** Advances in light microscopic examination have resulted in a wealth of new information about the structure of tissues and cells.
- If solid tissues (e.g. liver, kidney etc.) are to be examined by light microscopy, the sample must first be thinly sectioned to permit the transmission of light and to minimize the superimposition of tissue components.
- These sections are routinely cut from tissue hardened by embedding in wax
- The sections are stained to help distinguishing between different components of the tissue (e.g. nuclei, cytoplasm)
- steps of preparation: (fixation, embedding, cutting, staining)



# STAINS USED IN PATHOLOGY:

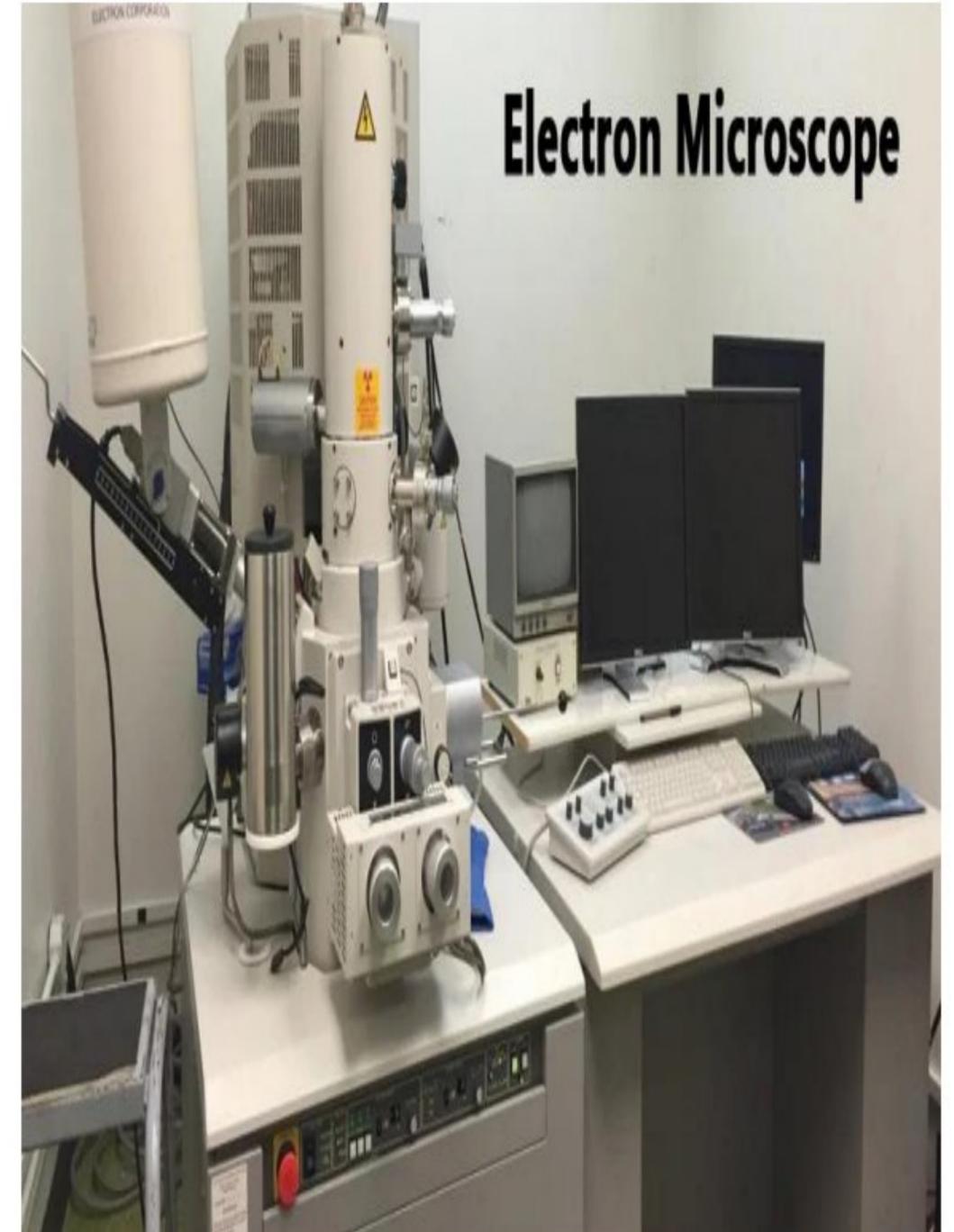
**1- Haematoxylin and eosin stain (H&E):** It is the primary stain used in sectioned slides to reveals their histological details. Haematoxylin has strong affinity for nuclear chromatin giving blue discoloration, while eosin has strong affinity for proteins presents in the cytoplasm giving pink discoloration.

## **2- special stains as:**

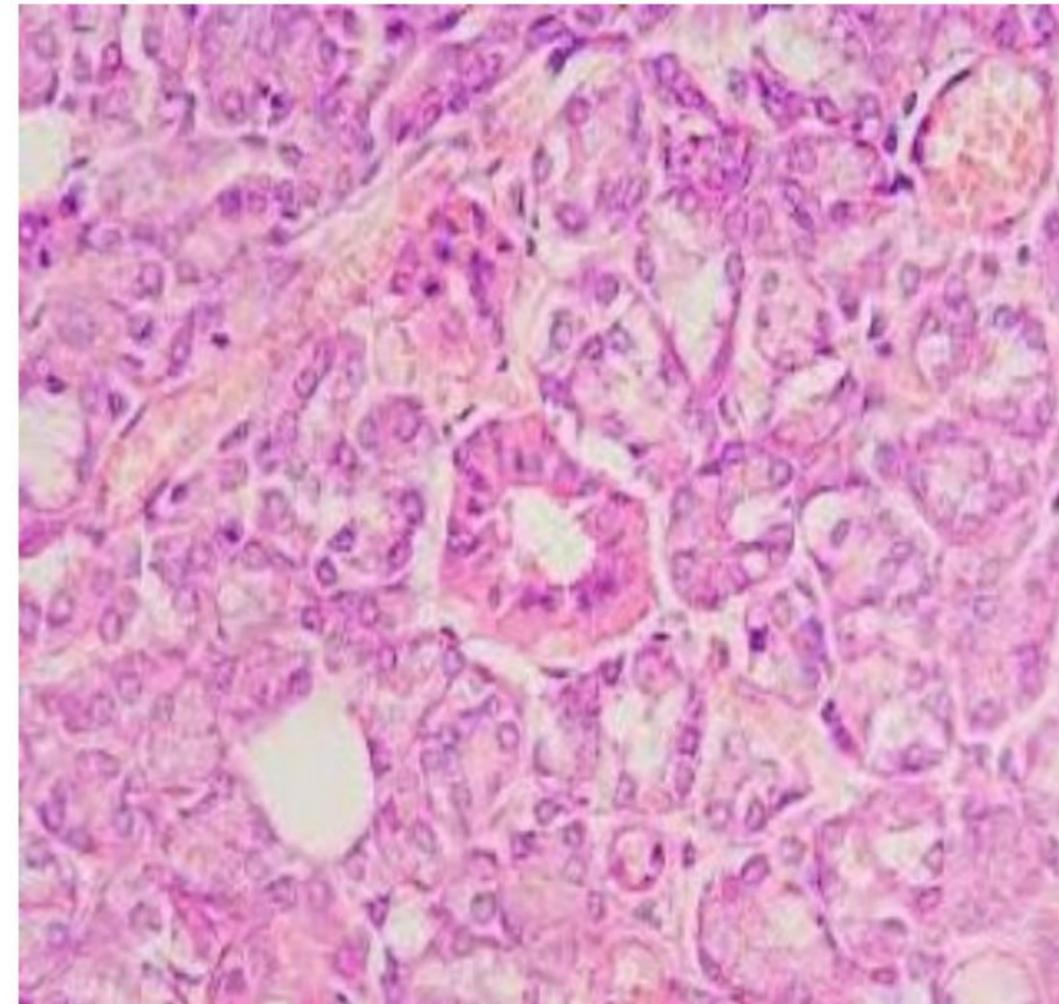
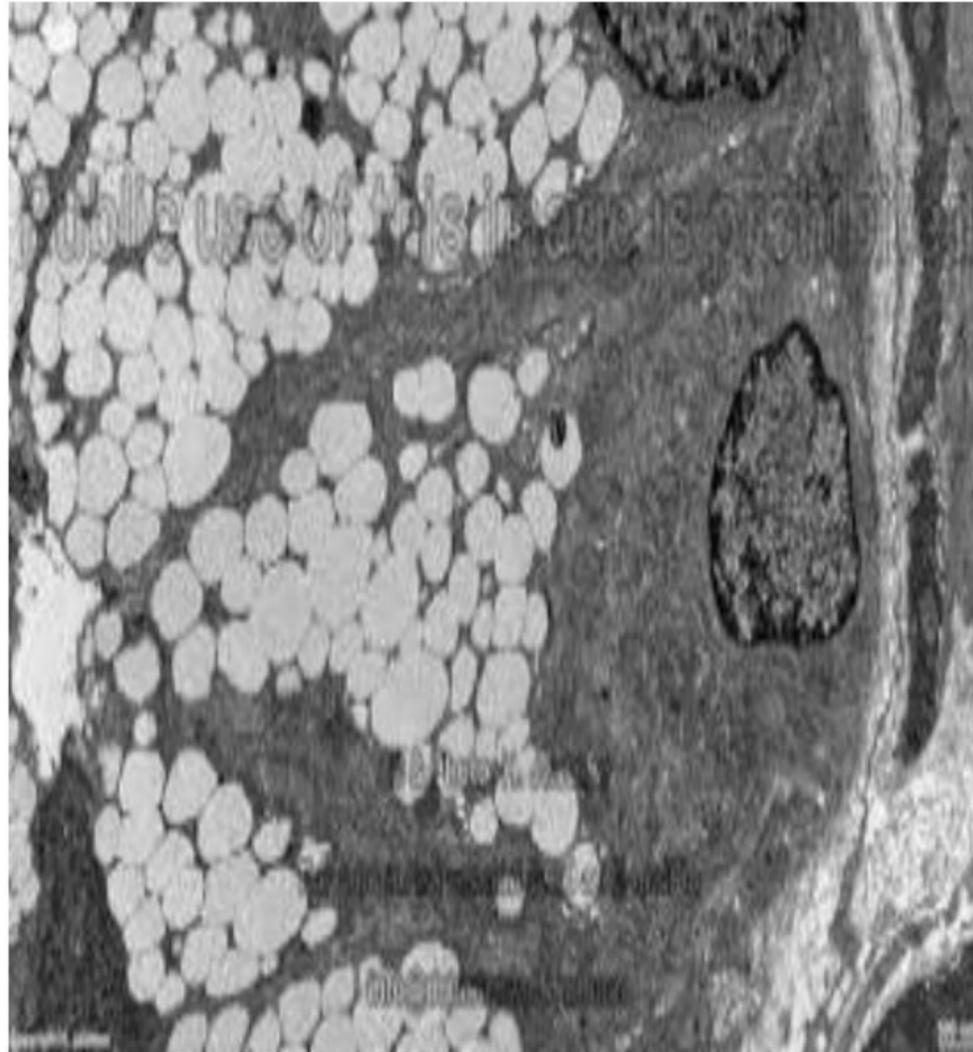
- **Periodic acid Schiff stain (PAS):** Special stain used to demonstrate glycogen.
- **Stain for microorganism:** used to demonstrate gram-positive and gram negative bacteria.
- **Giemsa stain:** used to demonstrate lymphoreticular elements.
- **Perl's stain** (for the detection of iron).

# Electron microscopy

- This has extended the range of pathology to the study of disorders at an organelle (sub cellular) level and the demonstration of viruses in tissue samples.
- **Electron Microscopes (EM)** are scientific instruments that use a beam of highly energetic electrons to examine objects on a very fine scale
- Application of EM to diagnostic Pathology
  1. Tumor pathology (histogenesis)
  2. Renal pathology (deposits and classification)
  3. Skin vesicular disorder



WHICH BY EM ?





THANK YOU  
SO MUCH