

**Duhok University**  
**Faculty of medical science**  
**School of health science**  
**Pathology -**  
**Microtechniques**

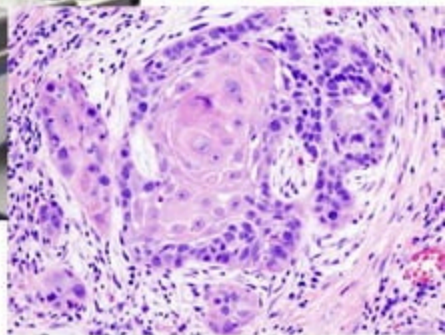
*Dr. Azad Mustafa Ahmed*

*Lecturer, FIBMS (Path)*

*University of Duhok, faculty of medical science*

# Lecture 1

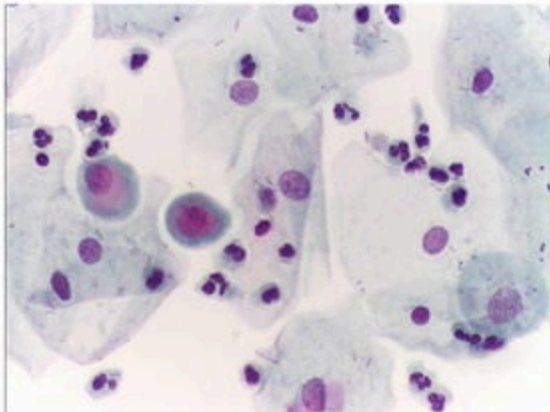
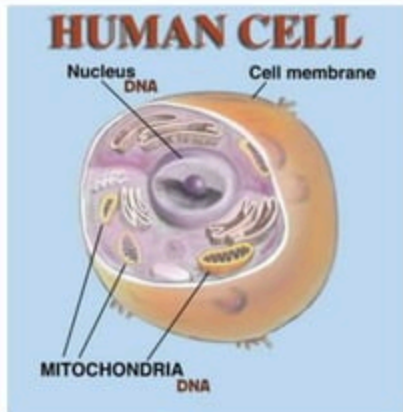
## *Introduction to pathology*



# **Definitions and terminologies**

# The Cell

the fundamental, structural and functional unit of living organism



# The Tissue

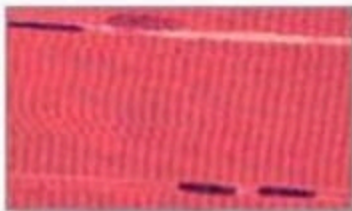
- An aggregate of specialized cells which together perform certain special function



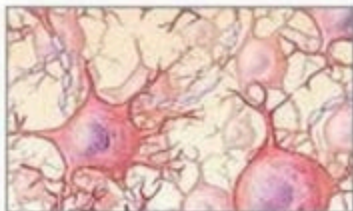
Connective tissue



Epithelial tissue



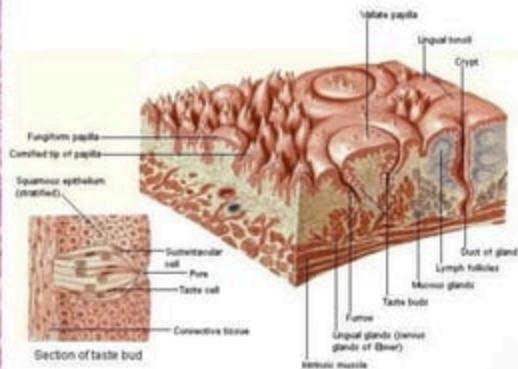
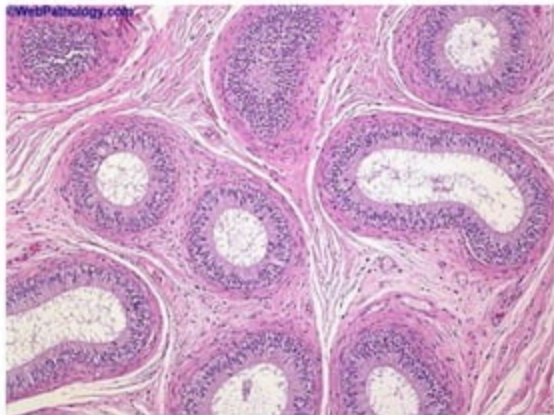
Muscle tissue



Nervous tissue

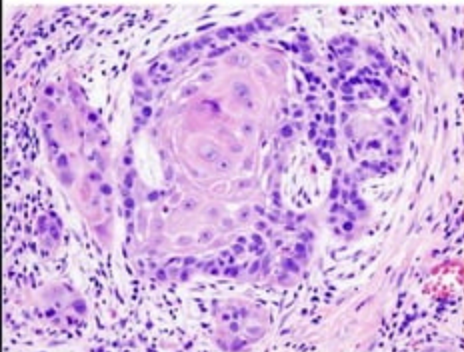
# Histology

- is the science that deals with microscopic structures, composition and function of normal tissues.



# Histopathology

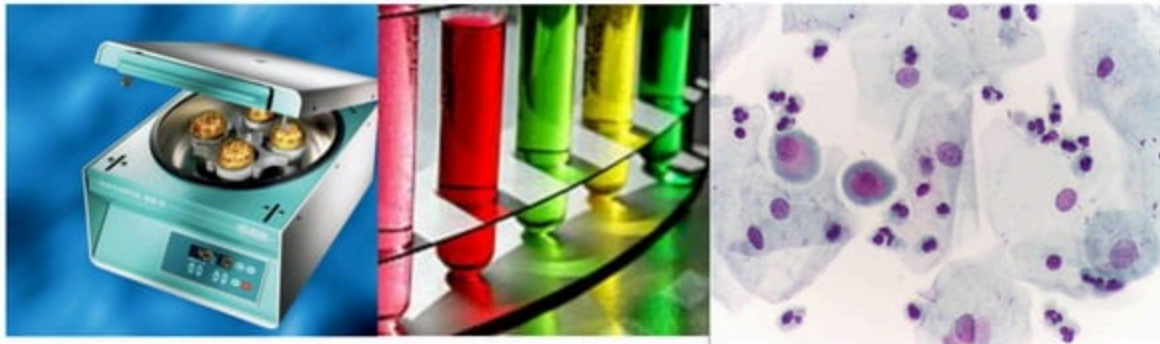
- concerned with the investigation and diagnosis of disease from examination of tissues





# Cytopathology

- concerned with the investigation and diagnosis of disease from the examination of isolated





## *Pathology*

- Literary pathology means the

**study (logos)**

**of disease (pathos, suffering)**

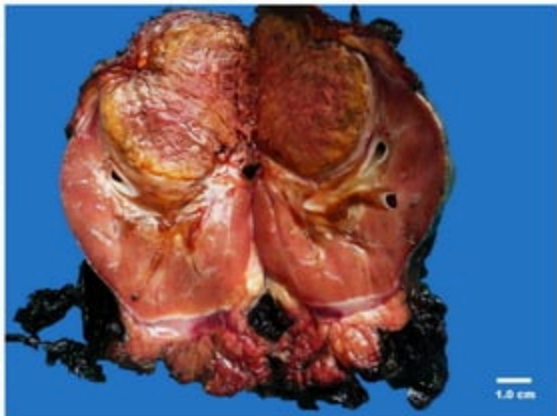
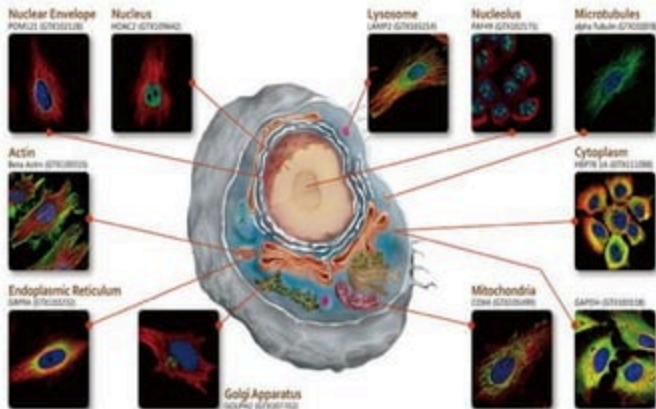
## *Pathology*

- It involves the investigation of the **causes** of disease and the associated **changes** at the levels of cells, tissues, and organs, which in turn give rise to the presenting signs and symptoms of the patient.

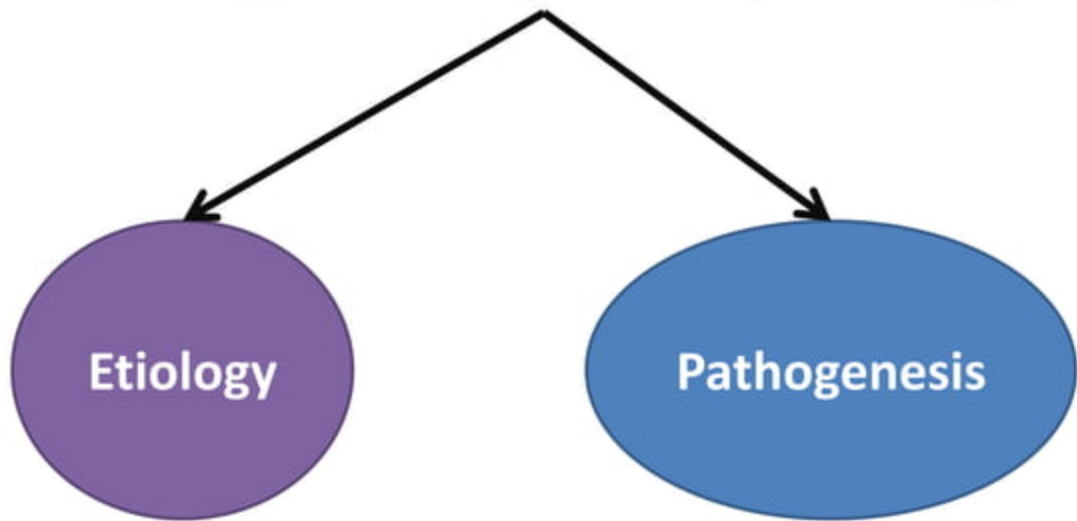


# Pathology

- The range of the structural changes is from those affecting sub-cellular organelles (molecular pathology) up to alterations seen by the naked eye (gross pathology).

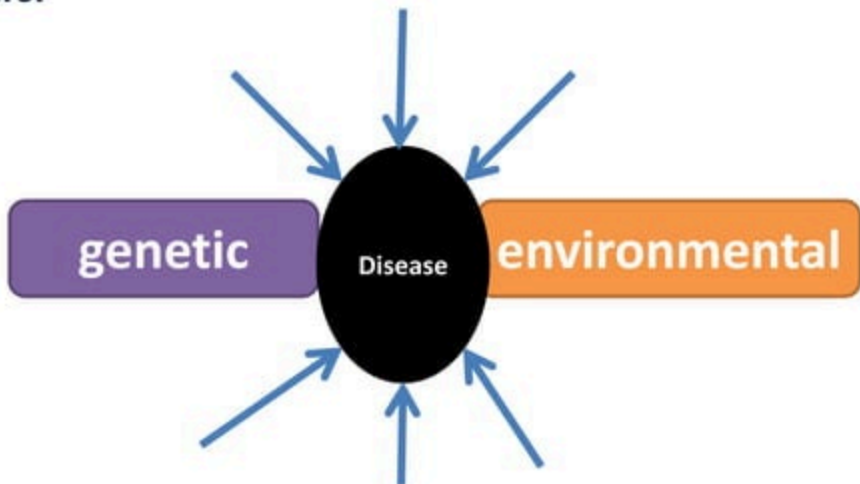


## Two important aspects of pathology;



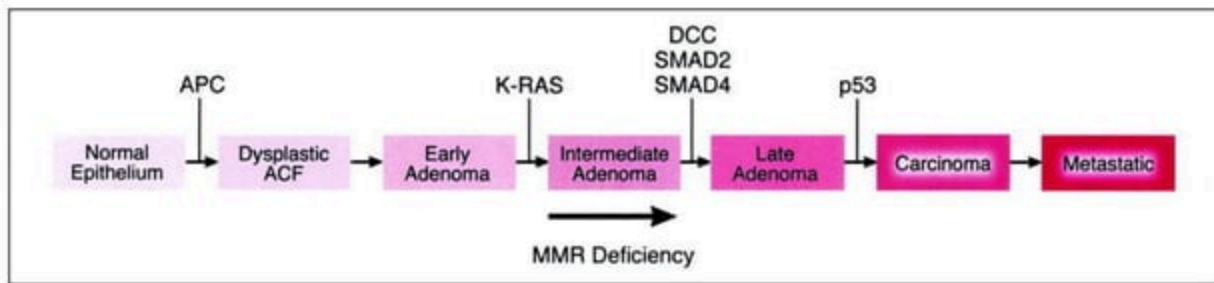
# *Etiology*

- It means the origin of a disease, including the underlying causes and modifying factors.
- Most common diseases are caused by a combination of inherited genetic susceptibility and various environmental triggers.



# Pathogenesis

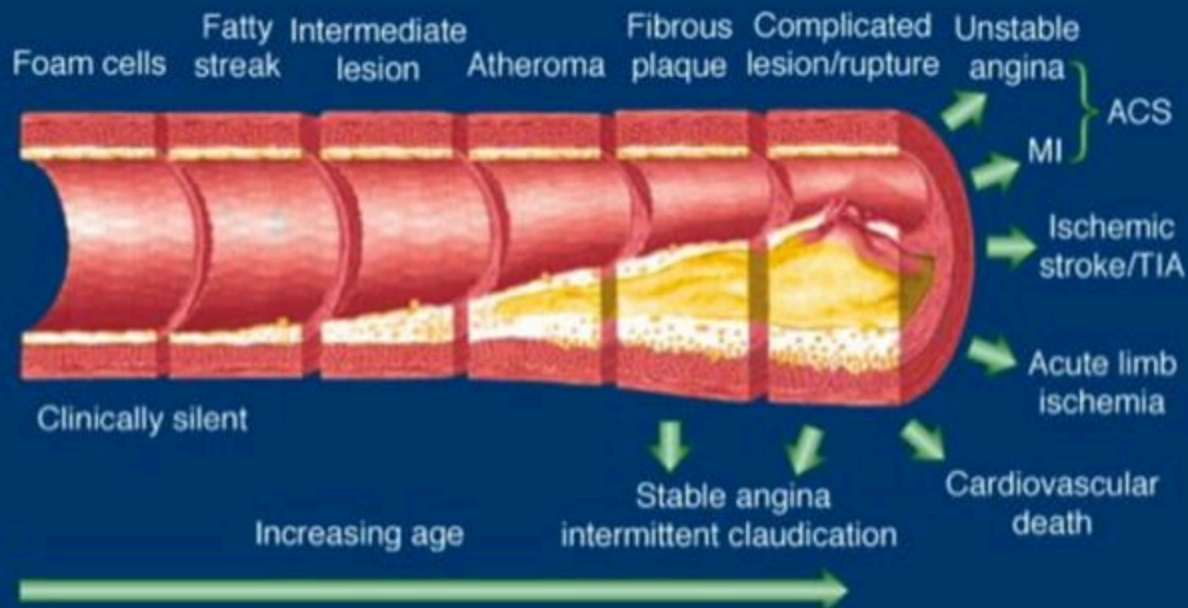
- Refers to the steps in the development of disease.
- It describes how etiologic factors trigger cellular and molecular changes that give rise to the specific functional and structural abnormalities that characterize the disease





# Pathogenesis of atherosclerosis

**Atherothrombosis: A generalized and progressive process**



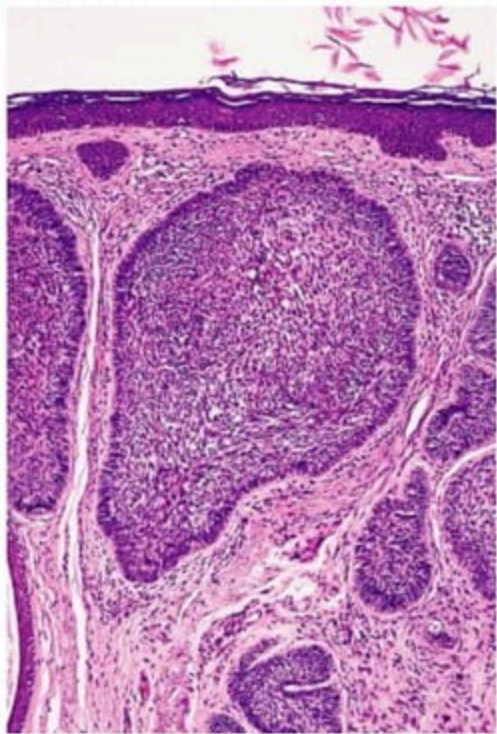
Whereas etiology refers to **why** a disease arises, pathogenesis describes **how** a disease develops.

*Thus pathology provides the scientific foundation for the practice of medicine.*

# *Aim and uses of pathological examination*



## *Diagnosis of diseases*



*Determining the treatment, prognosis, and grading.*

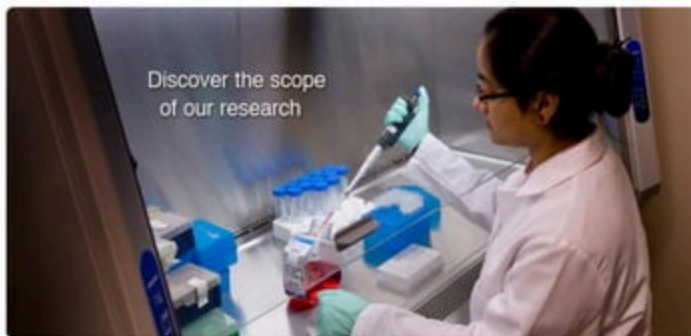


***Medico-legal conditions,  
to determine the cause of death***





# *Researches and medical discovery*



***Techniques included in the field of pathology***

## Macroscopic pathology (Gross pathology):

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

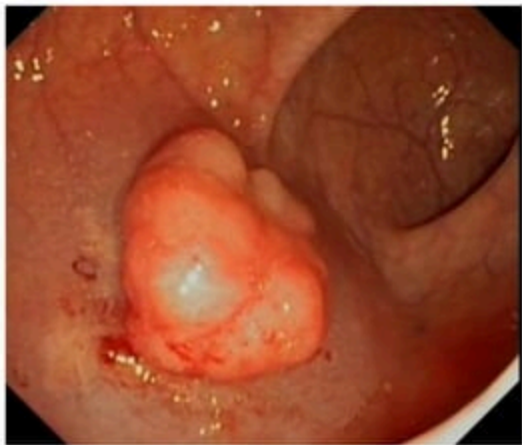
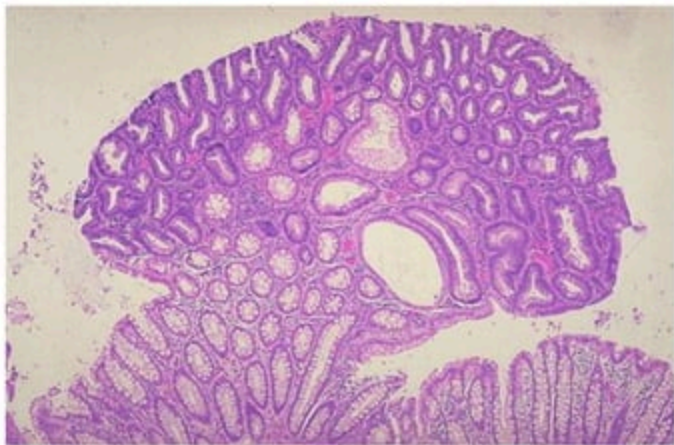


Normal Healthy Liver



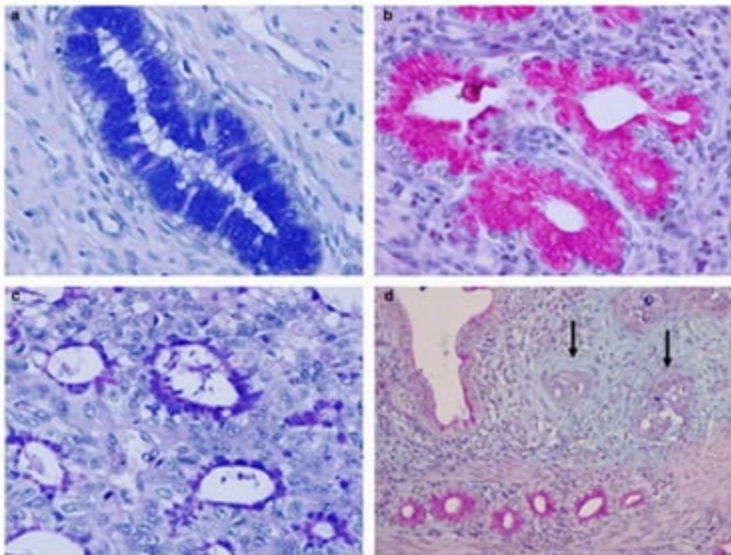
## Microscopic examination

- determining the structural changes in tissue or organ under the microscope



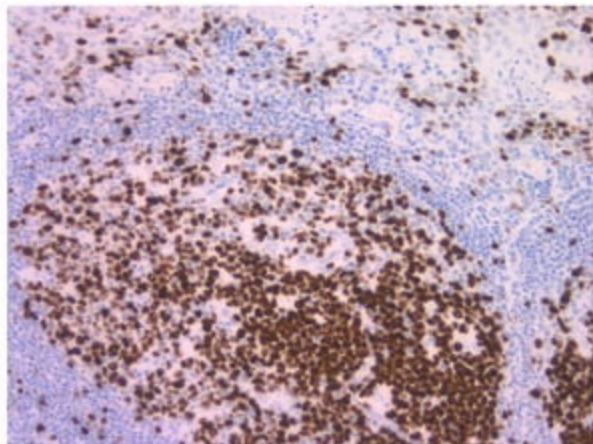
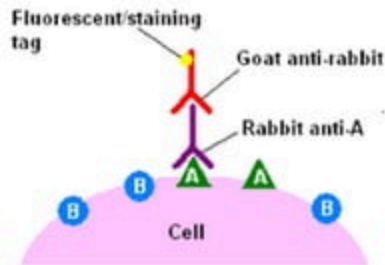
# Histochemistry

- the use of special stains that aid in demonstrating certain substances like Perl's stain for the detection of iron.



# Immunohistochemistry (IHC) and immunofluorescence (IF):

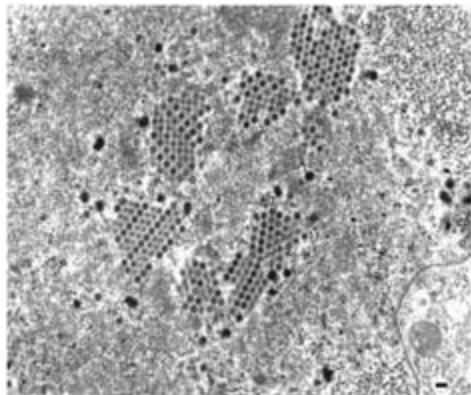
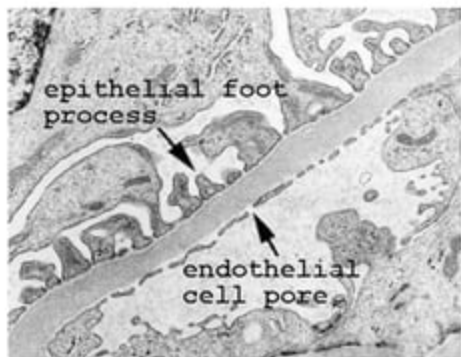
- These techniques employ antibodies (with antigen specificity) to visualize substances (for e.g. cellular proteins or surface receptors) in tissue sections or cytological cell preparations.





## **Electron microscopy (EM):**

- **this has extended the range of pathology to the study of disorders at an organelle (subcellular) level and the demonstration of viruses in tissue samples from some diseases. The most common diagnostic use of electron microscopy is the interpretation of renal biopsies i.e. helps establish the diagnosis of various glomerular diseases.**



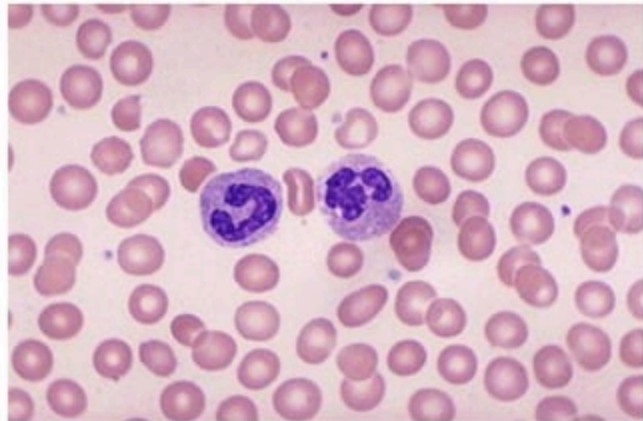
## Biochemical techniques

- by determining the changes in the chemical state of body help in the diagnosis and understanding the various disease for example, raised levels of cardiac enzymes in the blood indicate damage to cardiac myocytes and thus very helpful in establishing the diagnosis of myocardial infarction (MI).



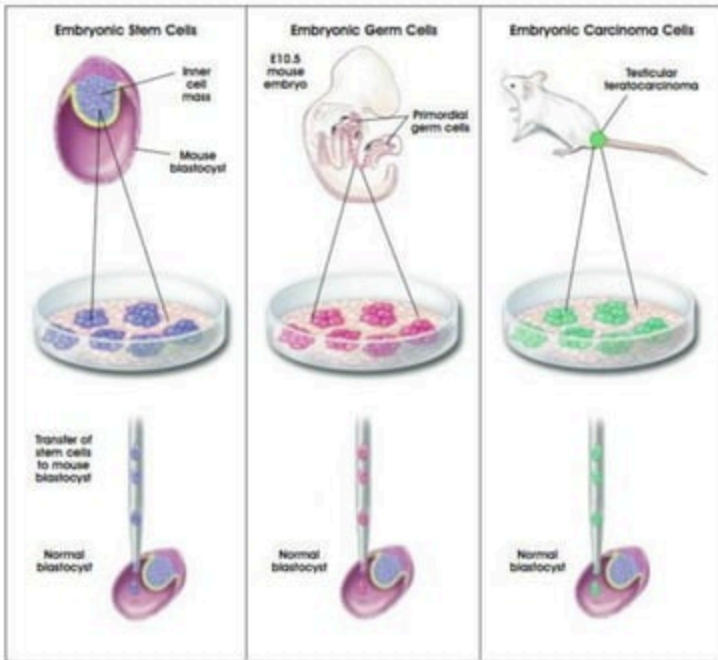
# Hematological techniques

- using complete blood picture, coagulation study, bone marrow aspiration and flow cytometry.



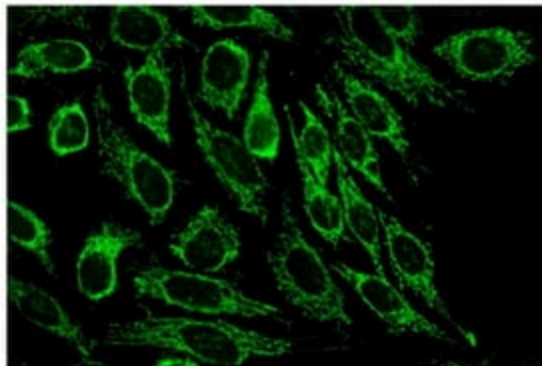
# Cell cultures

- widely used in research and diagnosis to prepare chromosome spreads for cytogenetic analysis.



# Medical microbiology

- the study of diseases caused by organisms such as bacteria, fungi, viruses and parasites by using direct microscopical examination and culture/sensitivity.





# Molecular pathology

- concerned with the study of abnormal chromosomes and genes and their relevance to disease processes using in situ hybridization technique (ISH), polymerase chain reaction (PCR) and DNA microarrays.

