# Introduction to Pathology

**Lecture 1**

PATHOLOGY
TEAM 433

Red is definitions. Orange is listings. Green is examples.
Blue is hyperlinks. Purple is notes to remember.

## Pathology:

1. **It is the study of disease by scientific method.**
2. **"Patho" means disease and "ology" means study.**
3. **It is the study of the disease process (the changes which occur in cells and tissues because of inborn genetic, environmental OR behavior).**
4. **It is also a link between basic biological science and practical medicine.**

## Etiology:

**It is the direct cause of the disease.**

## Pathogenesis:

**It is the mechanism of disease production.**

**E.g.: Squamous Metaplasia → Dysplasia (pre cancer) → Cancer.**

## Diseases:

**It is any functional or structural abnormality in our body that affects our life style and our normal behavior.**

a) **Physiological OR Psychological dysfunction.**

b) **What can cause a disease?**

**It can be caused by an obvious structural abnormality (e.g. broken bone, tumor) OR it can be less defined (e.g. anorexia nervosa).**


**And according from the evidences above, we can give a diagnosis.**

## Outcomes and consequences of disease:

a) **Resolution or recovery with or without complication.**
b) **The disease can settle down, but sequelae are left.**
c) **Natural recovery i.e. recovery without any intervention, can occur at any stage in the progression disease.**
d) **It may result in death.**

## Epidemiology:

1. **The study of how often diseases occur in different groups of people and why.**
2. **The study of the patterns, causes, and effects of health and disease conditions in defined populations.**

**It also studies the various data and statistics of diseases to provide information regarding the following titles in any disease in a particular population:**

| | |
|---|---|
| **Gender** | **Age** |
| **Occupation** | **Social Class** |
| **Behavior** | **Geographic Distribution** |
| **Prevalence** | **Incidence** |
| **Race** | **Prognosis** |

- It is important, because some diseases can affect males but not females.
- Some affect old people while some affect youngsters.
- Some may affect tropical regions such as Africa while others affect the cold regions.

## Prevalence and Incidence:

**Incidence is used when referring to the rate of new disease occurrences. Also, the number of new cases of a particular disease in a defined population in a defined period of time.**

**Prevalence is distribution of a disease within any population and any given time. It is also the total number of cases of a particular disease in a particular defined population in a particular period of time.**

**مثال على ذلك:**

**Incidence**

**عدد الحالات الجديدة التي شُخّصت بمرض السكري في عام 2013 في العالم العربي 32% من إجمالي السكان.**

**Prevalence**

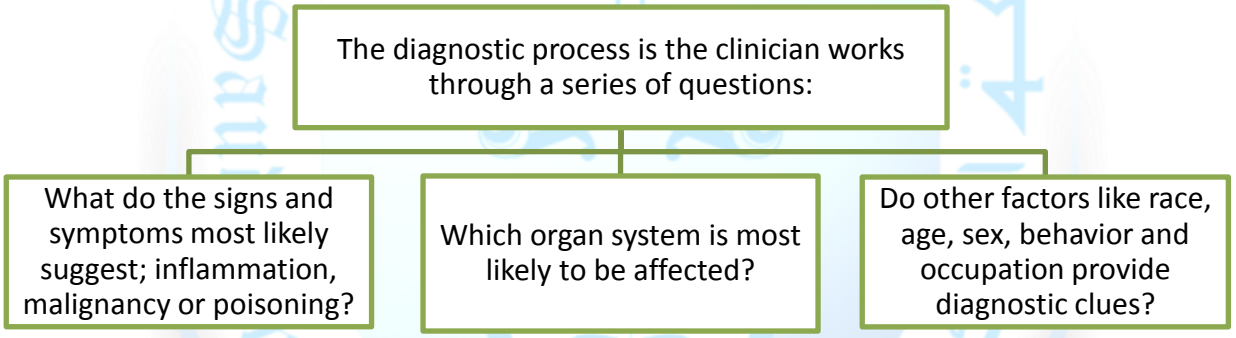
**عدد إجمالي الحالات التي تحمل مرض السكري في عام 2013 في العالم العربي 43% من إجمالي السكان.**

## Factors which affect incidence and preavlence:

1. **Time:** how the disease has varied over the course of time.
2. **Place:** how the disease varies geographically.
3. **Person:** the difference between a person who suffer from a disease and other who does not.

## Clinical presentation (symptoms and signs) and diagnostic process:

**Symptoms** are the patient's complaints.
**Signs** are clinical features discovered by examination of the patient.




## Differential diagnoses:

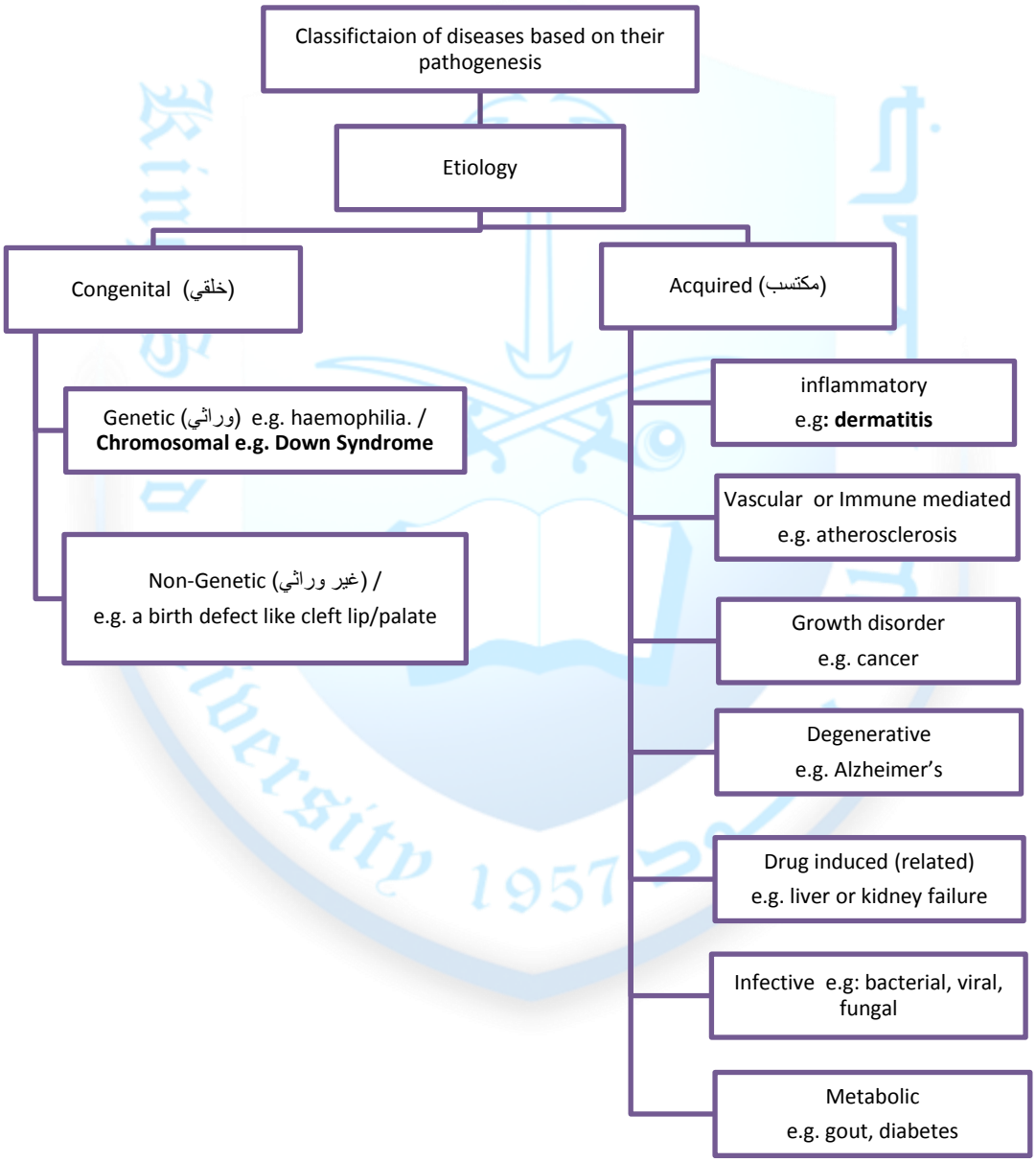
**Other diseases might be similar to the signs or the symptoms.**

## Prognosis:

**The disease's outcome (Cure OR Cure with complications OR Death). It depends on the epidemiology statistic. It is the expected outcome of the disease.**

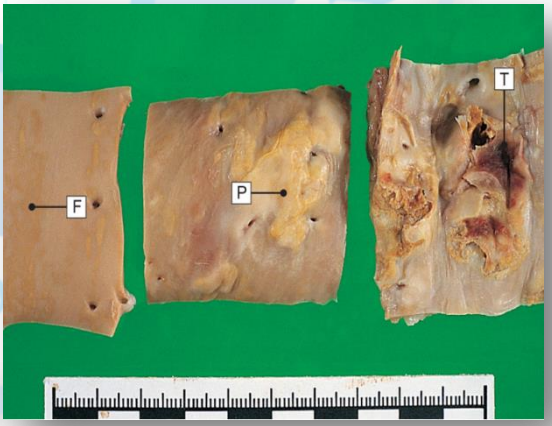
## Idiopathic:

**A disease with unknown cause. It also called Essential OR Primary. In some cases when we do not know the cause of a disease, the etiology is consider as idiopathic, cryptogenic, or essential.**



- **First: Congenital.**
  - **Genetic disease (e.g. Haemophilia: caused by genetic deficiency in clotting factor 8 – it affects males).**
    **Chromosomal disorder e.g. Trisomy 21: leads to Mongolism or Down syndrome.**
  - **Non-Genetic disease (e.g. cleft lip and palate)**
- **Second: Acquired**
  - **Inflammatory E.g. dermatitis (eczema)**
  - **Vascular E.g. Atherosclerosis (deposition of lipid with thickening of blood vessels) leading to a cerebrovascular accident (stroke جلطة في المخ) , myocardial infarction (heart attack).**

In the figure:
F » Normal Vessel.
P » Atherosclerosis.
T » Complicated Atherosclerosis.



## ➢ Growth disorder

In this figure, lung of a smoker.
It appears he has a tumorous mass in his Right main bronchus.


## ➢ Degenerative disease (ضمور):

**It is deterioration in cell or tissue because of aging process OR metabolic disturbance.**

**E.g. Alzheimer's disease: which cause by an atrophy in the hippocampal region.**

**E.g. Parkinson's disease (الشلل الرعاشي): which is because of the aging process, the neurons which have certain pigment in an area called substantia negra have been degenerated.**

- **Drug Induce:**

  **It is a side effect or allergic reaction from taking a certain drug.**

  **E.g. A haemorrhagic skin rash affecting both legs.**

- **Infective:**

  **It caused by an organism.**

  **E.g. Viral, bacterial or fungal causing a disease called meningitis: Which is as you can see it causing a yellowish creamy material or pus (صديد).**

  **E.g. Bacterial brain abscess (خراج).**

- **Metabolic:**

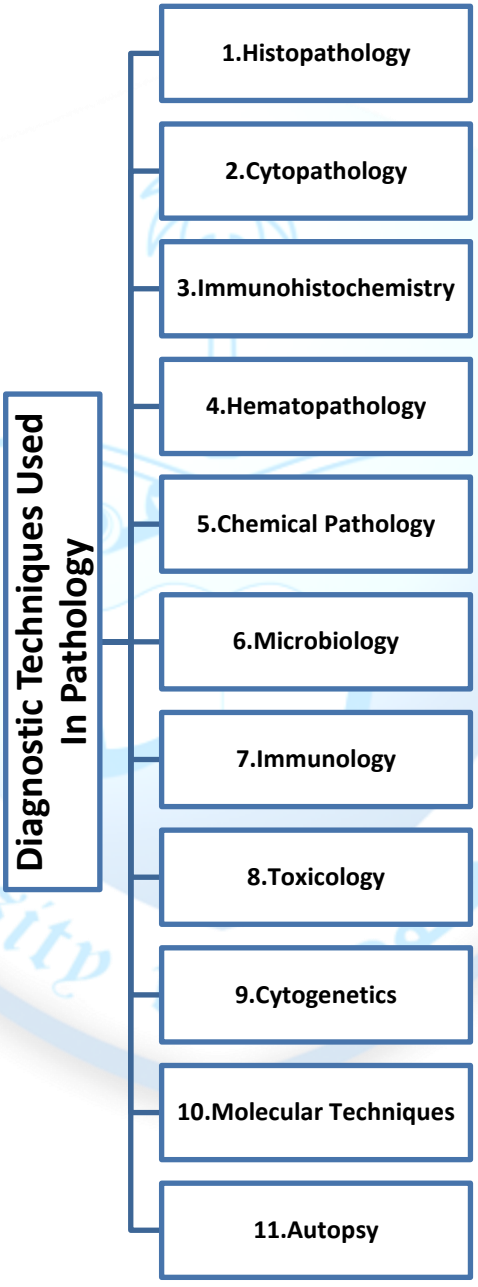
  **E.g., Gout caused by disposition of uric acid crystals in joints (especially the metatarsal of the big toe) and tissues.**

  **E.g. Diabetes mellitus, it is a systemic disease (يصيب أغلب أجهزة الجسم) which caused by abnormal metabolism of carbohydrates and lack of insulin.**

In the picture, the white regions are the uric acid crystals in a joint.

## The Role of the Pathologist:

**Helping the clinician to make a diagnosis by looking samples of tissues (biopsies) to refine the differential diagnosis.**

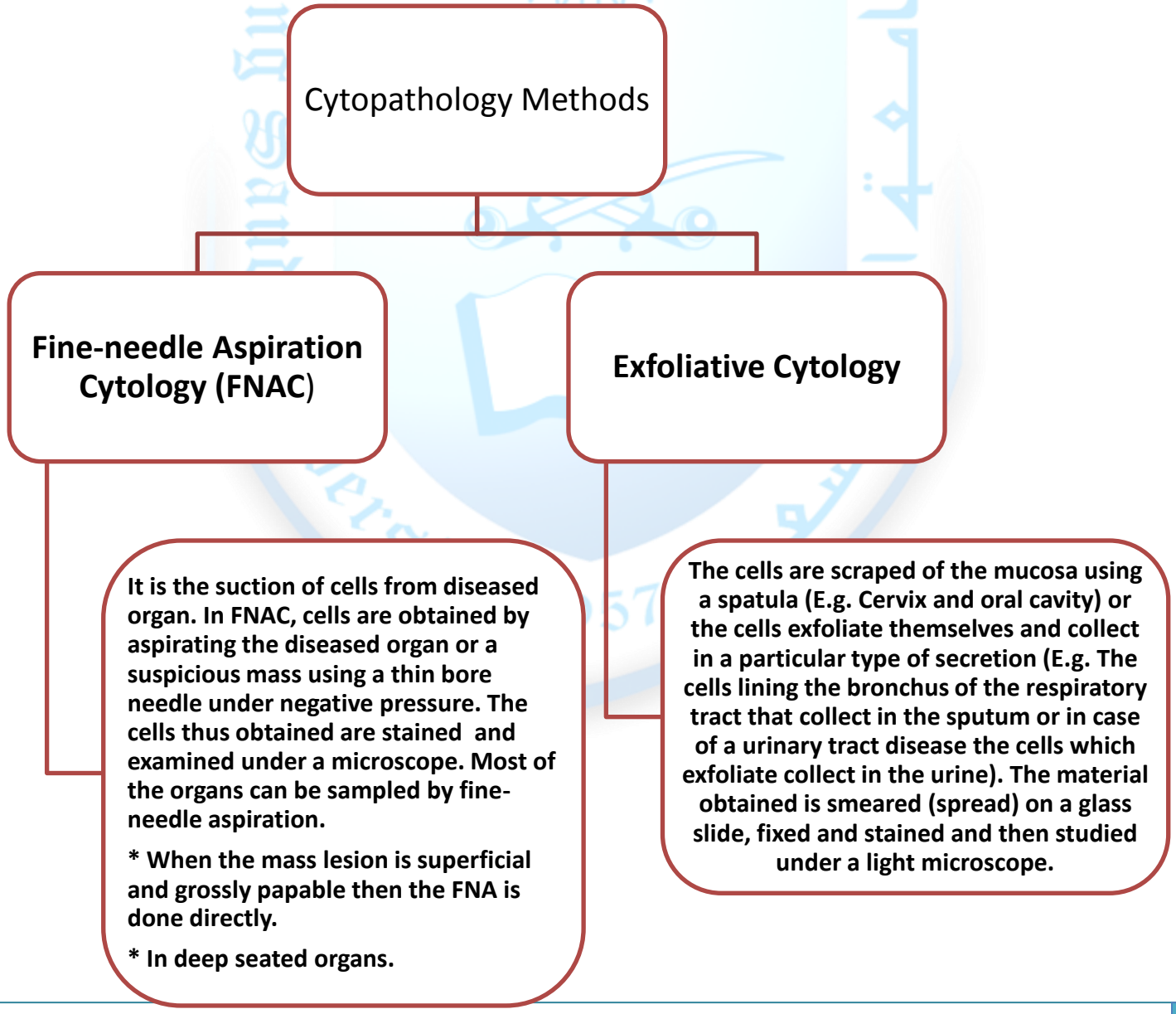


## 1. Histopathology:

**The Hematoxylin /Eosin (H&E) stain is routinely used to stain the selected tissue part. It gives the nucleus a blue color & the cytoplasm & the extracellular matrix a pinkish color.**

## 2. Cytopathology:

**It is the study of cells from various body sites to determine the cause or nature of disease.**



3. **Immunohistochemistry :**

**This is a specialized staining procedure is used to detect a specific antigen in the tissue in order to identify the type of disease.**

4. **Hematology :**

**It is a study of abnormalities of the cells of the blood and their precursors in the bone marrow.**

5. **Biochemical examination:**

**It is the analysis of bodily fluids and biochemical tests are used for diagnosis and management.**

6. **Microbiology:**

**It is the study and diagnosis of organisms responsible for various infectious diseases.**

7. **Immunology :**

**It is the analysis of the immune system of the body.**

8. **Toxicology :**

**It is the study and identification of various poisons and toxic substances.**

## 9. Cytogenetics (clinical genetics):

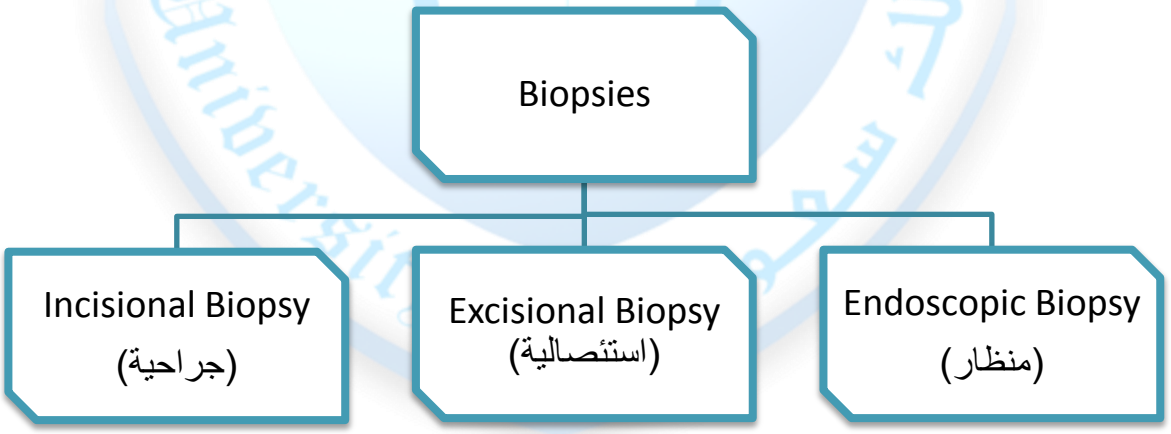
**It is a study of chromosomal abnormalities.**

## 10. Molecular techniques:

**Various molecular techniques such as fluorescent in situ hybridization, Southern blot are used to detect genetic diseases.**

## 11. Biopsy:

**Sample of tissue taking for diagnostic purpose.**

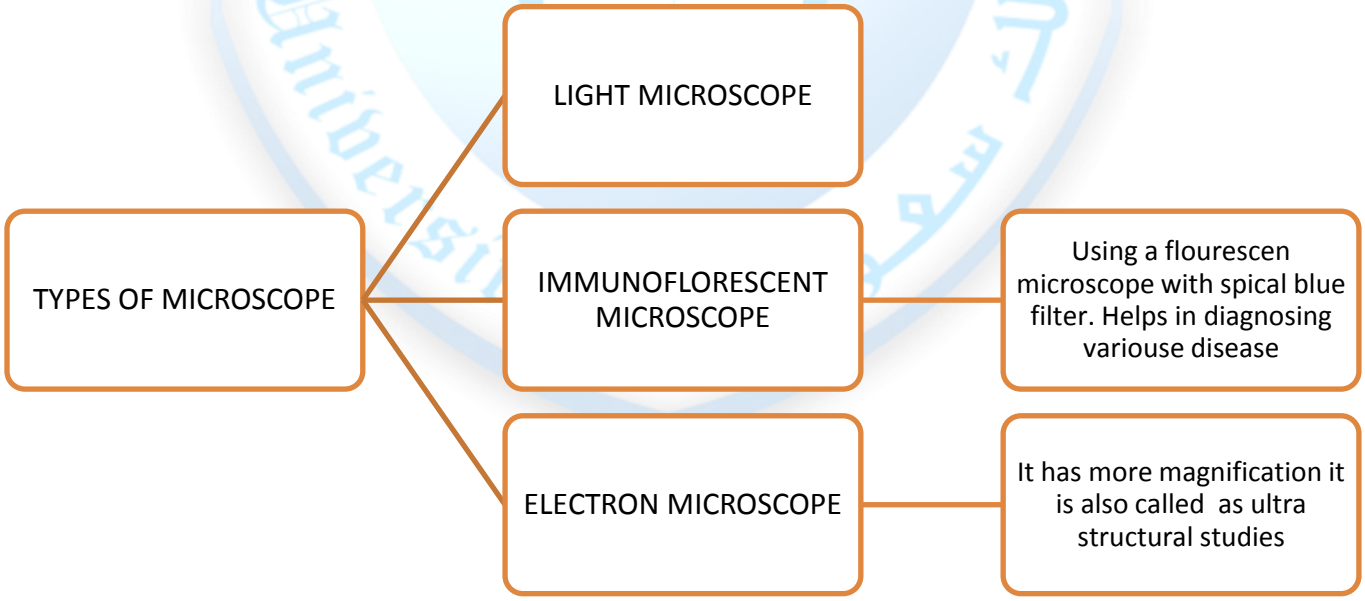


## 12. Autopsy:

**It is the dissection of the body to know the cause of the death; also it is a sub-specialty that focuses on determining the cause of death by examining a dead body. The autopsy informs about the pathologic process, leads to a person's death. Also it can be used as a tool to educate students, surgeons etc.**

### ➢ Indications for Autopsy:

1) **Determine the cause of death.**
2) **Auditing the clinical diagnosis.**
3) **Provision of useful material for teaching.**
4) **Research: causes and outcomes of diseases.**



# MCQ'S

Q1; What is " the act of naming a disease in an individual patient " ?
A : Pathogenesis
B ; Autopsy
C : Diagnosis
D : Epidemiology

Q2: What is "The study of chromosomal abnormalities. "?
A ; Immunohistochemistry
B ; Cytogenetics
C ; Hematology .
D ; Histopathology

Q3; What is " The observation of tissues with the naked eye to study disease " ?
A ; Molecular pathology.
B : Gross pathology .
C : Clinical pathology .
D : Medical pathology .

Q4 : What is " the study of specific defense mechanisms of the body " ?
A ; Immunology .
B ; Hematology .
C ; Histopathology .
D ; Microbiology .

Q5; Which microscope that enables us to see cell structure like mitochondria, endoplasmic reticulum, viral particles etc. ?
A ; Light Microscope .
B ; Electron Microscope .
C ; Immunofluorescence .
D ; Simple microscope

Q6; An African man came to your clinic, what is the most probable infectious he might have?
A ; Parasitic.
B ; Viral.
C ; bacterial.
D ; fungi.

Q7; in what classification you put cancer according to pathogenesis?
A ; Degenerative.
B ; Inflammatory.
C ; Drug induced.
D ; Growth disorder.

Q8; 16th year old boy with a swelling on his posterior aspect of his leg, after examine him you found out he has an accumulation of blood on the swelling area. One of his symptoms is spontaneous (automatic) bleeding, and his brother died 3 years ago because of internal bleeding, what is your diagnosis for his situation?

**A ; Haemophilia A**
**B ; Haemophilia B**
**C ; Hemochromatosis.**
**D ; Leukaemia**

Q9 ; A short stature child, with a short neck, Chinese eyes style although he is not Chinese, with a 1 crease on his hand, Big tongue and he is mentally retarded. What is his disease?

**A ; Klinefelter syndrome.**
**B ; Turner Syndrome.**
**C ; Down Syndrome.**
**D ; none of them.**

Q10 ; A mother brought her 7th months old child to the clinic she said that her child was chocking and having difficulties in feeding. After you examine the child you saw a cleft palate and lip palate, what is your diagnosis?

**A ; cleft palate and lip.**
**B ; neurofibromatosis.**
**C ; Cri du chat.**
**D ; Angelman syndrome.**

Q11; A patient who is allergic to eggs, a red skin area with vesicles that accumulate a yellow fluid within it. It is also very itchy. What is the classification of the disease based on its pathogenesis?

**A ; inflammatory.**
**B ; infection.**
**C ; Degenerative.**
**D ; Growth disorder.**

Q12; An 80 years old man have been found lost and disoriented in the street. After examine him you found that he has a loss of memory for recent events. What is your diagnosis?

**A ; Parkinson's Disease.**
**B ; Multiple sclerosis**
**C ; Tay Sachs.**
**D ; Alzheimer**

Q13; Dr.John prescribed penicillin for a sick woman, the next day she came with purpuric rash (rash on her legs) what is your first explanation for her situation?

**A; drug induced.**
**B; bacterial infection.**
**C; Growth disorder.**
**D; haemophilia C.**