

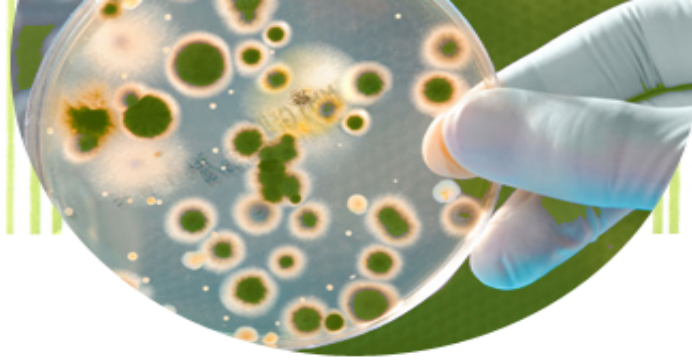
Pathology LECTURE (1) INTRODUCTION

As a doctor you should know what can threaten your patient's life
you should know what makes your patient suffers from pain
THAT'S WHY YOU LEARN PATHOLOGY

“ هذا العمل لا يغني عن المصادر الأساسية للمذاكرة ”

Definition: BLUE Examples: GREEN Important: RED Extra explanation: GRAY Disease names: **UNDERLINE**.

Objectives :



REPEAT AFTER ME:
“I CAN DO THIS”

- * Understands the role of pathology and its various subspecialities(التخصصات الفرعية)in the diagnostic process(عملية التشخيص) with special emphasis on histopathology and cytology(علم الخلايا)
- * Understands the meaning of the terminology (مصطلحات) used during the study of a disease like aetiology (المسببات المرضية) pathogenesis, prognosis, sequelae, symptoms, signs, incidence etc.
- * Role of diagnostic pathology in disease management.
- * Be aware of some of the principal techniques used in pathology like light microscopy, cytology, immunohistochemistry and molecular pathology.
- * Have a basic knowledge of the definition of autopsy(تشريح الجثة/الطب الشرعي) and its indications.

What 's PATHOLOGY?

P A T H O L O G Y T E A M

Pathology is divided into two parts: (Extra Information)

Academic pathology : is normal study of diseases by book and theoretical methods.

Clinical pathology : is the application of the knowledge gained to the treatment of patients.

Pathology : (pathos,suffering) disease(-ology) study(science). (The study of a disease). It is the study of changes which occur in cells and tissues as a result of any injury to the cell or tissue.

Another definition : It involves the investigation of the causes of disease and the associated changes at the levels of cells, tissues and organs.

Disease: a **dysfunction**¹ disorder with a specific cause. which leads to(**psychological**², **physiological**³, **anatomical**⁴ Dysfunctions). It can be caused by an obvious structural abnormality (e.g. **broken bone, tumor**⁵) OR it can be less defined (e.g. **anorexia nervosa**⁶).

Anorexia nervosa: a psychiatric illness in which patients starve themselves or use other techniques such as vomiting or taking laxatives⁷, to induce weight loss. (to lose weight).

YOU'LL BE A GREAT DOCTOR.



- 1 الاختلال الوظيفي
- 2 الضعف الفسيولوجي
- 3 الضعف النفسي
- 4 تشريحي
- 5 الورم
- 6 فقدان الشهية
- 7 أدوية مسهلة (مليينات)

Extra information
For you to know



The different between Physiological and Psychological DYSFUNCTIONS :

- **Physiological Dysfunction:**

Is somatic pain or problem. And always the pain will in specific organ or area. (أتاك شخص يشتكى ألم في بطنه أو). (أصبع رجله).

- **Psychological Dysfunction:**

Is mental or imaginary problem. And when you examine the patient and you find nothing wrong with his body, but when you talk to him he says: (يا) دكتور أنا أحس إنني أسبح مع الجن وأحس الناس (كلهم يتآمرون ضدي وأحس إنني أطير مع الملائكة!

Etymology is the origin or root of the word. Many medical terminologies are derived from smaller words called origins. **For example:** phagocytosis could be divided to the following origins: phago: means to devour (eat) , cyto: means cell, sis: means the process of. Together they give the meaning which is the process of eating cells.

يعني بعض الكلمات الطبية تكون مكونة من أكثر من مقطع وكل مقطع له معنى مُستقل, تُجمع المقاطع في كلمة واحدة فنؤدي إلى المعنى الكامل.

CON... What is pathology?



Parts of pathology:

All diseases have certain aspects that can form the basis of a classification & these include:

- **Epidemiology (علم الأوبئة):**
 - It is Study of the occurrence (وجود) and distribution (توزيع) of diseases in a population.
 - It is the study of the patterns, causes, and effects of disease conditions in various populations.
- **Etiology (علم أسباب الأمراض):** is the direct cause of the disease, (bacterial, fungal, parasternal, environmental, metabolic).

If the cause of the disease is unknown it is called: idiopathic / cryptogenic / essential. (مجهول السبب)

it may be written "aetiology" is the same.

- **Pathogenesis (آلية تطور المرض):** is the mechanism (آلية) of the disease production. (pathological manifestations) (المظاهر المرضية)
- **Morphologic changes (التغيرات الشكلية أو الظاهرية):** are the structural changes that take place in cells or tissues due to any disease.
- **Clinical features (functional alterations) (التغيرات الوظيفية):** -It means the signs & symptoms which appear on the patient.

Epidemiology:

It is the study of the patterns, causes and effects of disease condition in various populations.

According to:

Sex

Age

Race

Occupation ,Examples:

- Workers in asbestos industry can have
- Disease like **asbestosis**(تليف)
- Tumor like **mesotheliomas**(ورم خبيث).
- Workers in aniline dye industry can have •**Urinary bladder cancer**
- Hardwood workers can have •**Nasal cancer**

Geographic location:

- **Undevelopment countries** has :
- Malnutrition** (سوء تغذية)
 - infection like **tuberculosis** (مرض السل).
- **Development countries** have :
- **Cardiac problems.** •**Obesity.**

Socioeconomic strata

(الطبقات الاجتماعية والاقتصادية):

The social and financial status of the people affect by a particular disease.

Prevalence(انتشار المرض):

The **total number of cases** of a particular disease.

Incidence(مدى تأثير المرض):

The **number of new cases** of a particular disease.

Sequelae

is **the complication** or the consequence of a disease.

Prognosis(التنبؤ)

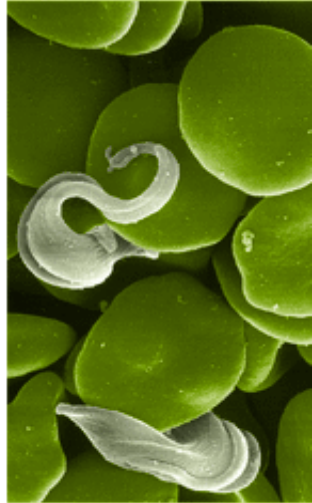
is **the expected outcome of the disease** based on severity of any disease.

Morbidity(نسبة انتشار المرض)

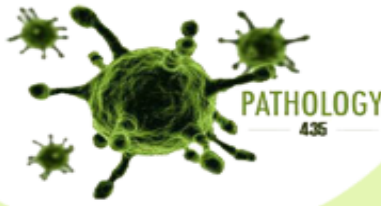
is **the presence of illness.**

Mortality rate(معدل الوفيات)

is a **measure of the number of people dead.**



What is the Purposes or importance of Epidemiology?



ليش احنا ندرس علم الأوبئة؟

- 1.To investigate the extent of a disease in a community.** (عشان نعرف ونحقق بمدى انتشار المرض بالمجتمع)
- 2.To study natural pattern/history and prognosis of disease.**(عشان نعرف أنماط التشخيص وكيف نقدر نتنبأ بالمرض)
- 3.To identify causes and risk factors.**(عشان نعرّف بالأسباب وايش هي عوامل الخطر بهالمرض)
- 4.To provide good health care based on the findings.**(عشان نوفر عناية صحية من المضاعفات اللي اكتشفناها عن هالمرض)
- 5.To recommend and assist in various health programmes to prevent or treat disease (preventive and therapeutic measures), e.g. immunizations and screening programs for different disease etc.**(عشان ناخذ التدابير الوقائية والعلاجية مثل) (التطعيمات والفحوصات لمرض معين مثل : فحص سرطان الثدي)
- 6.To evaluate all health care facilities and programs.**(عشان نقيّم كل مرافق وبرامج الرعاية الصحية)
- 7.Provide information on public health in order to help the health care system and develop health policies.**(وأخر شي) (عشان نقدم معلومات عن الصحة العامة إذا أحد سألنا ونساعد في نظام الرعاية الصحية ونطور السياسات الصحية)

Classification of disease:

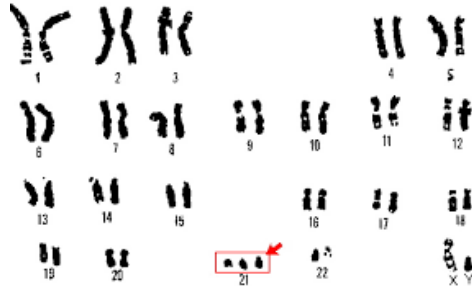
diseases are classified into two broad categories.

P A T H O L O G Y T E A M

1- CONGENITAL

خُلقي

Inherited /Genetic: like [hemophilia](#) (deficiency of factor 8), which only affects males. However certain inherited diseases are characterized by an abnormality in the chromosomes (**chromosomal diseases**), like [down syndrome](#) (trisomy 21).



Non-inherited/ non-genetic: due to abnormality, which occurred in embryonic life, like [cleft lip and cleft palate](#).



Unilateral cleft lip



Bilateral cleft lip

Classification of disease:

diseases are classified into two broad categories.

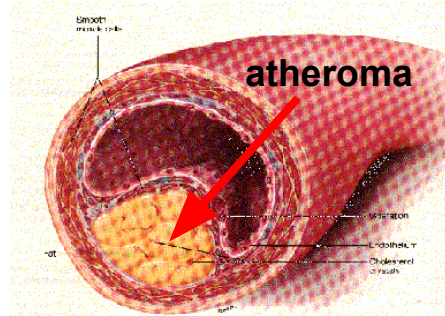
P A T H O L O G Y T E A M

- ❑ **Inflammatory.**(التهابي)
like eczema (dermatitis).
Case: a child patient who has **meningitis** because of **meningococci bacteria.**
طفل لديه التهاب السحايا بسبب البكتيريا
المكورات السحائية.



2-ACQUIRED

مُكتسب



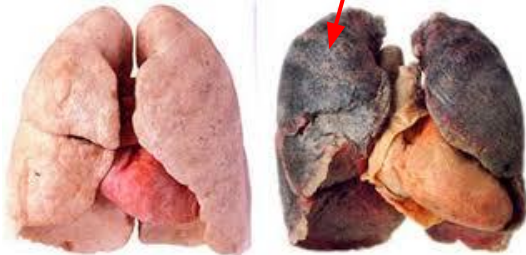
- ❑ **Vascular or Immune mediated.**(أمراض الأوعية الدموية أو المناعية)
-Vascular: e.g. **atherosclerosis** (heart attack) , **atheroma:** which is caused by **accumulation of lipids and cholesterol in the wall of arteries** سببه تراكم الدهون و الكولسترول في جدار الشرايين.
-Immune mediated: e.g. **vasculitis**(التهاب الأوعية الدموية)

Cont.. ACQUIRED DISEASES

P A T H O L O G Y T E A M

- ❑ **Infective.**(معدية)
bacterial, viral, fungal.
الأمراض التي تنقلها البكتيريا
والفيروسات والفطريات مثل : كورونا

- ❑ **Neoplastic**(الأورام)
(growth disorder اضطراب
النمو).
like : lung cancer.



- ❑ **Metabolic.**
(Case: a patient has an abnormality in the metabolism of uric acid. He suffers from gout (مرض النقرس) **VEDIO Another VEDIO**
(Case: a patient has an abnormality in the metabolism of carbohydrates. He suffers from diabetes mellitus(مرض السكري) It is very common).



- ❑ **Mechanical.**
e.g. road traffic accident, burns
(حوادث السيارات والحروق)

- ❑ **Nutritional deficiency diseases.**(أمراض نقص التغذية).
e.g. anemia, protein energy malnutrition etc.

Cont.. ACQUIRED DISEASES

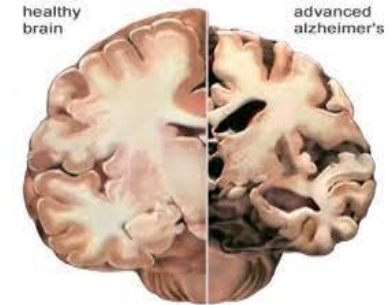
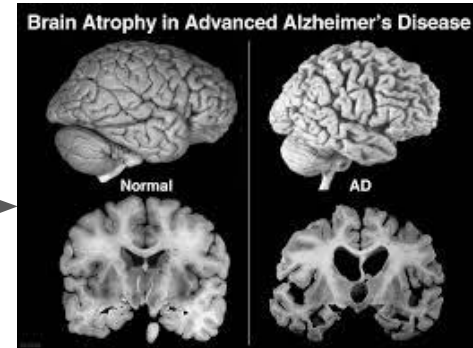
P A T H O L O G Y T E A M

❑ Degenerative.

caused by degeneration (deterioration in the function of cells or loss of cells because of **aging** (الشيخوخة)).

Case: Alzheimer disease an old patient keeps forgetting recent facts and always gets lost. This patient has **dementia** (فقدان الذاكرة للأحداث) (الخرف), **loss of memory for recent events** (الأخيرة). there is an **atrophy** (ضمور), **half of the brain is reduced** (نصف الدماغ يبدأ بالتلاشي)

Case: Parkinson's disease an old patient suffers from **tremors**, he **walks with his head leaning forward**, and **his face has no expressions**. (مريض مُسن يعاني من الهزّات بيديه). (ويمشي ورأسه مائل للأمام ووجهه ليس لديه تعابير) This is quite common in the ages above 60. **When the midbrain neurons are absent or when they degenerate.** (يحدث بسبب فقدان الخلايا) (العصبية وضمورها)



Parkinson's Disease: A new approach

Cont.. ACQUIRED DISEASES

P A T H O L O G Y T E A M

- Therapeutic or recreational drug associated disease.

(الأدوية العلاجية المرتبطة بالمرض)

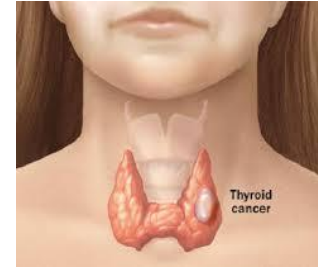
Case: a patient took antibiotics for her sore throat, after she's taken the antibiotics she developed a skin rash. This rash is an allergic reaction (الطفح الجلدي أو الحساسية).



- Radiation.

(الإشعاعات)

radiation to neck can cause thyroid cancer or radiation to skin can cause skin cancer (سرطان الجلد) (squamous cell carcinoma) (سرطان الخلايا الحرشفية)



Pathogenesis

It is the steps that take place in the body once the problem begins that finally lead to tissue injury.

The four basic pathogenetic mechanisms(STEPS):

- Inflammatory process
- Degenerative process
- Carcinogenesis (السرطان): transformation of normal cells to malignant (تحول الخلايا الطبيعية إلى خلايا خبيثة).
- Immunological process

Pathogenesis leads to ...

Morphologic changes

The structural alterations in cells or tissues that occur following the pathogenetic mechanisms.

These morphological changes can be seen:

- Grossly (called **macroscopic findings**) with the naked eye (العين المجرة).
- Under the light microscope (called **microscopic/histologic findings**).

Morphologic changes leads to ...

Clinical features

When an organ is damaged by a disease, the normal function of that organ is affected and this will lead to the development certain clinical changes called :

- **Symptoms (الأعراض):** is something experienced and reported by the patient. (**patient experience**)
- **Signs (علامات أو نتائج الفحوصات):** are findings discovered by the physician during examination of the patient. (**physician discovery**)

PATHOLOGY



Epidemiology



Etiology



Pathogenesis



Morphologic changes



Clinical features

How to Study a disease!

Definition

Epidemiology of disease

Etiology

Pathogenesis and pathophysiology

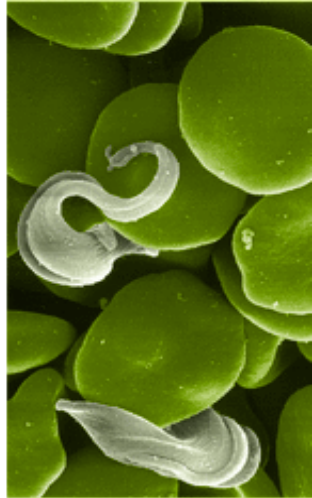
Morphology changes

Clinical features/presentation

Differential diagnosis: is there any other alternative diagnosis/diagnoses (التشخيص) with similar findings

Treatment and management

Prognosis (التنبؤ بالمرض)



Course of disease (مسار المرض)

P A T H O L O G Y T E A M

Is the different stages in the natural history or progression (تقدّم أو تفاعم) of a disease in the absence of any intervention (تدخل).

The different stages in the natural history or course of a disease **especially infectious** are as follows:

Exposure (التعرض):

to causative agents or risk factors.
التعرض لمسببات المرض أو عوامل الخطر.

• latent period (فترة الكمون):

Between exposure and onset of disease.

• incubation (induction) period (فترة الحضانة):

The time period from the exposure to the development of signs or symptoms.

Onset of disease (بداية المرض): the beginning of signs or symptoms.

Outcome and consequences (النتائج) of disease: could lead to one of these options:

Recovery/resolution of disease without complication or sequelae. (المريض يعود لحالته (الصحية بدون مضاعفات

The disease recovery but with sequelae. (يتعافى المريض لكن (مع وجود مضاعفات

Development of complications. (تتطور المضاعفات) (لدى المريض

Death. (يؤدي إلى موت المريض).



Any patient going to a clinic meets clinician who will :

1- Take history and do clinical examination. (يقوم بالسؤال عن المرض ويعمل فحص للمريض)

2- Ask for radiological and pathological examination. (يقوم بطلب الفحص الإشعاعي والمرضي)

The common pathological examinations are:

- Blood.
- Urine.
- Stool.

Sometimes the patient is also asked to undergo:

- Cytopathology test.
- histopathology test(اختبار التشريح المرضي)
- Other special pathological tests.

The Diagnostic Process !



The role of pathologist !

- The role of pathologists is in doing these tests, analysis of the cells, tissues, and blood, bacteriological studies, autopsy, etc.

The branches/subdivisions of pathology

Histopathology	study of tissue biopsied/excised from body (دراسة الأنسجة)
Cytopathology	study of cell morphology, exfoliated or aspirated from body. (علم الخلايا : دراسة الخلايا)
Hematology	a study of blood, blood cells and bone marrow, used in the diagnosis of anemias & leukemias.
Immunohistochemistry	a special staining procedure is used to detect antigens in the tissue. (دراسة لاكتشاف مستضدات الجسم)
Chemical pathology/ clinical biochemistry	is the analysis of bodily fluids (blood, urine, etc) for diagnosis. (لفحص سوائل الجسم)
Microbiology	is the study of micro-organisms (دراسة الجسيمات في الجسم)
Immunology	is the analysis of the immune system of the body. (دراسة جهاز المناعة)
Toxicology	study of various poisonous and toxic substances. (دراسة مختلف المواد السامة)
Cytogenetics (clinical genetics)	is a study of chromosomal abnormalities. (دراسة الحالات الغير طبيعية للكروموسومات)
Molecular pathology	e.g. fluorescent in situ hybridization , Southern blot tests etc. (Click to know what are these)
Autopsy	It's a subspecialty of pathology which involves examining a dead body. (تشريح الجثة وفحصها)

AUTOPSY (الطب الشرعي): is done to!

1- To determine the cause of death. It can be performed in any of the following situations:

- Homicidal (قتل)
- Suicidal (انتحار)
- Accidental (عرضي)
- To identify the disease (التعرف على المرض)

2- To provide useful information about various disease.

3- To do research.

4- Also it can be used as a tool to educate students, surgeons etc

**Who Does The
Autopsy?**

The Pathologist.



Histopathology

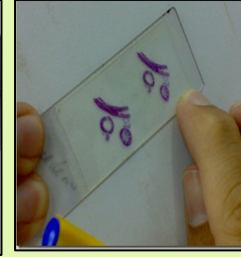
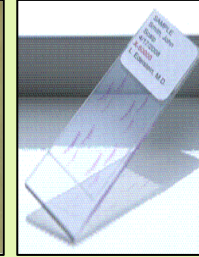


Steps of histopathology:

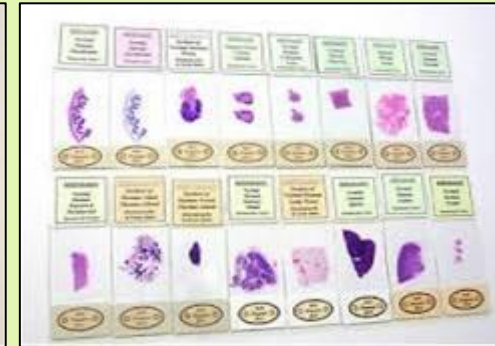
Histopathology is the study of tissues using light microscope.

Important Notes:

- The purpose of fixation is to prevent autolysis and decomposition (تعفن) of the tissue. **container of formalin (10% formaldehyde)**
- The most commonly used routine stain is **Hematoxylin & Eosin stain**. It gives **the nucleus a blue/violet color** & **the cytoplasm a pink color**.
- Histopathology is usually **the final/gold standard of diagnosis**.
- Sometimes during surgery an urgent diagnosis is needed **INSTANTLY** and tissue is processed rapidly to give results in 20 minutes. **This is called frozen section**.



Histopathology slides ready to be examined under a light microscope



Cytopathology



Is the study of morphology of cells which are obtained by :

- Exfoliative (falling or scrapping off)cytology
- Aspiration (fine-needle aspiration cytology FNAC).

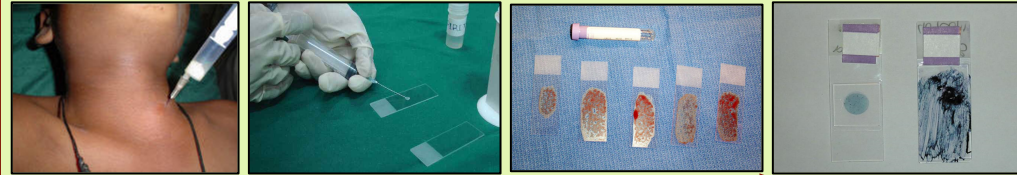
It is used for the purpose of:

- Screening for cancer e.g. cervical cytology (خلايا عنق الرحم)
- Diagnosing cancer.

The advantage of cytologic technique when compared to histopathological techniques is that the procedure is:

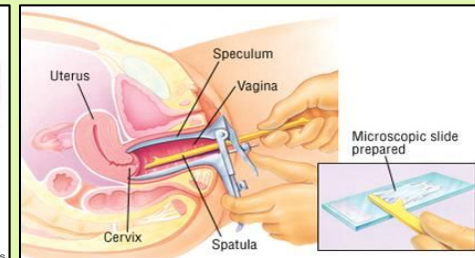
- Cheap.
- Takes less time.
- Requires no anesthesia (تخدير).

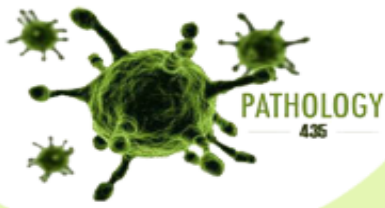
1- Aspiration (fine-needle aspiration cytology FNAC). The cells are obtained by aspiration/suction (سحب/شفط) of cells from affected organ or tumor mass using a needle.



2- Exfoliative (falling or scrapping off)cytology.

The cells are scraped of any mucosa using a spatula (e.g. cervix and oral cavity) or the cells exfoliate (fall off) themselves and collect in the respective fluids/secretion (e.g. in urinary tract) the cells which exfoliate collect in the urine, sputum (لعاب/بصاق) etc.

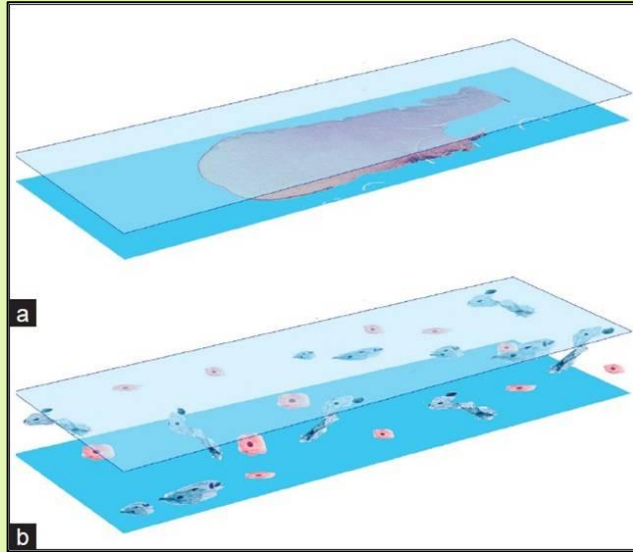




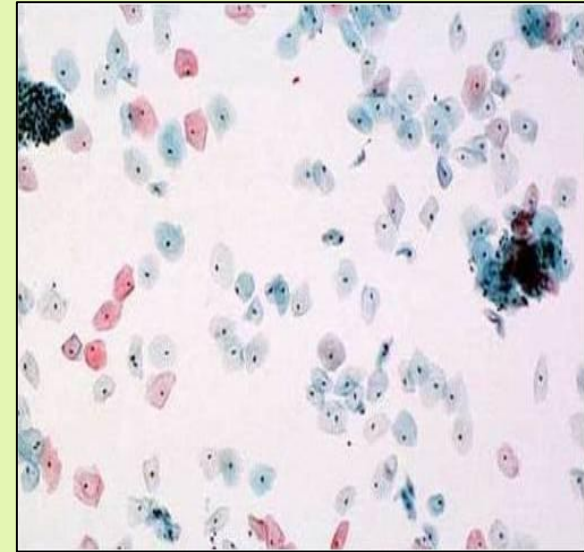
The difference between Histopathology and Cytopathology.



A) Histology under the microscope
(يكون عبارة عن نسيج كامل)



a) Histology b) Cytology

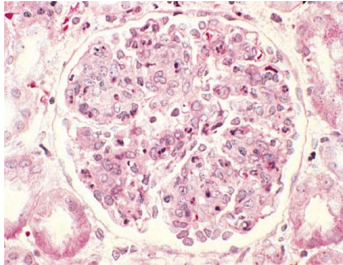


B) Cytology under the microscope
(يكون عبارة عن خلايا وليس نسيج)

Some Instruments In Pathology

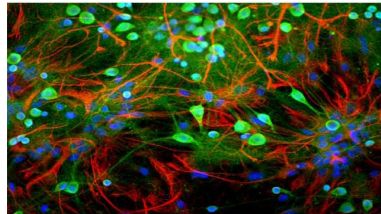
Light microscope

A type of microscope which uses visible light and a system of lenses to magnify images of small samples. **it is the oldest design of microscope.**



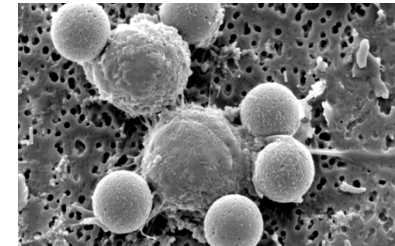
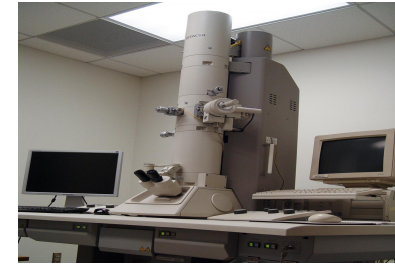
Immunofluorescent microscope

It is used for diagnosing immunological diseases
(الأمراض المناعية).



Electron microscope

It enables us to see cell structure like **mitochondria, endoplasmic reticulum, viral particles etc.**



CLINICAL CASES

DO YOU KNOW WHAT'S THE INTERESTING THING ABOUT DOCTORS? THEY KNOW HOW DISEASES OCCUR !! **(THAT'S OUR SECRET)**

ECZEMA

INFLAMMATORY DISEASE.

Example: my hand is always red and feels hot.

He could be: allergic (حساسية) / inflamed (ملتهبة) / infected (مصابة).

He says: I bought nylon socks and after wearing them my hand got red & " فيها صديد "

He has: **eczema / dermatitis (إلتهاب الجلد) (allergic)**



VEDIO

HEMOPHILIA

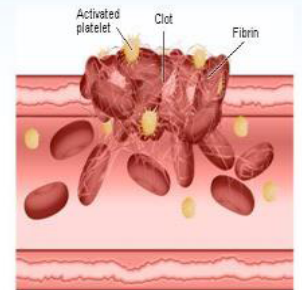
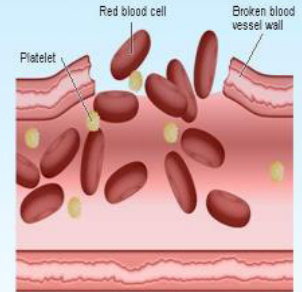
Man with swelling contains blood
Symptoms: said: "I've always had excessive bleeding. Me and my brother. But my sister doesn't".

Diagnose: problem is physiological (organic) + related to blood coagulation (blood tendency) + inherited

+ deficiency of factor 8 (coagulation factor) [we have 12 factors] + the gene for it is mutated or absent = **Hemophilia.**

VEDIO

Blood Clot



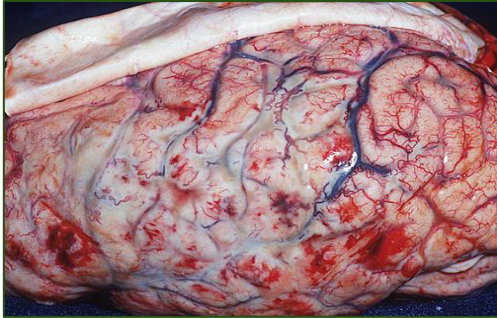
CLINICAL CASES

meningitis

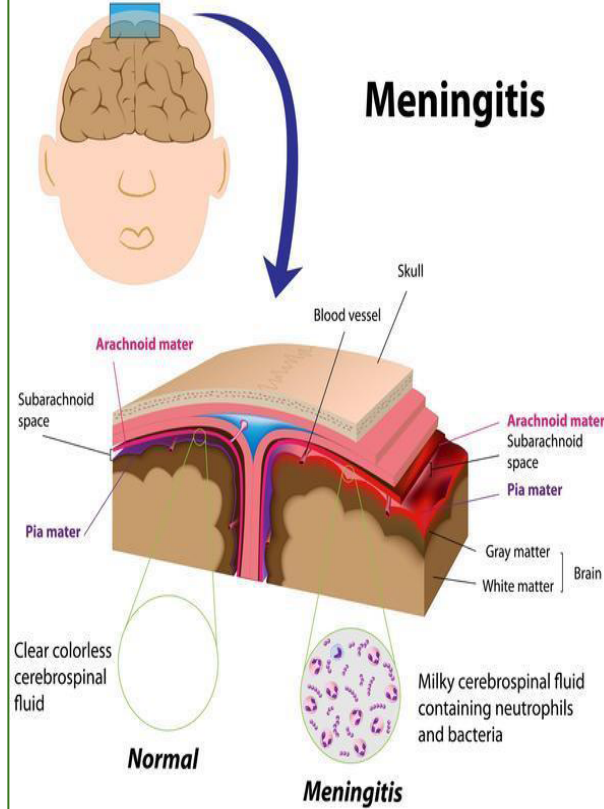
Man with bacterial التهاب السحايا meningitis (16 years)

Symptoms: headache, high body temperature [39.5], stiff neck, fear of light (photophobia)

Diagnose: acquired inflammatory. **Cause:** bacteria.



VEDIO



CLEFT PALATE CONGENITAL MALFORMATION.

Symptoms:

boy with a cleft palate (مع الأنف مع الشفة العلوية متصلين تشوهه) (congenital malformation) (حلقي)

Treatment: surgery.



VEDIO

CLINICAL CASES

MYOCARDIAL INFARCTION Cardiovascular disease(Heart Attack)

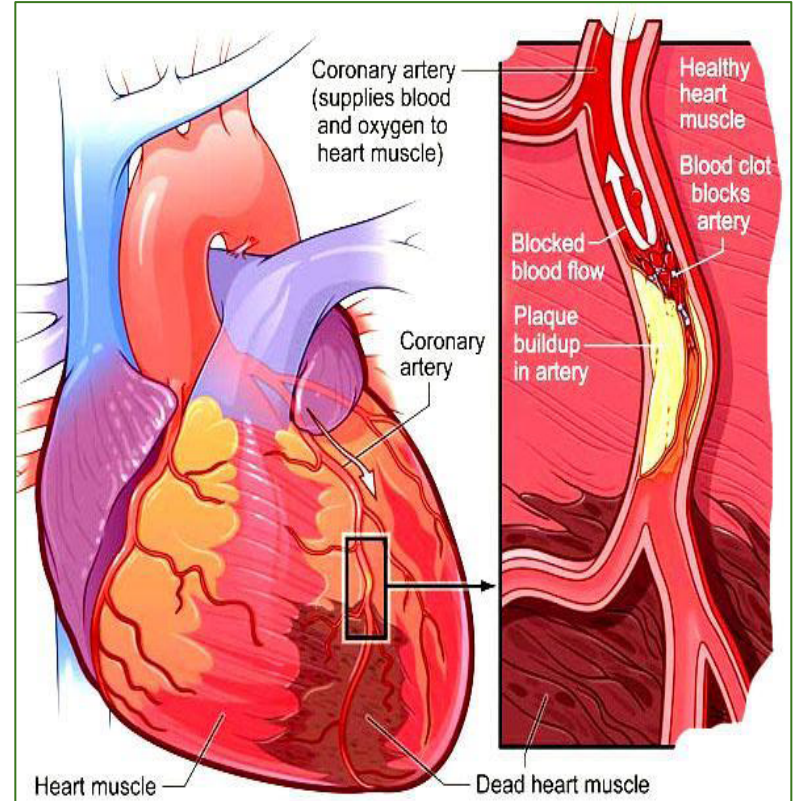
Symptoms : 50 years old man with central chest pain.

The doctors suspects he has myocardial infarction (ذبحة قلبية) “why?”

- 1- Because this symptom is very common.
- 2- This case is the most common in his age.

Pathogenesis: High cholesterol > thrombosis جلطة > coronary arteries clot تجلط الشرايين القلبية (they supply blood to heart) > heart doesn't get blood needed > ischemia (poor blood supply to an organ or part of the body, especially the heart muscles.) > Hypoxemia نقص الأوكسجة > severe pain (60% die) .

VEDIO



HOPEFULLY WE DID
A GREAT JOB

online TEST

For any questions
and suggestions
CONTACT US ...



PATHOLOGY435@GMAIL.COM



[@PATHOLOGY435](https://twitter.com/PATHOLOGY435)

To make sure that all students are aware of any changes, please check out this link to know if there are any additions or changes.

The same link will be used for all of our work:

[\(Pathology Edit\)](#)

BOYS Team:

- Salem AlAmmari
- Mohammed AlSuhbani
- Zaki AlWatban
- Ibrahim AlAteiq
- Yosef AlSamil
- Ibrahim AlNafisah
- Ahmad AlKhiary
- Nasser AlNasser

GIRLS Team:

- Samar AlOtaibi
- Ghaida Aljamili
- Nurah AlQahtani
- Nojood AlHaidri
- Reem Albahlal
- Amjad Alduhaish
- Kowthar Akmousa
- Johara Almalki
- Lina Ismael
- Ghadeer Asiri
- Atheer Alnashwan
- Reem Alageel
- Demaah Alrajhi
- Lojain Alsiwat
- Noura Altawil
- Haifa Bin Taleb
- Aljohara Almazroua
- Hissah Almuzini
- Meynial Bawazier
- Sarah AlHussein

DIFFICULTIES IN YOUR LIFE DON'T COME TO DESTROY YOU.. BEST OF LUCK