

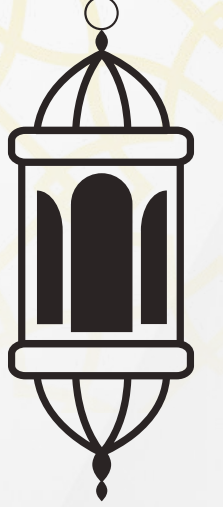
تفريغ علم وظائف الأعضاء المرضي



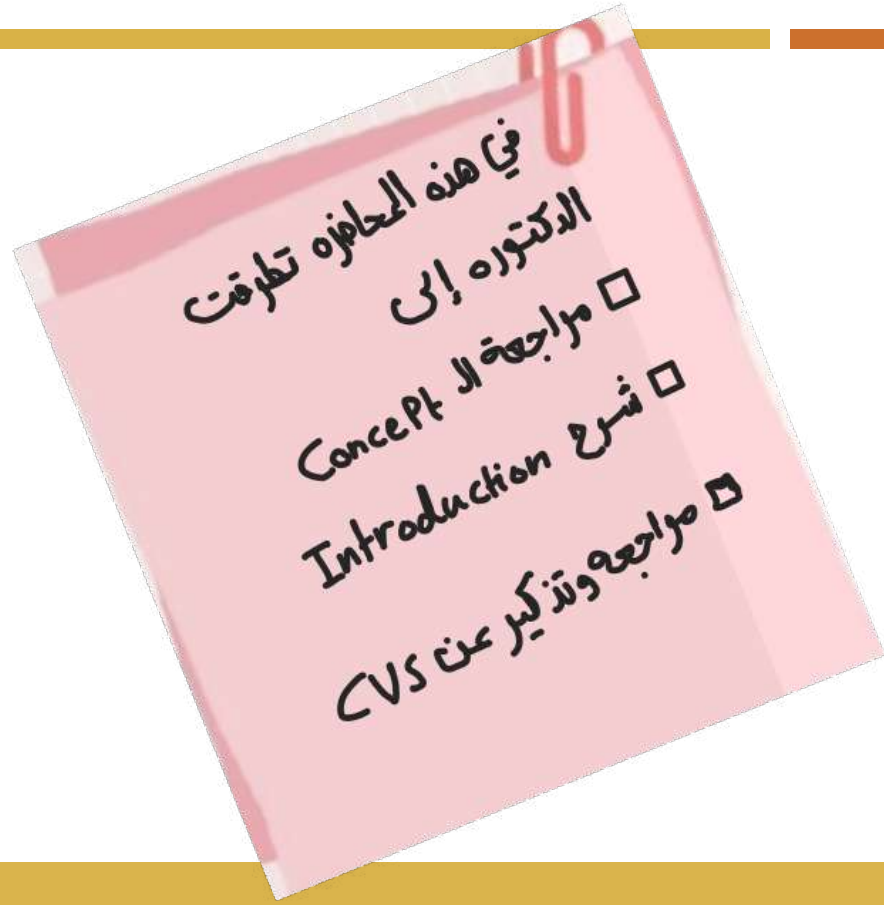
اسم الموضوع: المحاضرة الثانية

مراجعة من Intro + CVS

إعداد الصيدلاني / Ghada Kasasbeh



لجان الدُفعات



Pathophysiology-Introduction

Faculty of Pharmaceutical Sciences

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Understanding pathophysiology begins with understanding the body's basic building block: the cell.



Pathophysiology made incredibly easy!.—5th ed

Diseases related of anatomy : Pathology □

// // // Physiology : Pathophysiology

□ اخذنا عن ال Cross anatomy ، إذا انا بدى أحلل تحليل مقطعي في جسم الإنسان في Tissues, Organs, Systems

□ Etiology : Causes ، عامل الخطورة ، Risk Factor ، الأمراض التي يتطور عالميها : Signs

□ التي يكون بين ال acute وال chronic : Subacute ، تفاقم المرض : Exacerbation ، التي ما بتتغير : Symptoms

□ تشخيص : Diagnosis ، ما عليه أعراض : Asymptomatic ، بين تباش Signs, Symptoms نقل : Remission

□ بالنسبة ل Prognosis ← إذا كان مكتوب (Poor أو bad) Prognosis ← إذا حالة المريض تسوء .

□ لكن Prognosis لحالها أو (Positive, good) Prognosis ← بتتحسن .

□ Epidemiology

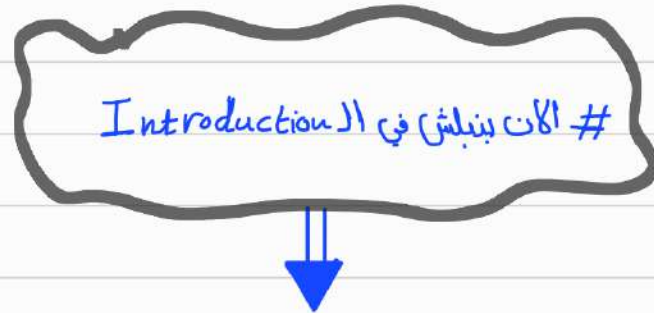
→ Prevalence : دراسة المرض بالرجوع للماضي
→ Incidence : دراسة الحالات اليا رج تعبير



□ حكي ال diseases اما يكون Endemic الأكرمة Epidemic الأكرمة Pandemic الأكرمة

□ Pathogenesis : تطور حالة المريض (disease development)

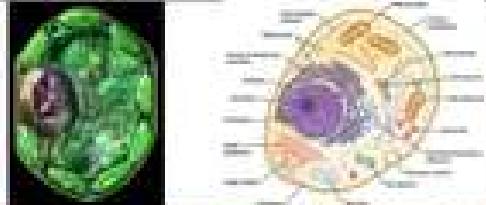

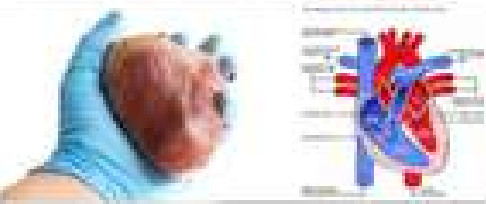
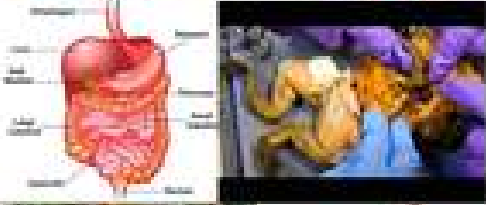
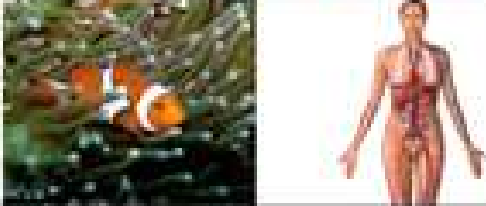
ميك خلصنا أول جزئية من هالعافره ♥



أنت تستطيع

فقط إبدأ

أصغر جزء بالجسم

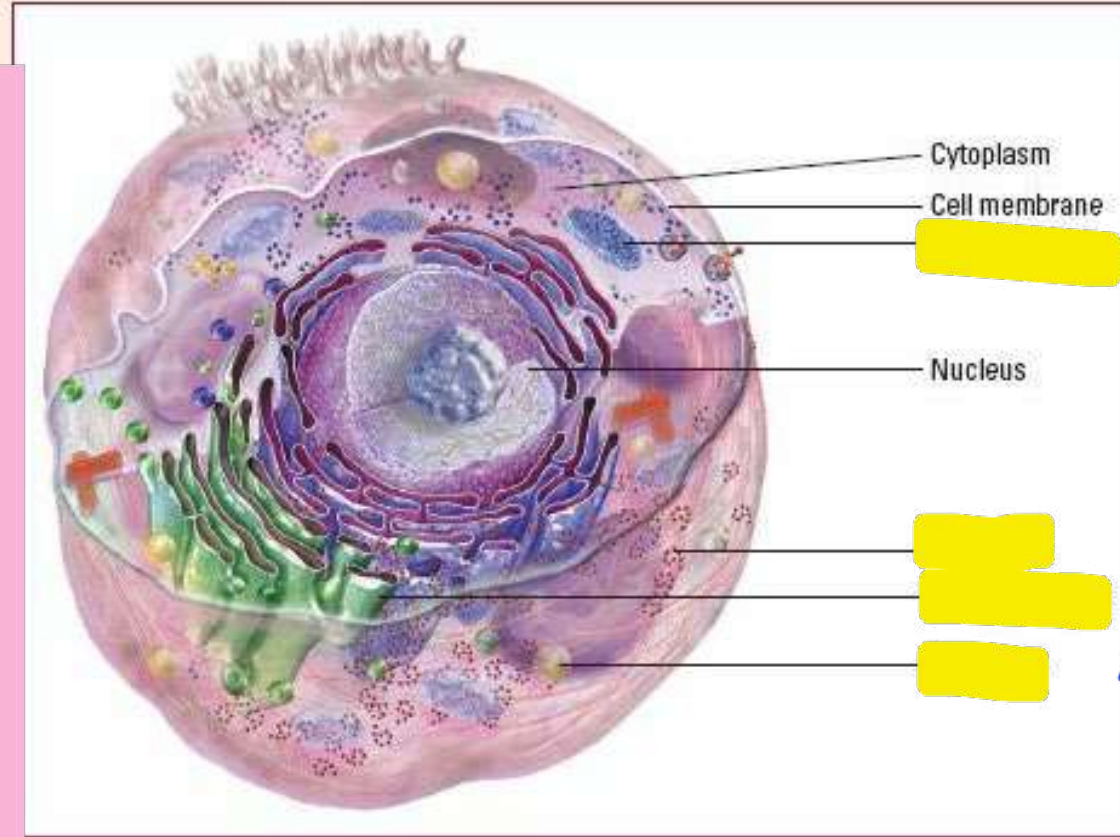
Cell	Basic structural and functional unit of a living organism	
Tissue	Group of cells with similar structures, working together to perform a shared function	
Organ	Structure made up of a group of tissues, working together to perform specific functions	
Organ System	Group of organs with related functions, working together to perform body functions	
Organism	Living thing performing all seven life processes	

Just your average cell

The illustration below shows cell components and structures. Each part has a function in maintaining the cell's life and homeostasis.

Cytoplasm
Plasma membrane
Nucleus

الخلية تنقسم إلى 3 أجزاء رئيسية



Cytoplasm

fluid
النسيج الأكبر

Organelles
النسيج الأصغر



تذكير

Systemic Physiology :
الدراسة على مستوى System

Cellular Physiology :

الدراسة على مستوى الخلية
ويفحص الطريقة عنها

Pathology

Systemic Cellular



Pathophysiology made incredibly easy!.—5th ed

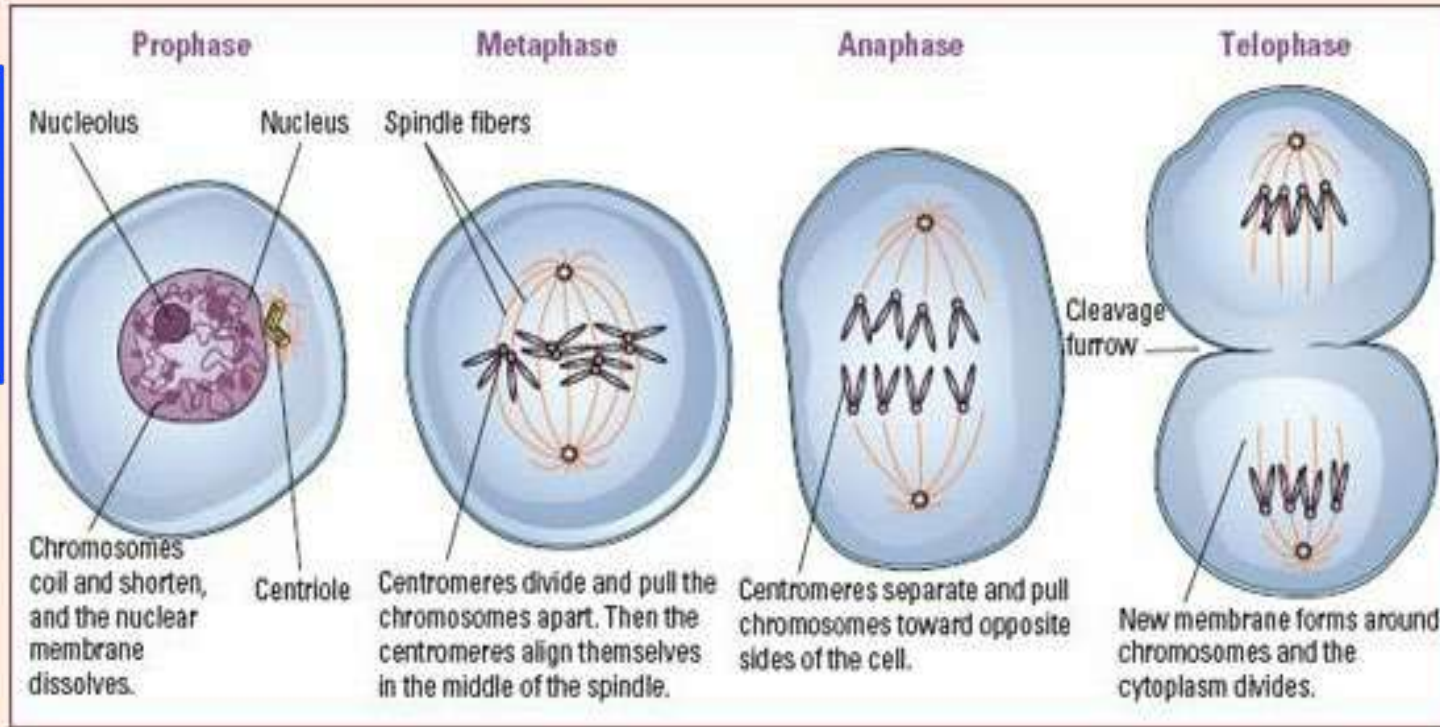
Replicate and divide

[Identical number of chromosomes]

mitosis ← عا خلية بتقسم من الاصل الى خليتين ايسم

These illustrations show the different phases of cell reproduction, or *mitosis*.

ما هو السر في تعرفهم
عشان علاج
Cancer ال





الكروموسوم : 2 كروماتيد وبالتمسك رابطهم
Centromeres

البداية يتكون الكروموسومات موجوده في منتصف الخلية بال (Nucleus) يكونوا Coiling على بعض
ProPhase ← يتكون الكروموسومات Coiling أي ملتفات على بعض (مثل مرتبات)

MetaPhase ← تترتب هذه الكروموسومات في منتصف الخلية
أقطاب الخلية تسمى Centriole ← تكون مرتبطة ب Spindle fibers
الالبان الغزلية
Centromeres ← التي يكون بهنصف ماي الكروموسومات .

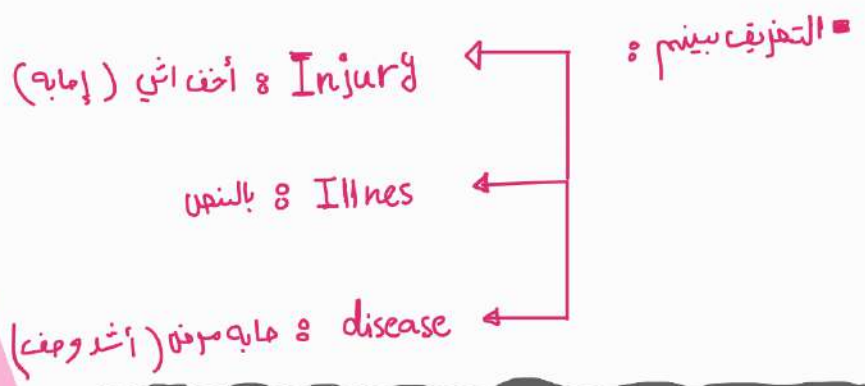
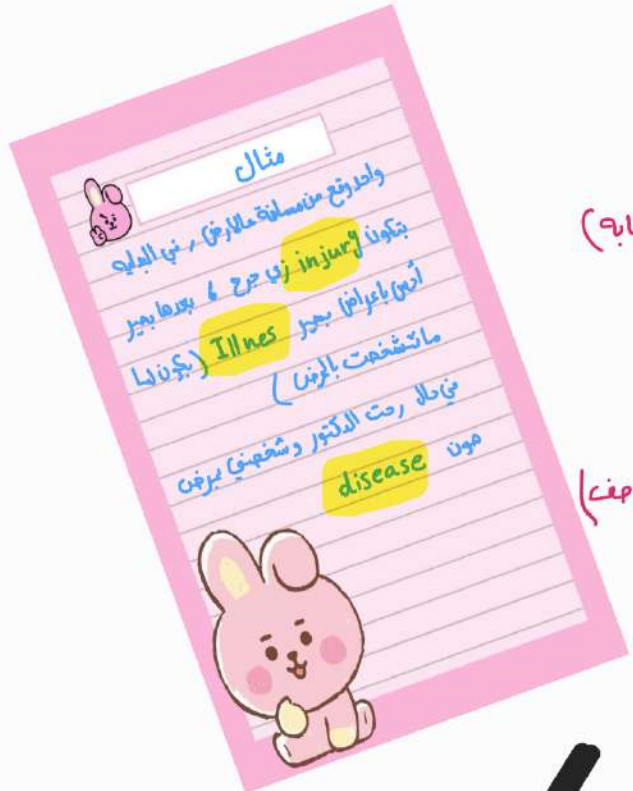
AnaPhase ← Centrioles: يتغير تسحب لتحت فتقسم الكروموسومات إلى قسمين

TeloPhase ← بعدين كل كروموسوم يتكون حواليه عبارة عن جدار ← Cytoplasm divides

أي مزيج ، تروما ، الخ ..

Stress بتغير تحاول تعمل Adaptive changes لحق ترجع لـ balance

لكن في حال ما قدرت هون رح يجبر فشل في وظائفها و هيك يجبر عنا المرض .
لو طول عنا الـ dysfunction / يجبر في Cell death



☆ مهم تعرف بالامتحان شو هي الـ adaptive change التي بتعملها الخلية .

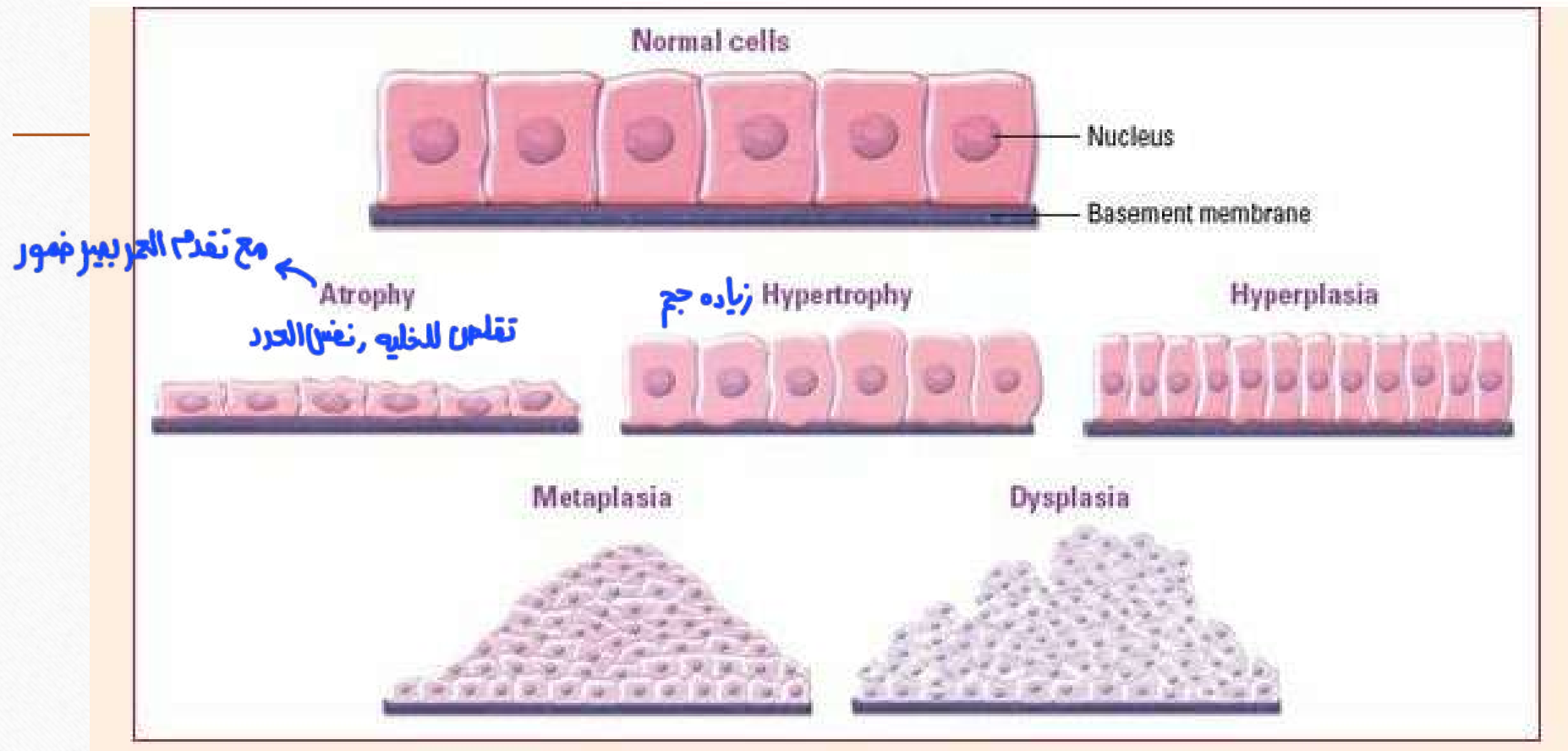


Pathophysiologic concepts

Stressors, changes in the body's health, disease, and other extrinsic and intrinsic factors can alter the cells' normal functioning.

Cells generally continue functioning despite challenging conditions or stressors. However, severe or prolonged stress or changes may injure or destroy cells. When cell integrity is threatened, the cell reacts by drawing in its reserves to keep functioning, by adaptive changes or by cellular dysfunction. If the cellular reserve is insufficient, the cell dies (cell death (necrosis, is usually localized and easily identifiable, occurs). If enough reserve is available and the body doesn't detect abnormalities, the cell adapts by atrophy, hypertrophy, hyperplasia, metaplasia, or dysplasia.

Adaptive cell changes



مصطلحات

عدم الاستخدام

الاسباب

قلة وصول الدم اليها

Atrophy

Atrophy is a reversible reduction in the size of the cell. It results from disuse, insufficient blood flow, malnutrition, denervation, or reduced endocrine stimulation.

↳ nerve impulses ما يوصلها

Hypertrophy

زيادة الحجم

Hypertrophy is an increase in the size of a cell due to an increased workload. It can result from normal physiologic conditions or abnormal pathologic conditions.

مثل مرضين ← Arteriosclerosis

Hyperplasia

زيادة عدد الخلايا

Hyperplasia, an increase in the number of cells, is caused by increased workload, hormonal stimulation, or decreased tissue.

Metaplasia

استبدال النوع الخلايا لا خزني المدخنين

Metaplasia is the replacement of one adult cell with another adult cell that can better endure the change or stress. It's usually a response to chronic inflammation or irritation.

Irreversible

Dysplasia

تسكل الخلية, أعدادها, الشكل العام (يتغير)

In dysplasia, deranged cell growth of specific tissue results in abnormal size, shape, and appearance. Although dysplastic cell changes are adaptive and potentially reversible, they can precede cancerous changes.



Memory jogger

To remember the four **causes of cell injury**, think of how the injury tipped (or **TIPD**) the scale of homeostasis:

Toxin or other lethal (cytotoxic) substance تسمم

Infection التهاب

Physical insult or injury زي شخصه تعرض لمادش

Deficit, or lack of water, oxygen, or nutrients. نعمان

ليس تشوف مصطلح

Preclinical :
هي دراسة الحيوانات

Study clinical :
للإنسان

Sub clinical :
مرضى
diagnosed
لكنها ما ظهرت
الأعراض

Degeneration occurs in the cytoplasm of the cell; the nucleus remains unaffected.



degeneration : الخلية مرت بـ [adaptive changes] بعدين حار إعادته تجديد للخلايا بدون حدوث ← dis function

A type of nonlethal cell damage known as degeneration

Degeneration

When changes within cells are identified, degeneration may be slowed or cell death prevented through prompt treatment. An electron microscope makes the identification of changes within cells easier.

When a disease is diagnosed before the patient complains of any symptoms, it's termed subclinical identification. Unfortunately, many cell changes remain unidentifiable even under a microscope, making early detection impossible.

Cell aging ← مش هزوري الشخص كان كبير بالهر ، ممكن بعض الخلايا تدخل في مرحلة ال aging على عمر مغير للشخص

Cell aging

له هي نفسها الخلية عم تكبر هارينا
dysfunction

- During the normal process of cell aging, cells lose structure and function. Lost cell structure may cause a decrease in size or wasting away, a process called atrophy.

سبحان الله..

In's and out's of cell aging

Factors that affect cell aging may be intrinsic or extrinsic, as outlined here.

Intrinsic factors

داخليه

- Psychogenic
- Inherited
- Congenital
- Metabolic
- Degenerative
- Neoplastic
- Immunologic
- Nutritional

Extrinsic factors *Physical agents*

خارجيه ممكنه تعرضا
لمادات ...

- Force
- Temperature
- Humidity
- Radiation
- Electricity
- Chemicals

Infectious agents

- Viruses
- Bacteria
- Fungi
- Protozoa
- Insects
- Worms

HOMEOSTASIS

- The body is constantly striving to maintain a dynamic, steady-state of internal balance called homeostasis. Every cell in the body is involved in maintaining homeostasis, both on the cellular level and as part of an organism.
- Any change or damage at the cellular level can affect the entire body. When an external stressor disrupts homeostasis, illness may occur. A few examples of external stressors include injury, lack of nutrients, and invasion by parasites or other organisms. Throughout the course of a person's life, many external stressors affect the body's internal equilibrium.

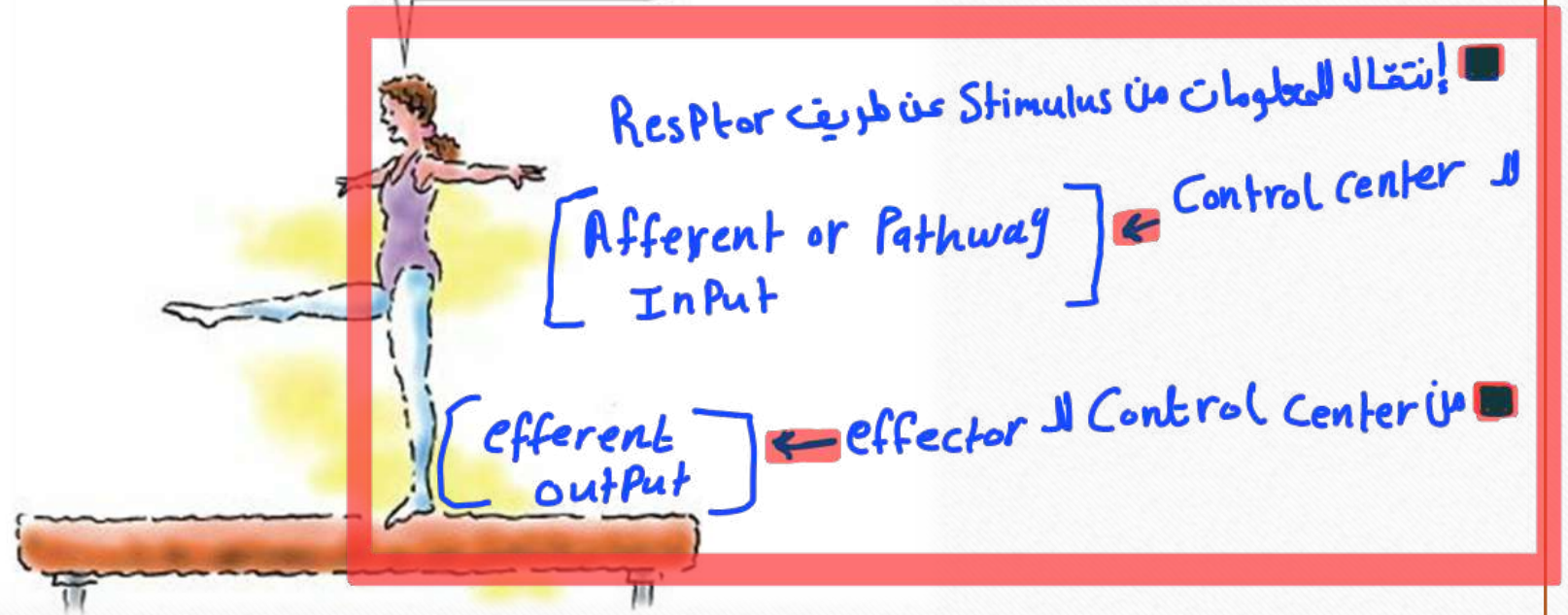
لا حول ولا قوة إلا بالله

استغفر الله وأتوب إليه

Every cell in the body is involved in maintaining homeostasis, a dynamic, steady state of internal balance.

Stimulus
Resptor
Control center
effector

4 Components of homeostasis



Maintaining the balance

Three structures in the brain are responsible for maintaining homeostasis:



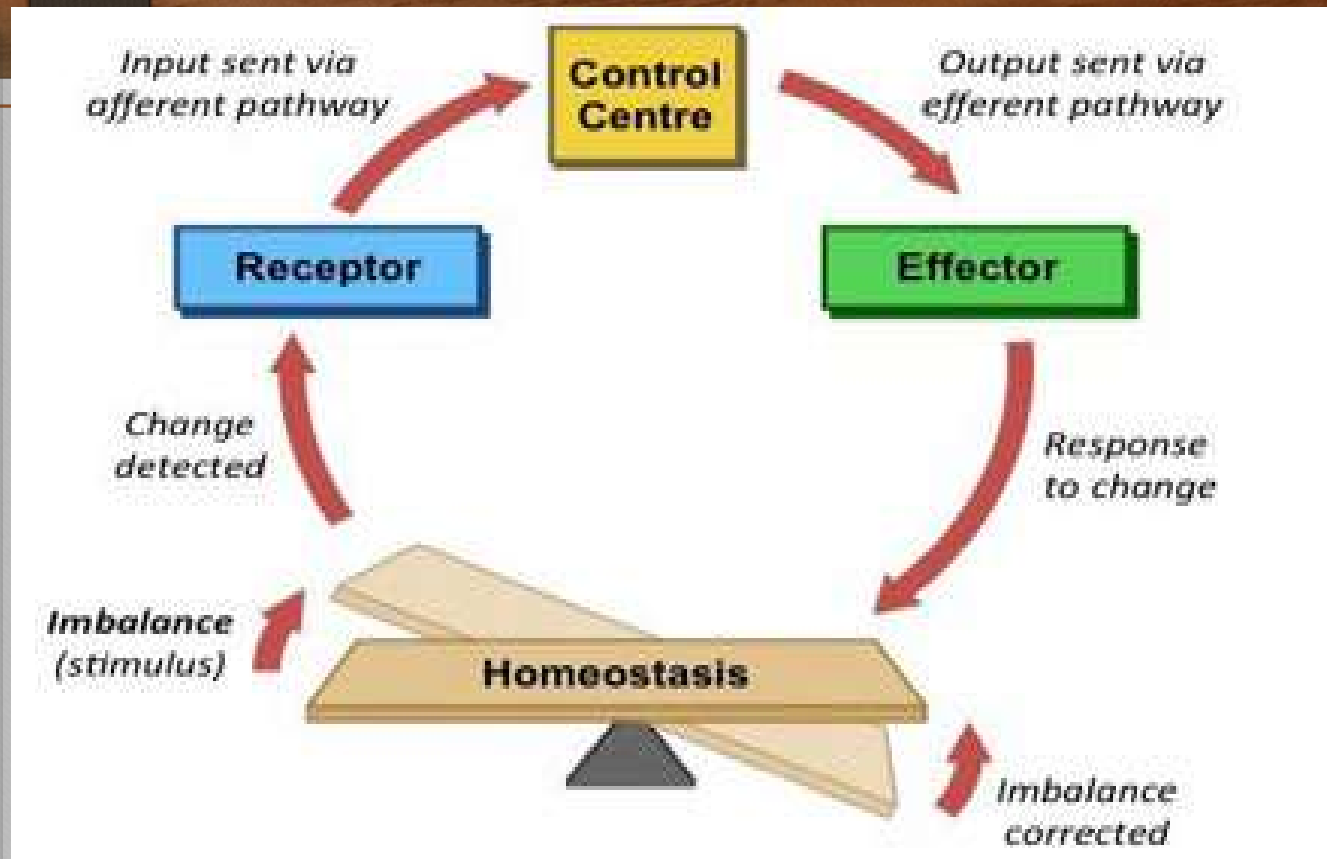
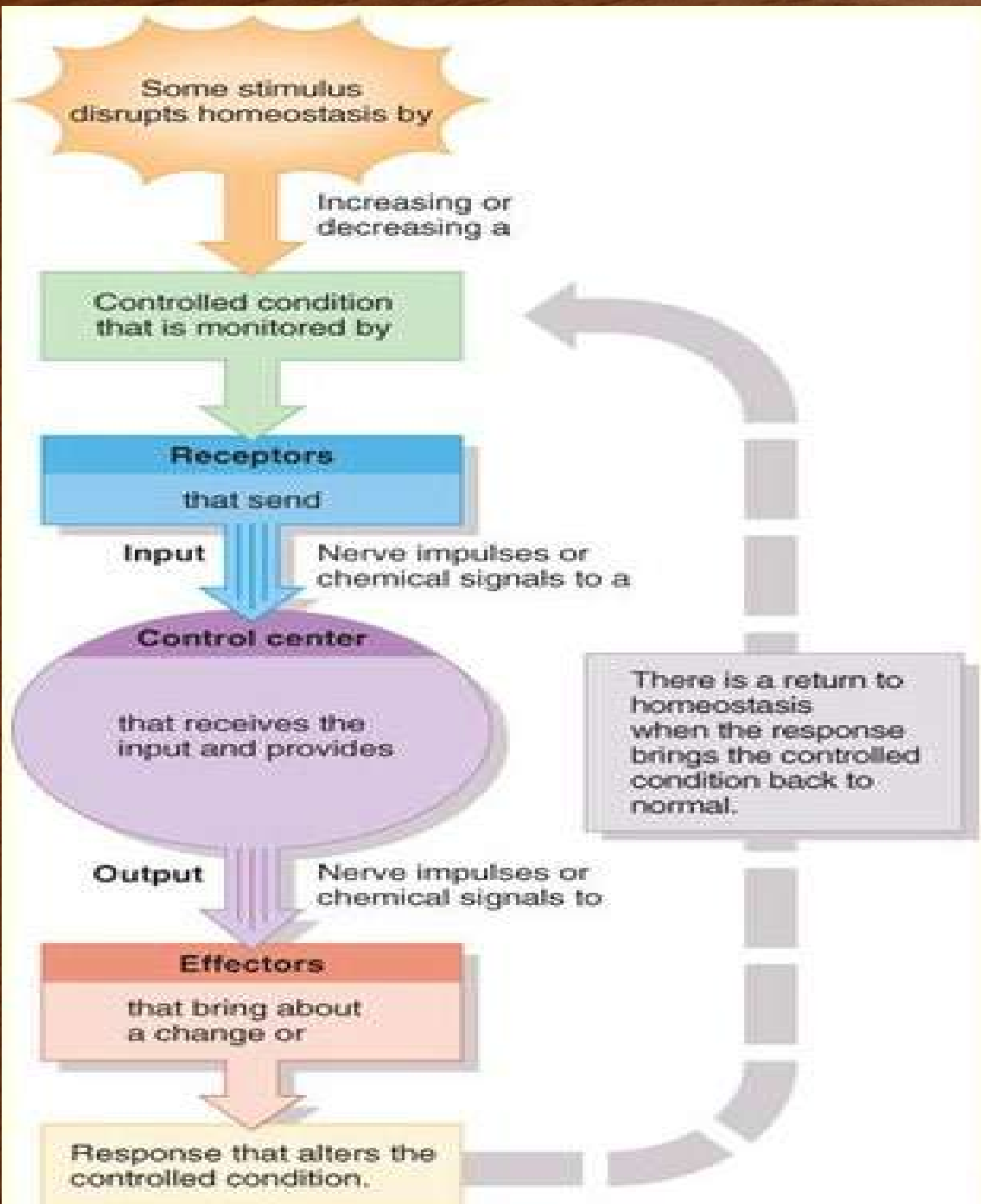
the medulla oblongata, the part of the brain stem that's associated with vital functions, such as respiration and circulation



the pituitary gland, which regulates the function of other glands and thereby a person's growth, maturation, and reproduction



the reticular formation, a group of nerve cells or nuclei that form a large network of connected tissues that help control vital reflexes, such as cardiovascular function and respiration.



Group of receptors and effectors communicating with their control center forms a feedback system

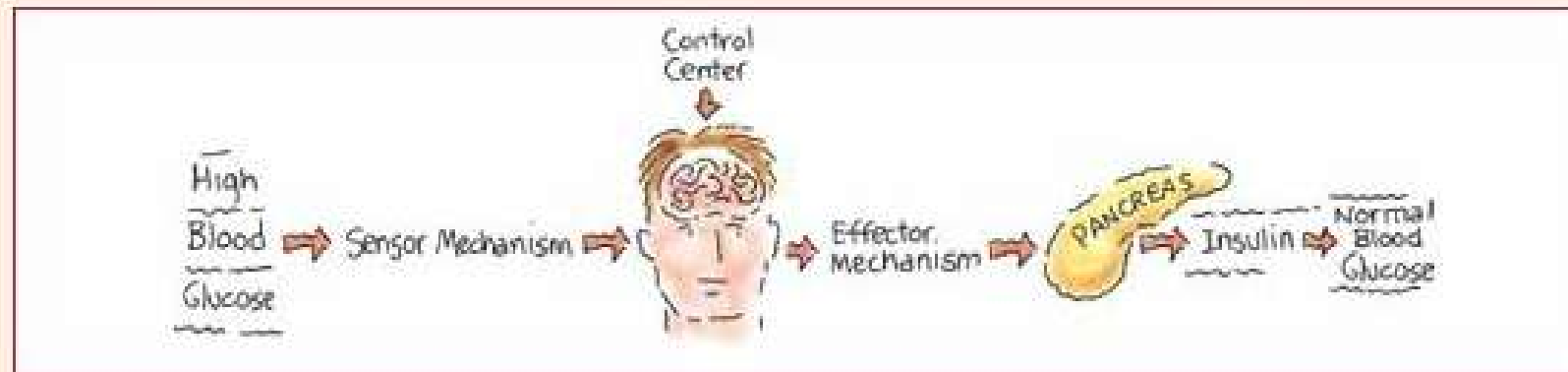
Negative feedback
cancels out the
original response.
Positive feedback
exaggerates it.



عكس الاتجاه ، يرجع الوضع للطبيعي

Negative feedback, positive result

This flowchart shows how a negative feedback mechanism works to restore homeostasis in a patient with a high blood glucose level.



POSITIVE FEEDBACK SYSTEM

مستمر بنفس الاتجاه
لو ارتفع ضغطي فزيد برقع
مع

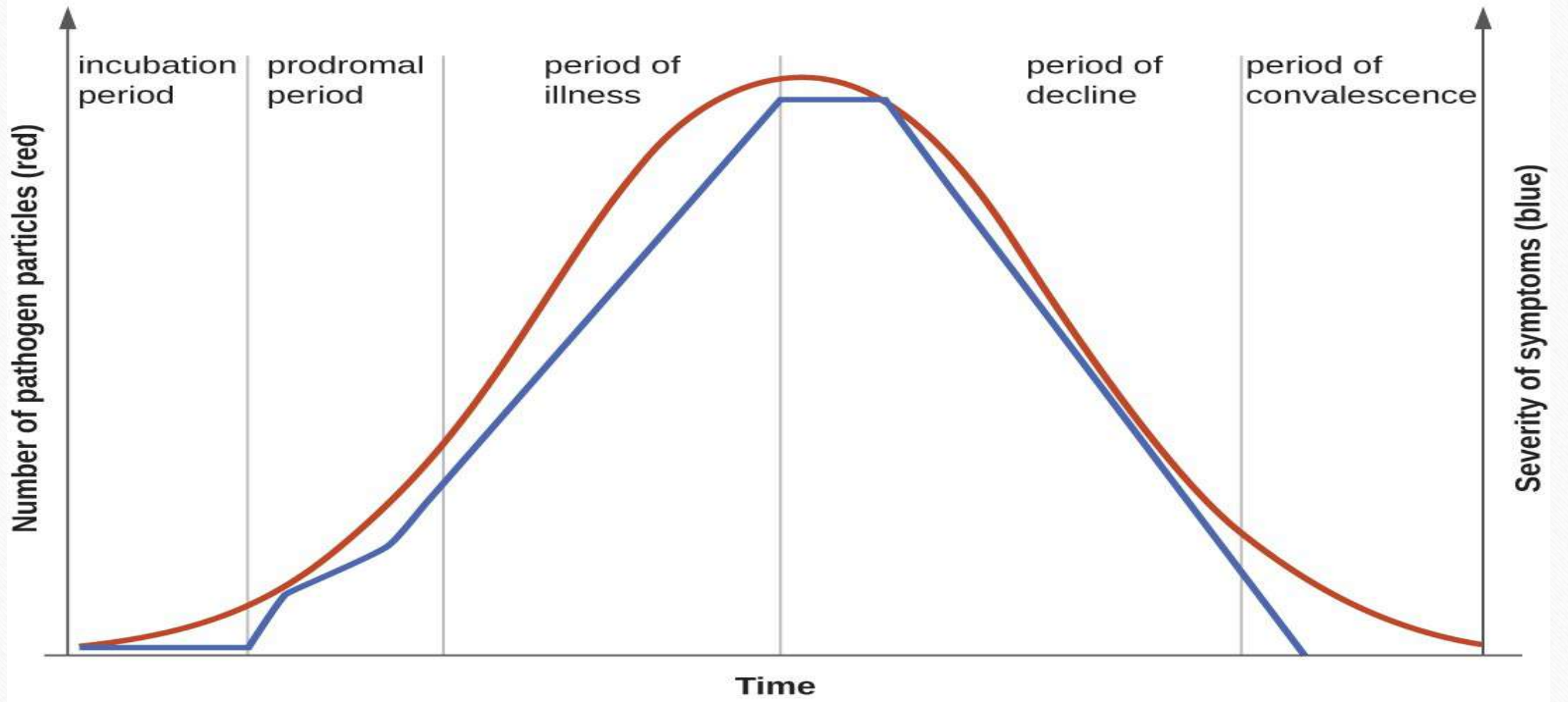
...and the positive

The positive feedback mechanism is far from positive. It takes the original response and exaggerates it. It's said to be positive because the change that occurs proceeds in the same direction as the initial disturbance, causing a further deviation from homeostasis. A positive feedback mechanism is responsible for intensifying labor contractions during childbirth.

DISEASE AND ILLNESS

- Disease occurs when homeostasis isn't maintained.
- One aspect of the disease is its cause (the fancy term is **etiology**).
سبب المرض معروف
- Diseases with no known cause are called **idiopathic**. → السبب غير معروف
- A disease's development is called its **pathogenesis**. → تطور المرض

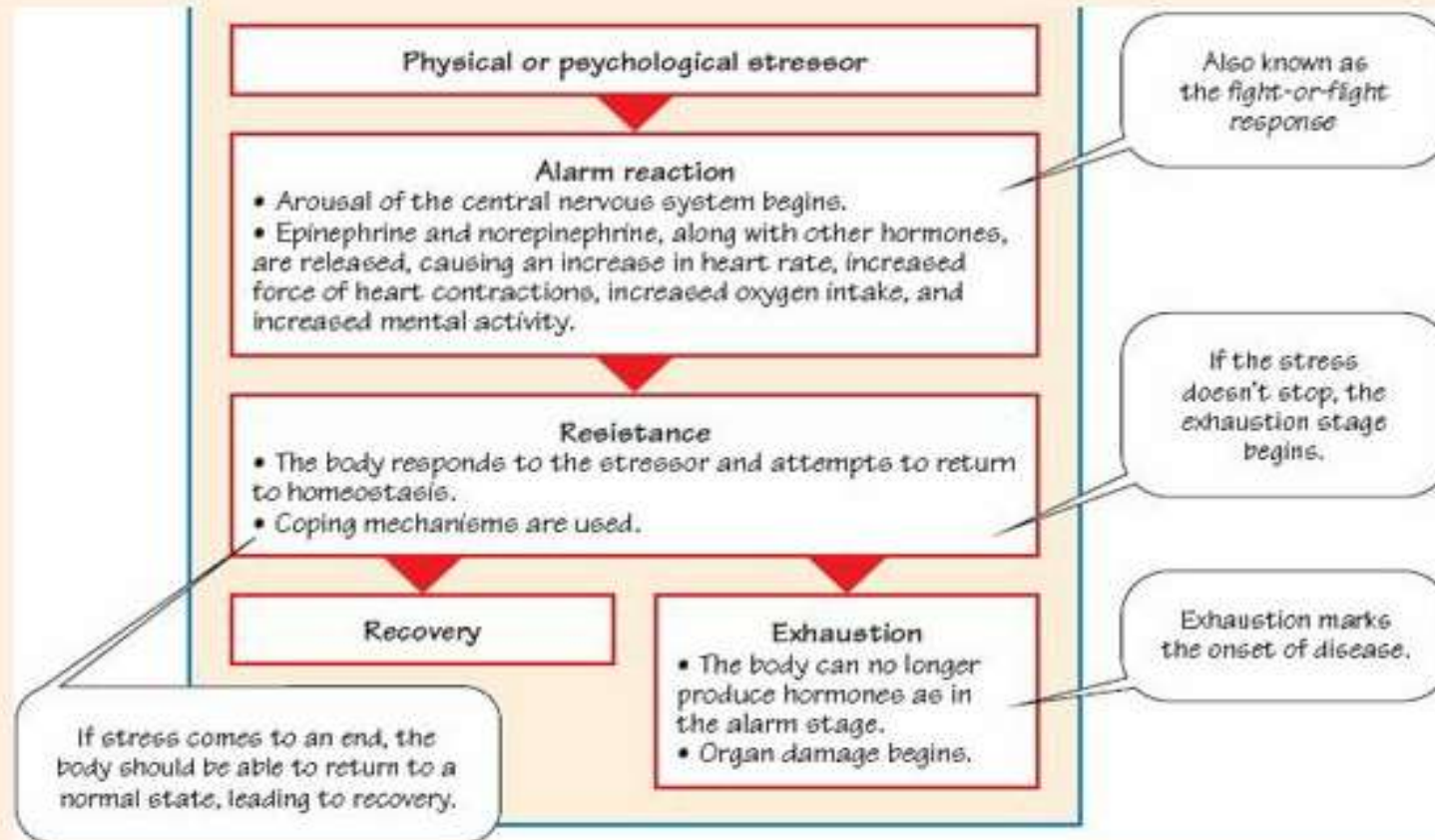
Periods of Disease



<https://courses.lumenlearning.com/microbiology/chapter/characteristics-of-infectious-disease/>

When stress strikes

According to Hans Selye's General Adaptation Model, the body reacts to stress in the stages depicted below.





Quick quiz



1. The organelle that contains the cell's DNA is the:

- A. mitochondria.
- B. Golgi apparatus.
- C. ribosome.
- D. nucleus.

2. When a cell gets injured, the first sign is:

- A. a biochemical lesion.
- B. an area of hyperplasia.
- C. a chromatid.
- D. cellular necrosis.

3. An extrinsic factor that can cause cell aging and death is:

A. Down syndrome.

B. sickle cell anemia.

C. ultraviolet radiation.

D. person's advanced age.

4. Homeostasis can be defined as:

A. a steady, dynamic state.

B. a state of flux.

C. an unbalanced state.

D. an exaggeration of an original response.

وهي تكون
خلجاتنا تاتي
جزء من الحافظه
ت



نبلش بتالت و آخر جزء
مناها المحاضرة وهو عبارة
عن تذكير ومراجعة بال CVS

Pathophysiology-Review of CVS

Faculty of Pharmaceutical Sciences

Dr. Amjaad Zuhier Alrosan, Dr. Abdelrahim Alqudah

➤ As we learned before:

- ✓ **Physiology** is the science, which is related to studying mechanics, characteristics, and features of the body that makes it function the right way.
- ✓ **Pathophysiology** studies abnormal physiology.

الكلام كثير لسيك كتبته بسلايد جديد لتفهموا أوفتح ♥

ال Heart عبارة عن Circulatory System " حزام دوراني " ينقل الدم إلى جميع

أجزاء الجسم ليكن يسمى Transportation System in the body ينقل ال

Oxygenated blood , بعد ذلك ينقل الدم Deoxygenated إلى

Right side من القلب ، وبالتالي هو يساعده على نقل الغذاء وال O_2 إلى جميع أجزاء الجسم

• الدم الغير مؤكسد يرجع من خلايا الجسم للقلب Of the Right side عن طريق Vena Cava

Superior Vena Cava لو كان راجع من الأجزاء العلوية

Inferior Vena Cava ~ ~ ~ ~ السفلية

ال blood يجب أن Right atrium ← Repolarization = diastole

تسمى فال Tricuspid Value (ح يفتح بين Right atrium , Right Ventricular

ح يعبر في Systole = depolarization = Contraction for right atrium (يحدث

يعني بال Right Ventricular ، إذا خلال atrial depolarization يكون atrial

إذا ال atrial Systole يكون atrial diastole Re Polarization

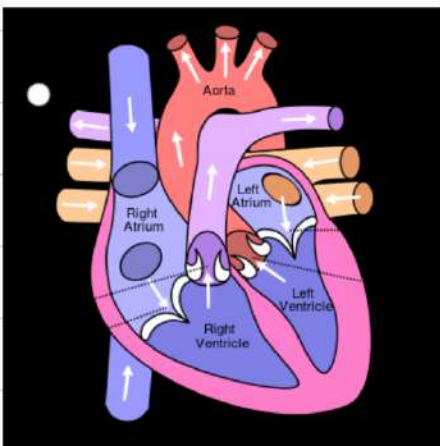
من يتبع ويصل ال Right Ventricular حتى الصمام الموجود بين RV وال Pulmonary artery

يخرج وينقل الدم ال lungs يتم تبادل الغازات

ال Oxygenated الدم ال Pulmonary Vein ال left side of the heart يدخل على Left atrium يدخل في حالة Repolarization = diastole حتى يفتح Mitral Value

يعبر يعني بال Left Ventricular بعدها يدخل في حالة ال Contraction = Ventricular Systole

aortic Valve وينقل الدم عن طريق aorta



لا حول ولا قوة إلا بالله

استغفر الله وأتوب إليه

THE CARDIOVASCULAR SYSTEM: THE HEART

- The **heart contributes to homeostasis** by pumping blood through blood vessels to the tissues of the body to deliver oxygen and nutrients and remove wastes.
- The cardiovascular system consists of the blood, the heart, and blood vessels.

Table 12–1 **The Cardiovascular System**

Component	Function
<i>Heart</i>	
Atria	Chambers through which blood flows from veins to ventricles. Atrial contraction adds to ventricular filling but is not essential for it.
Ventricles	Chambers whose contractions produce the pressures that drive blood through the pulmonary and systemic vascular systems and back to the heart.
<i>Vascular system</i>	
Arteries	Low-resistance tubes conducting blood to the various organs with little loss in pressure. They also act as pressure reservoirs for maintaining blood flow during ventricular relaxation.
Arterioles	Major sites of resistance to flow; responsible for the pattern of blood flow distribution to the various organs; participate in the regulation of arterial blood pressure.
Capillaries	Major sites of nutrient, metabolic end product, and fluid exchange between blood and tissues.
Venules	Sites of nutrient, metabolic end product, and fluid exchange between blood and tissues.
Veins	Low-resistance conduits for blood flow back to the heart. Their capacity for blood is adjusted to facilitate this flow.
<i>Blood</i>	
Plasma	Liquid portion of blood that contains dissolved nutrients, ions, wastes, gases, and other substances. Its composition equilibrates with that of the interstitial fluid at the capillaries.
Cells	Includes erythrocytes that function mainly in gas transport, leukocytes that function in immune defenses, and platelets (cell fragments) for blood clotting.

Components of blood

Plasma



90% water

Transports nutrients, hormones, and proteins. It is a yellow liquid that makes up about 55% of the body's blood volume.

Platelets



Form clots to stop bleeding. Platelets make up less than 1% of blood.



Red blood cells



Carry fresh oxygen through the body and remove carbon dioxide. Red blood cells make up about 40 to 45% of blood.

White blood cells



Part of the body's immune system, detect and fight viruses and bacteria. There are five major types of white blood cells, and they make up less than 1% of blood.

Source: American Society of Hematology



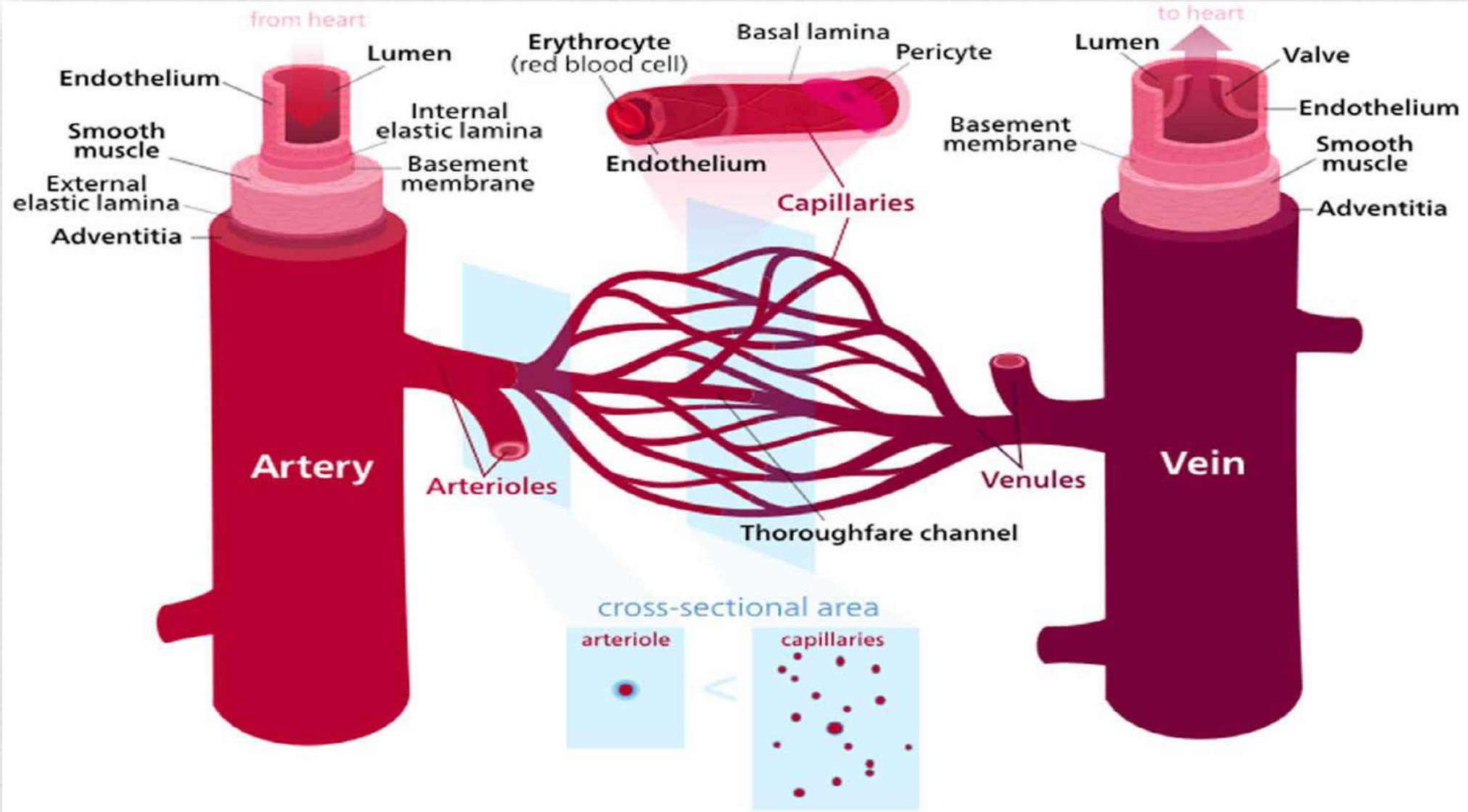
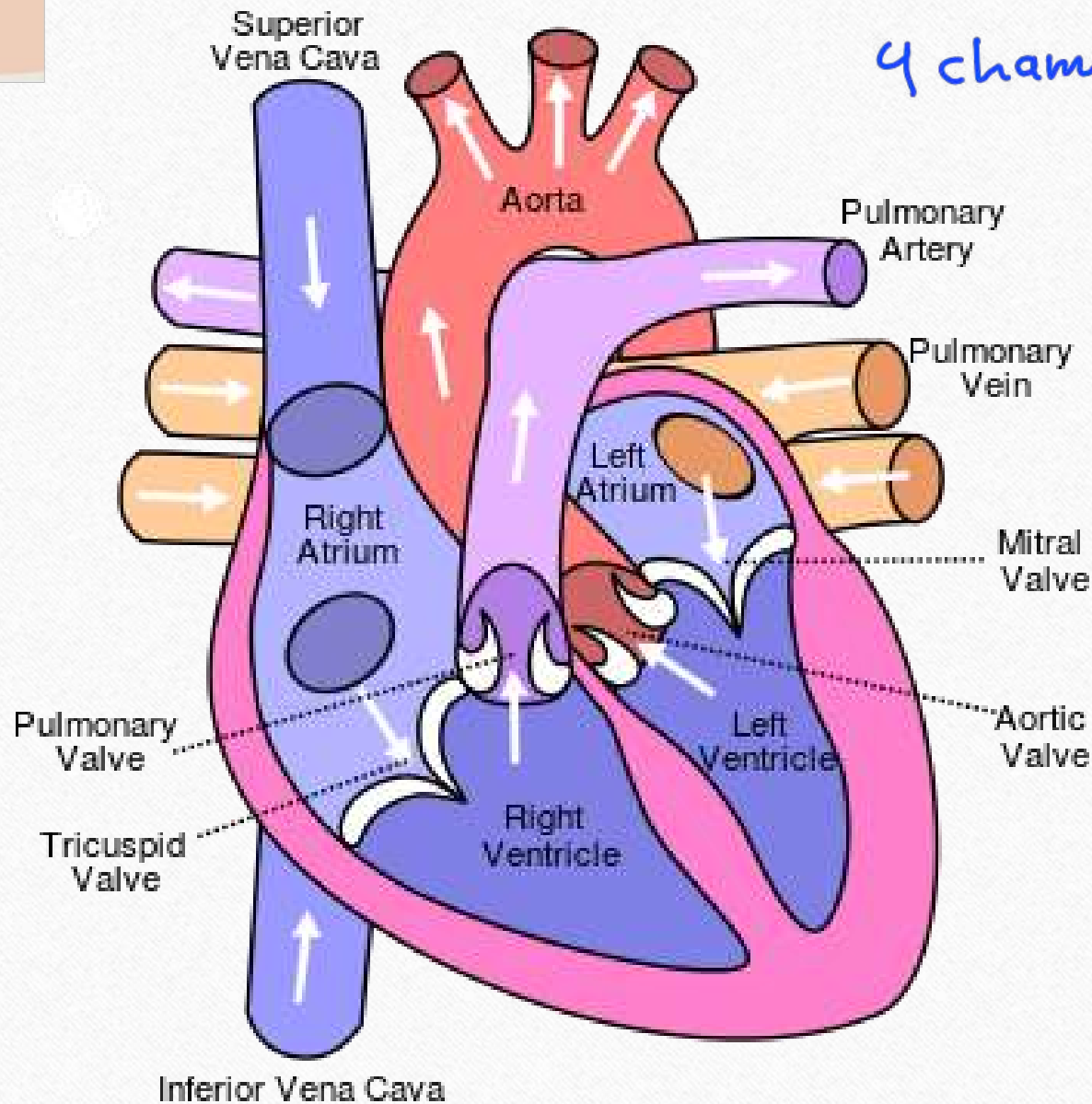


Table 1. Five blood vessel types

Vessel type	Function
Arteries	Transport high-pressure blood from the heart to smaller arteries and arterioles
Arterioles	Connect arteries and capillaries
Veins	Act as reservoir of blood and transport low-pressure blood from venules to heart
Venules	Connect capillaries and veins
Capillaries	Allow gas exchange, nutrient transfer and waste removal between blood and tissue fluid

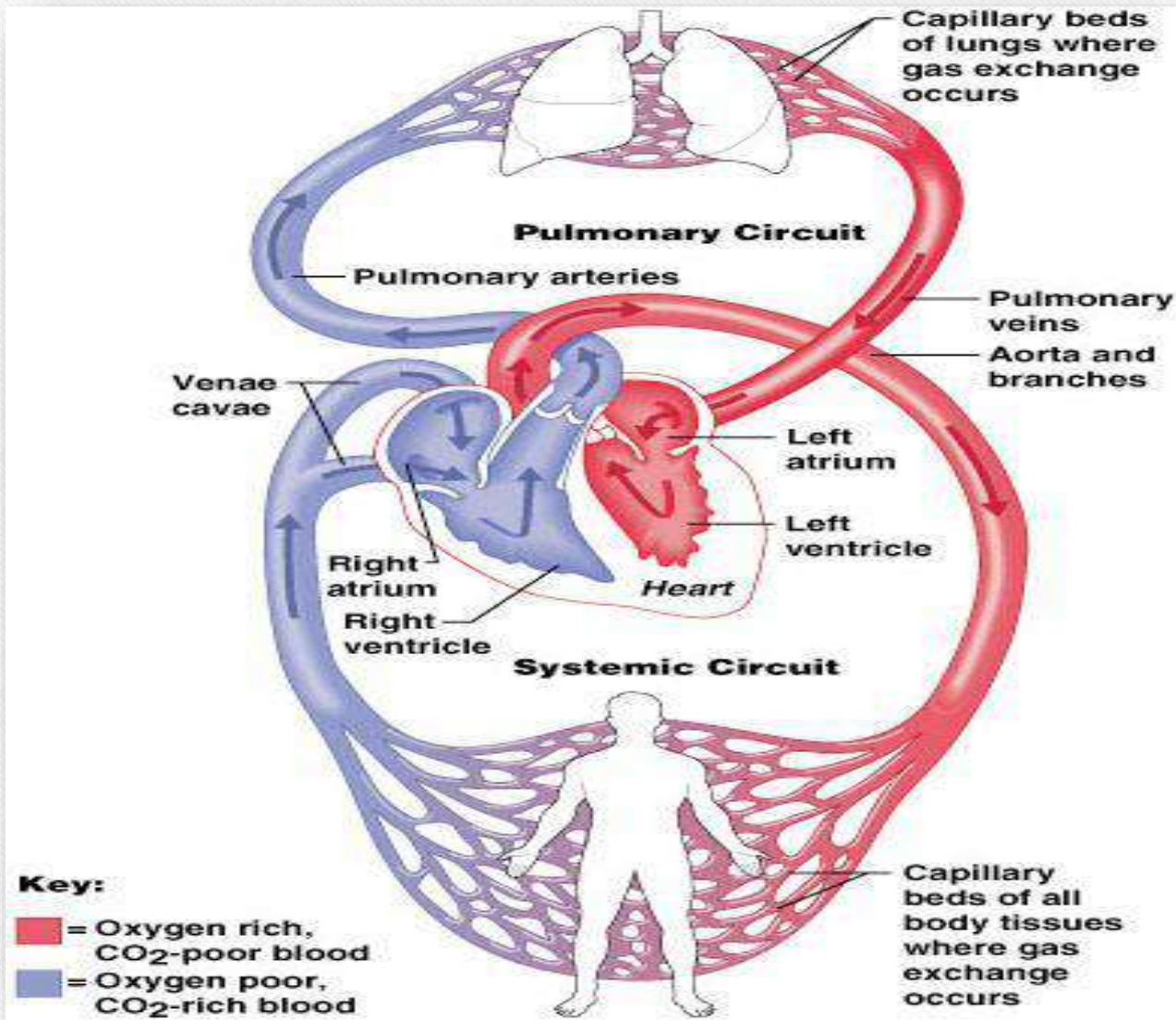
سبحان الله..



القلب عبارة عن 4 chambers

2 atria

2 ventricles



Heart Pumps Blood into Two Circuits in Sequence :

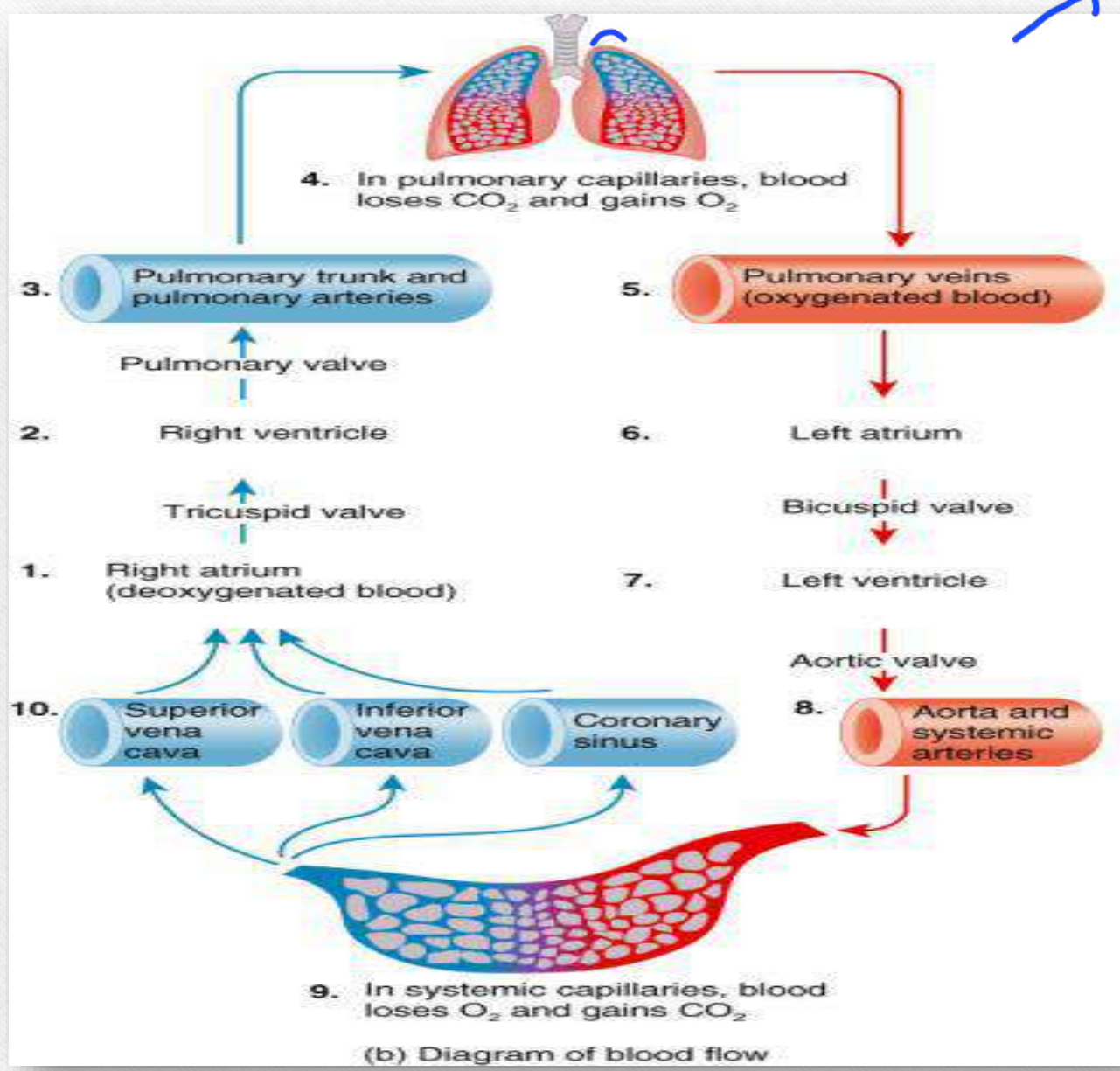
- Pulmonary circuit: To and from the lungs.
- Systemic circuit: To and from the rest of the body.

شرحها فوق
↑

Circulation

Two Sets of Pumping Chambers in Heart:

- Right atrium:
Receives systemic blood.
- Right ventricle:
Pumps blood to lungs (pulmonary).
- Left atrium:
Receives blood from lungs.
- Left ventricle:
Pumps blood to organ systems (systemic).



□ Pulmonary artery ال Pulmonary Circulation
 يكون محمل بال deoxygenated blood
 لكن Pulmonary Vein يكون محمل بال Oxygenated blood

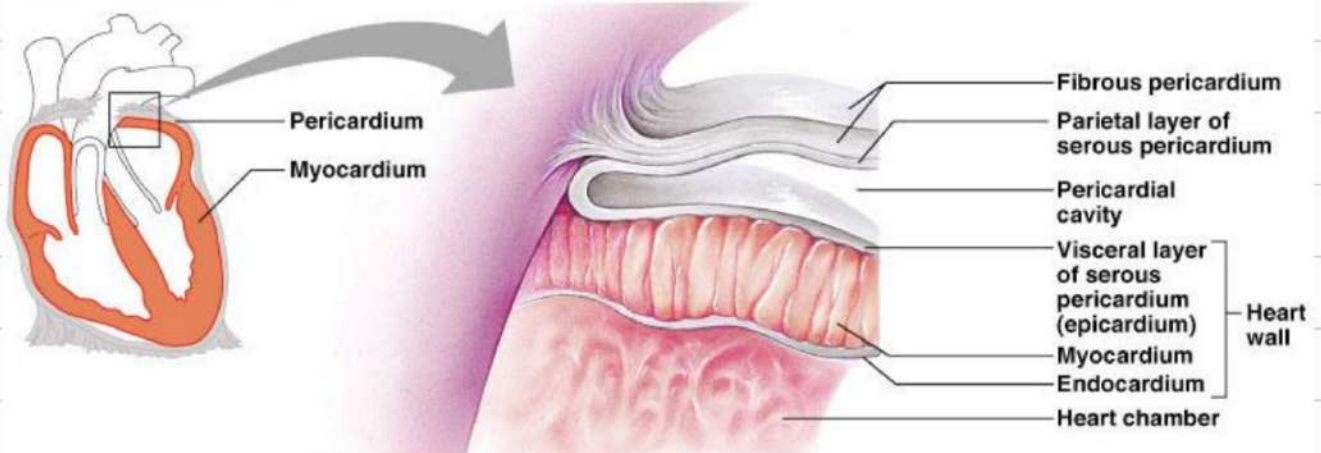
□ ال Systemic Circulation العكس

Oxygenated blood محمل arterier
 deoxygenated محمل Veins
 blood



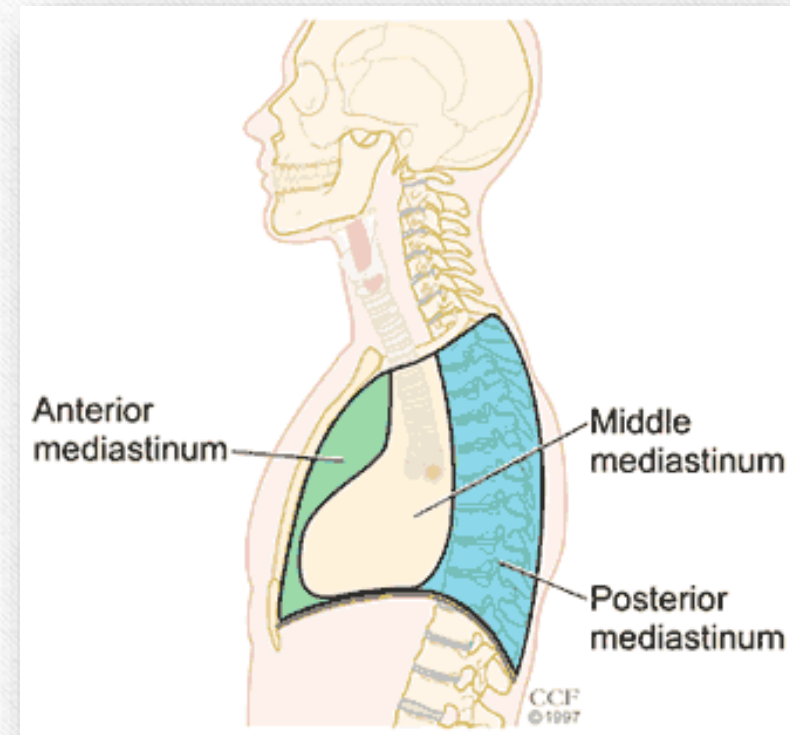
ال membrane ال ال يكون حول ال Ventricles يكون More thicker
 □ القلب ← Blood vessels , tissues , 3 layers of

• ال tissue ال ال يكون داخل ال Chambers! Endocardium ← نسمح لـ Smooth blood flow
 • ال ال بعد طبقة ال Endocardium أي حوالي ال chambers وتساعد على Contraction تسمى Myocardium
 • ال ال يكون محاطة بكل العنقه تسمى Pericardium وهي Protective layer + تمنع تغيير
 Over expansion (توسع)



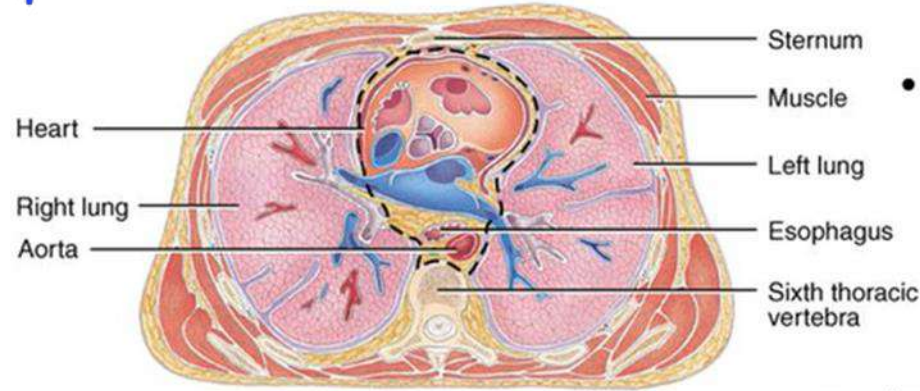
لم تتطرق له في المحاضرة ٢ { Location of the heart }

- The heart is located in the thoracic cavity, it is located in the *mediastinum*.
- Area from the sternum to the vertebral column and between the lungs.
- The ascending of the aorta is located in the middle mediastinum. The apex of the heart is located in the inferior of the mediastinum. The base is located in the superior mediastinum.

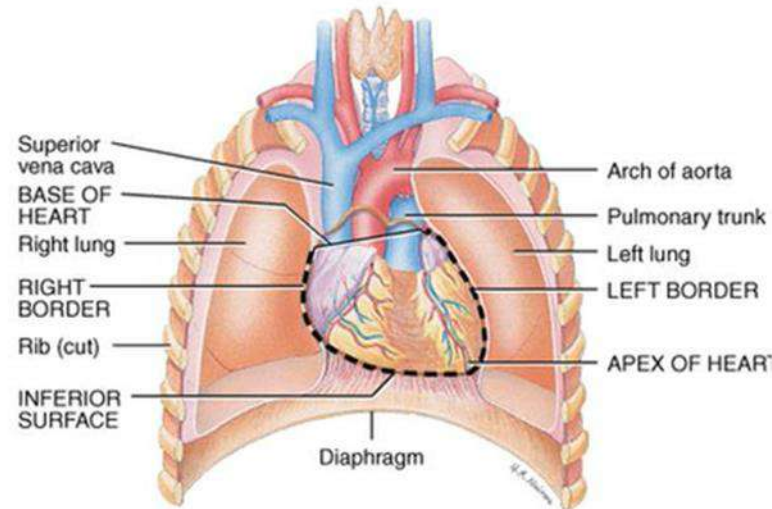


لم نتطرق له في محاضرة ٢

Heart Location

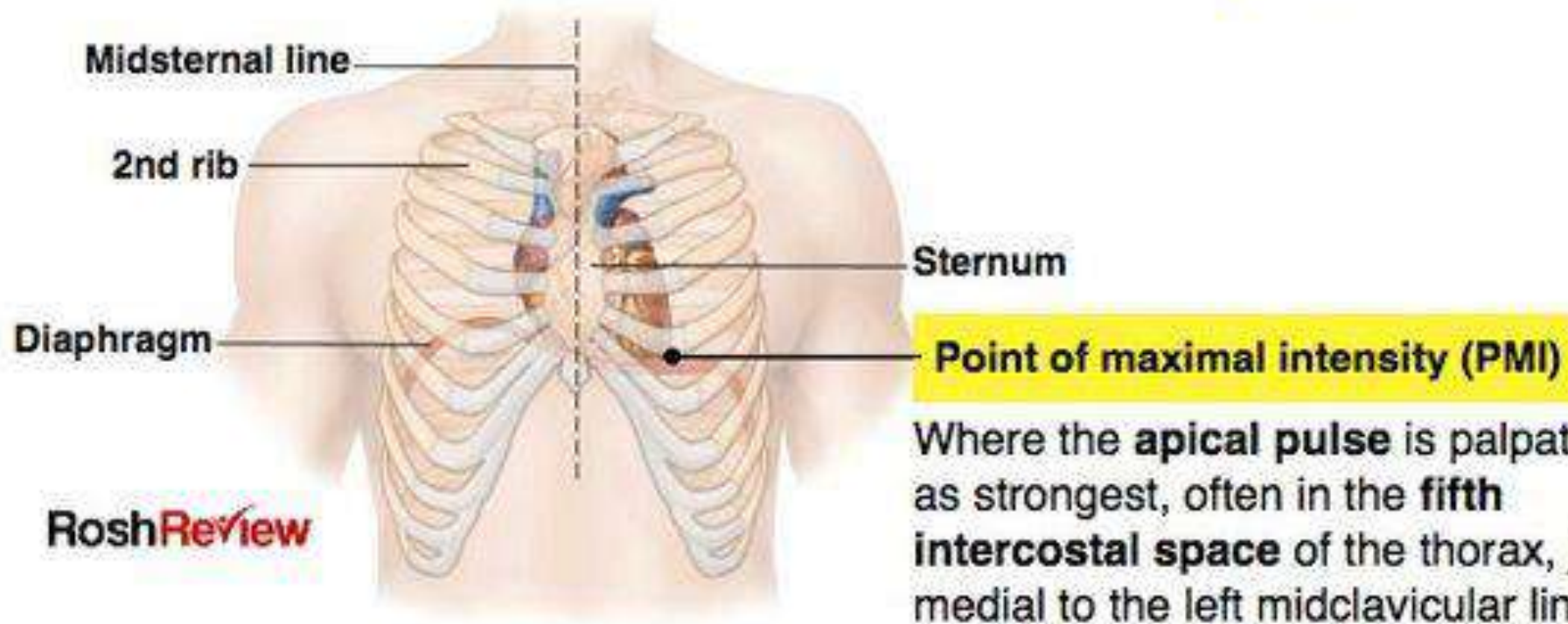


- Heart is located in the **mediastinum**
 - area from the sternum to the vertebral column and between the lungs



- Apex - directed anteriorly, inferiorly and to the left
- Base - directed posteriorly, superiorly and to the right
- Anterior surface - deep to the sternum and ribs
- Inferior surface - rests on the diaphragm
- Right border - faces right lung
- Left border (pulmonary border) - faces left lung

Point of Maximal Intensity (PMI)



RoshReview

■ **Pericardial Cavity:**

✓ Surrounds the heart.

✓ Lined by the pericardium.

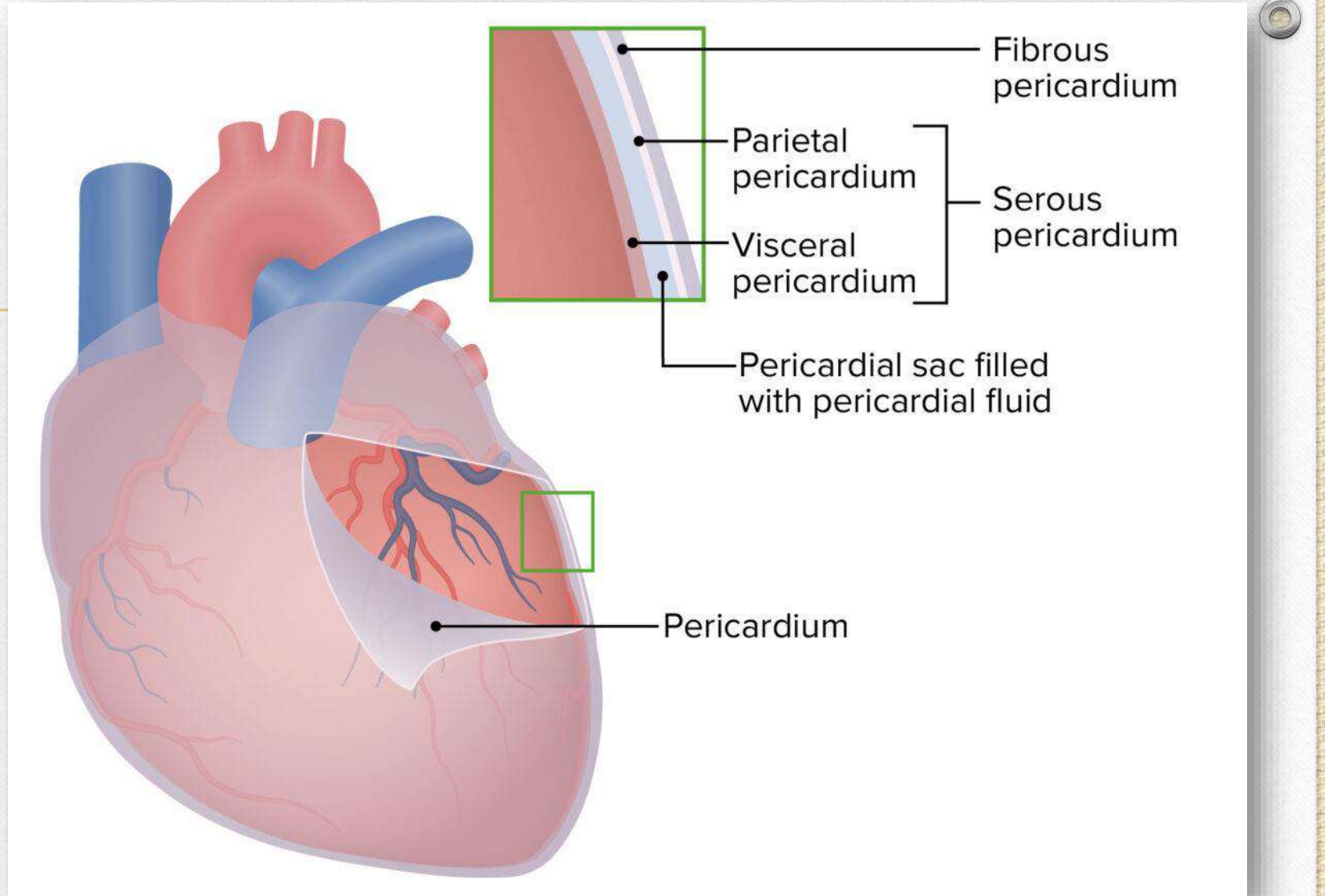
✓ Two layers:

- Visceral pericardium (epicardium):

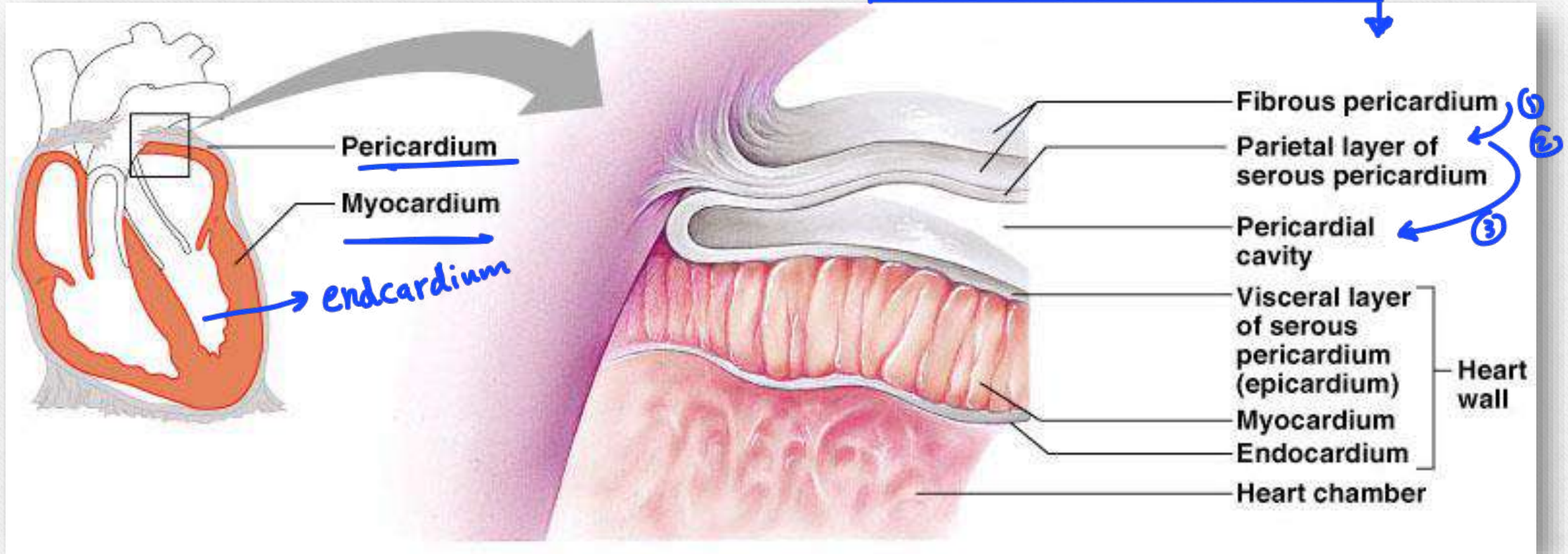
Covers heart surface

- Parietal pericardium:

Lines pericardial sac that surrounds the heart.



Pericardial Layers of the Heart



The Heart Wall

✓ Epicardium (visceral pericardium):

- Outermost layer.
- Serous membrane.

✓ Myocardium: → Contraction

- Middle layer.
- Thick muscle layer.

✓ Endocardium. → Smooth blood flow

- Inner lining of pumping chambers.
- Continuous with endothelium



اللّٰهُمَّ بَلِّغْنَا رَمَضَانَ بِرَوْحٍ أَنْقَى
وَقَلْبٍ اتَّقَى وَعَمَلٍ أَرْقَى

ما تنسوني من صالح
دعائكم ولكم بالمثل
إن شاء الله ♥

