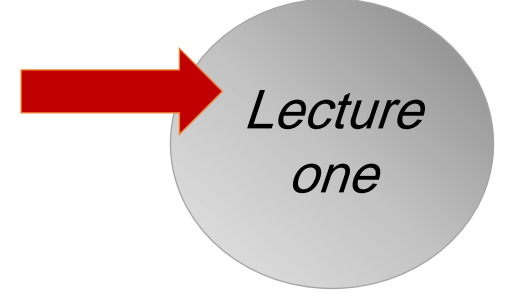




كلية الرشيد الجامعة  
قسم الصيدلة  
المرحلة الاولى



التشريح العام

## **General Anatomy The circulatory System**

**الدكتور طارق الربيعي**

M.B.Ch.B., D.G.S, M.R.C.S. Ireland

م.د. يحيى فداء الدين

## LECTURE ONE

كلية الرشيد الجامعه

قسم الصيدلة

المرحلة الاولى

General Anatomy.

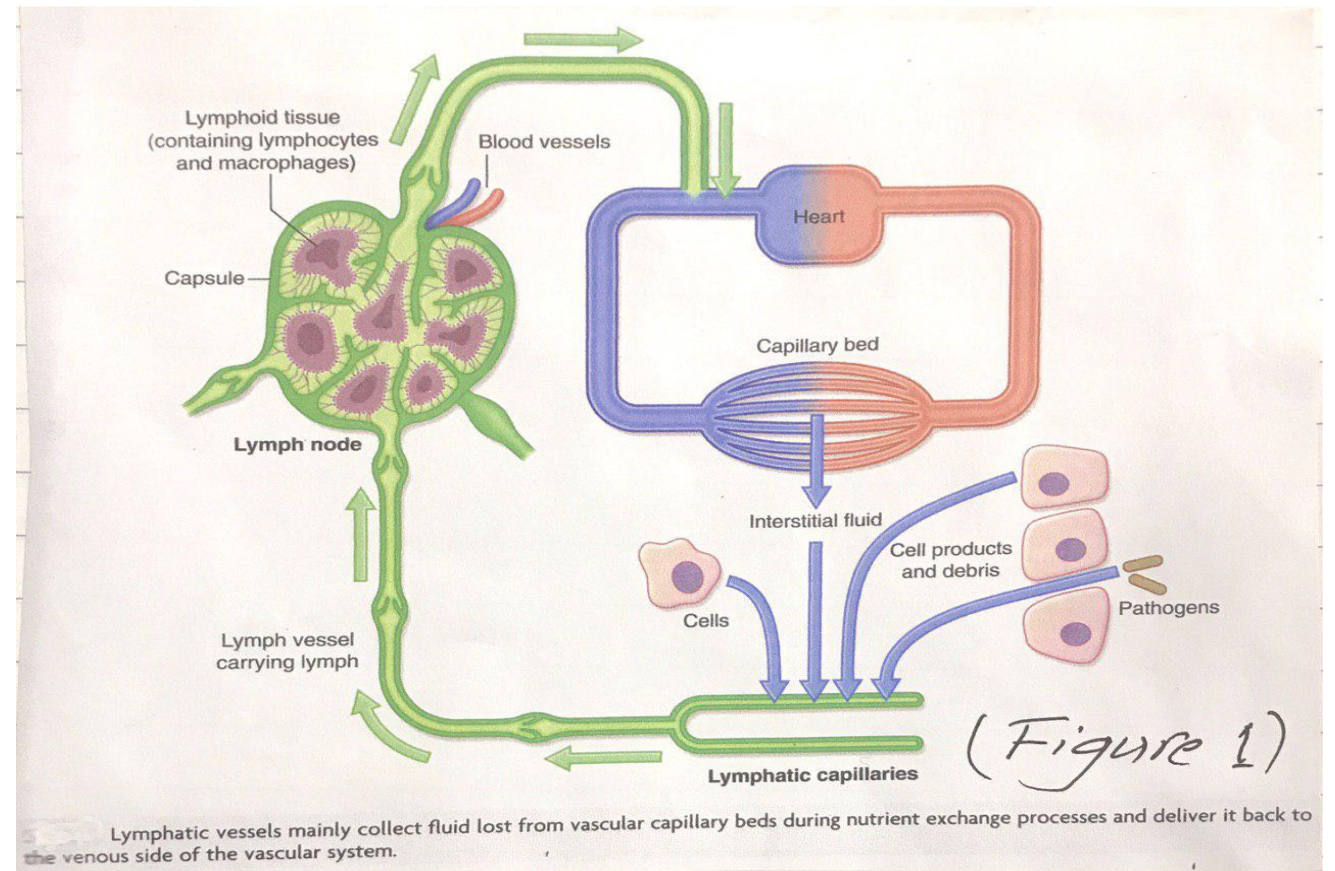
### The circulatory System.

- Parts of the circulatory system.
- The cardio vascular system.
- The Heart.
- The pericardium.
- Chambers of the heart and their openings.
- The conducting system of the heart.
- Arterial supply of the heart .(coronaries)
- Venous drainage of the heart. (cardiac veins)
- Main arteries of the body.
- Main veins of the body.
- The lymphatic vascular system.

# The circulatory system

Circulatory system including both:

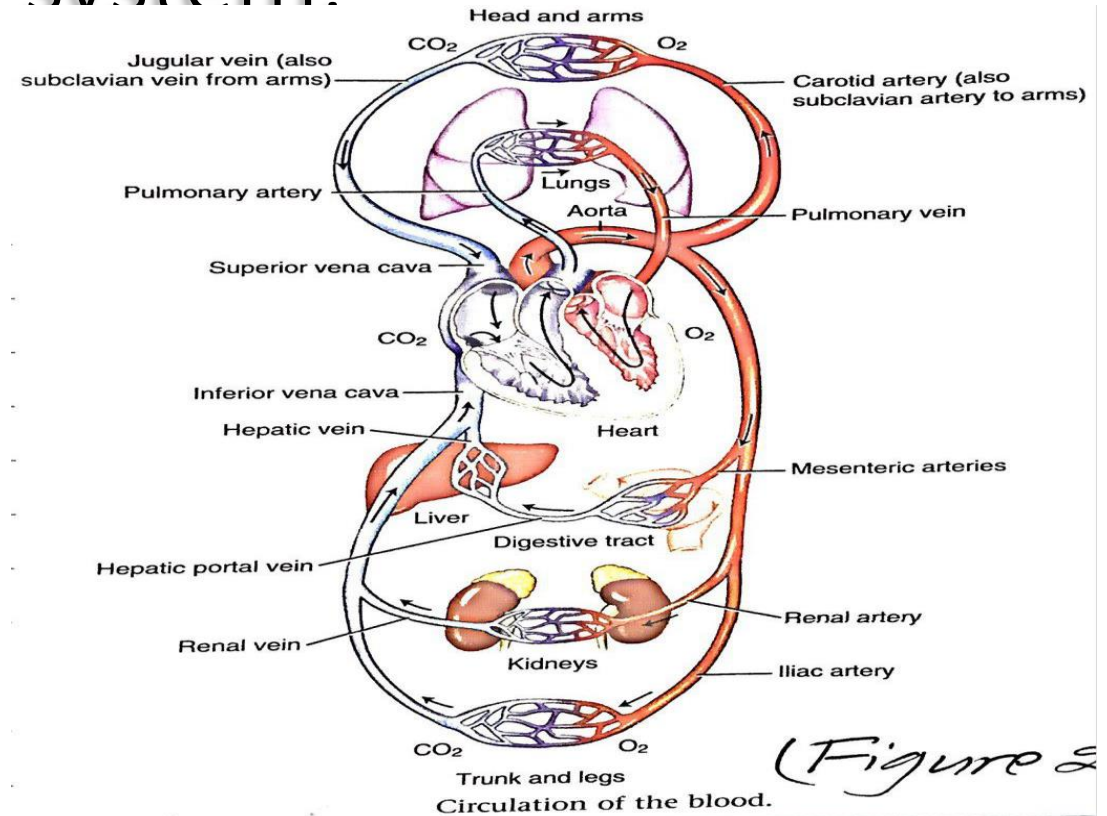
1. Blood vascular system.
2. Lymphatic vascular system.



# Blood vascular system or cardiovascular system.

## Consists of.

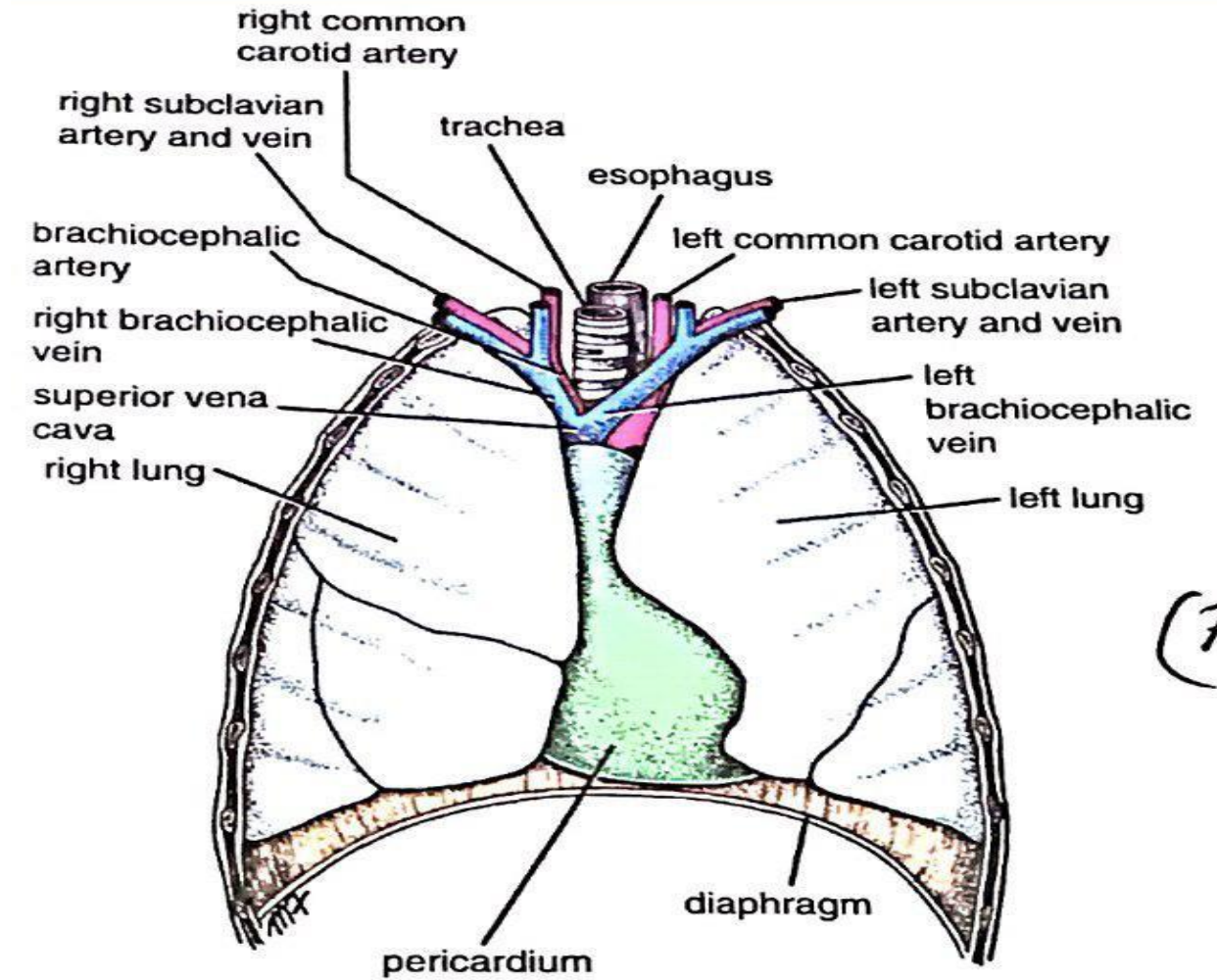
1. The heart.
2. The arteries.
3. The veins.
4. The capillaries.



The general plan of circulation of the blood  
In the cardiovascular system is as follows → heart  
→ arteries → capillaries → veins → heart;  
to be pumped again.

# ➤ The heart

- The heart lies in the chest ,
- And is enclosed in the pericardium.



in front.

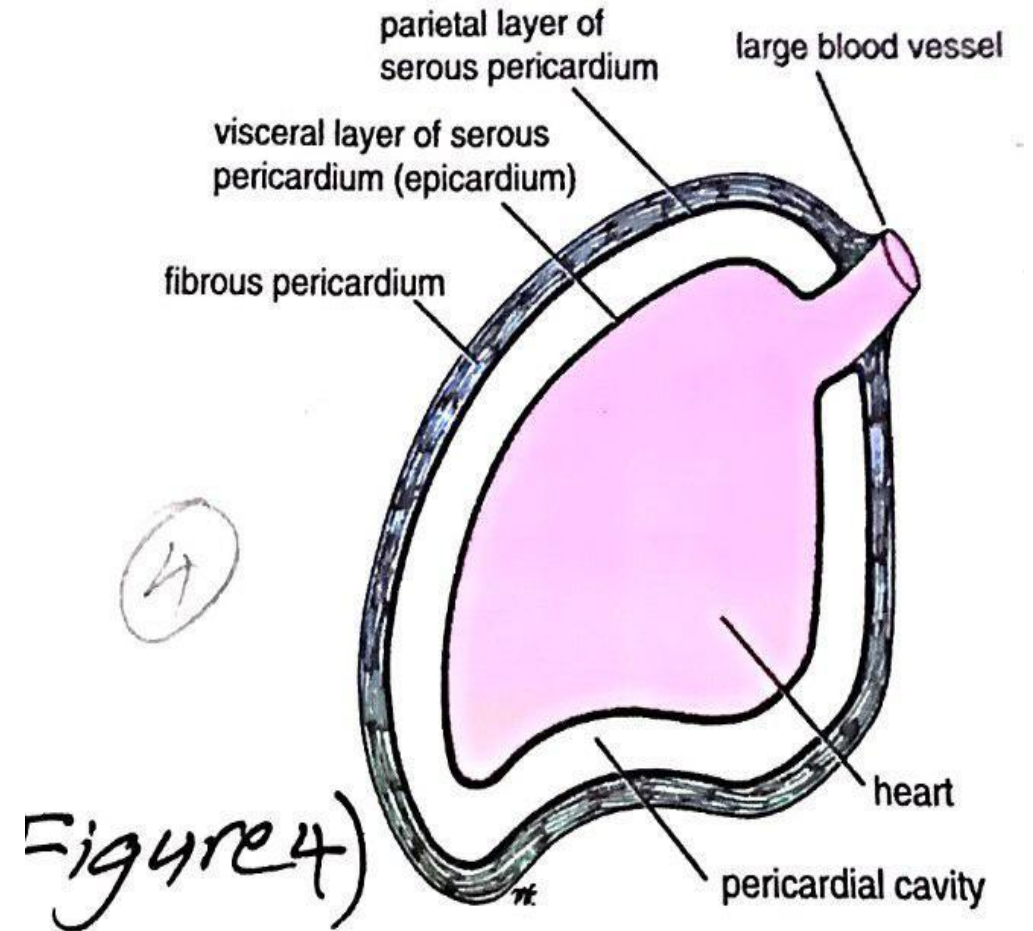
The pericardium and the lungs exposed from  
*(Figure 3)*

*(F)*

## ➤ The pericardium

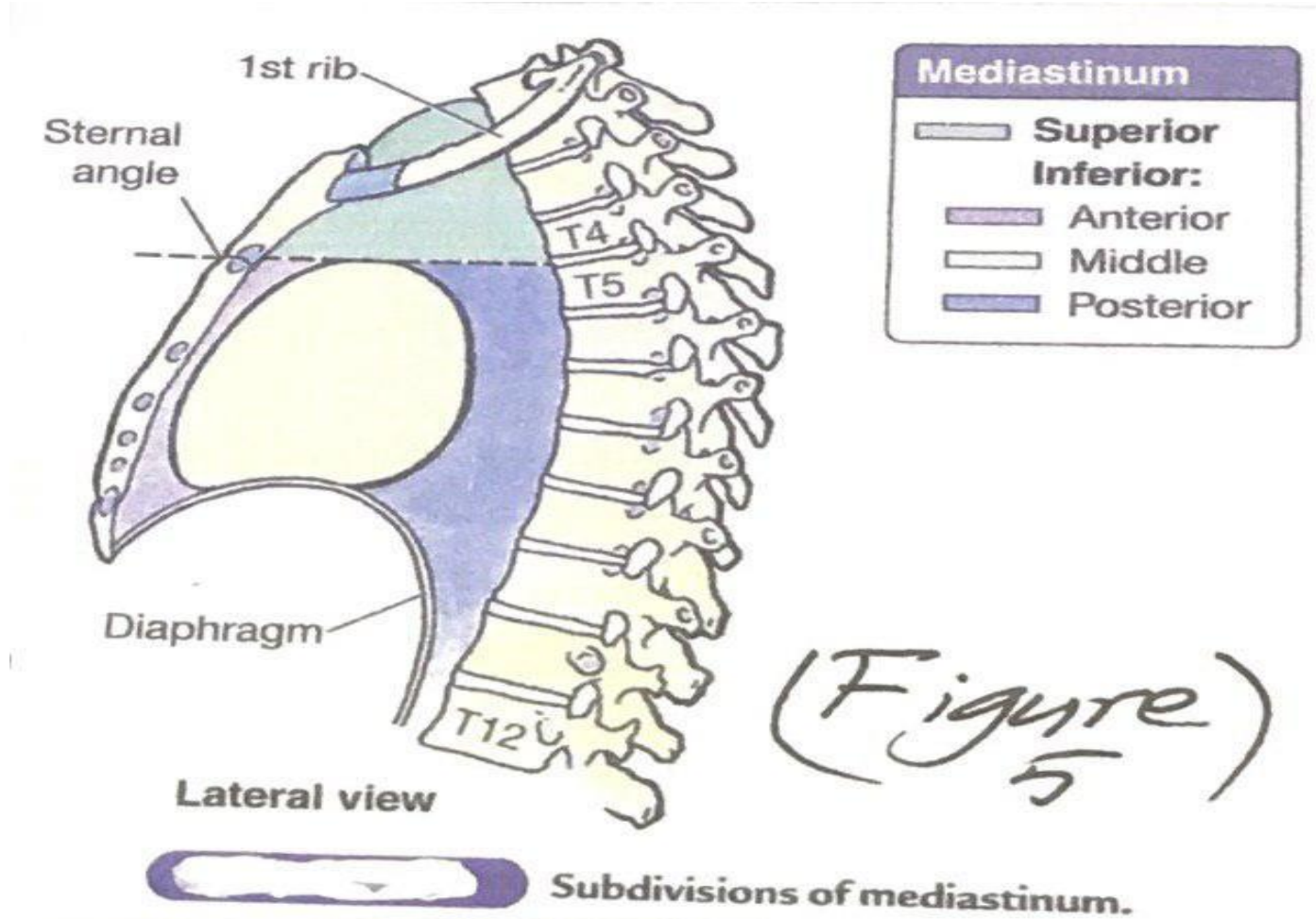
Is a fibroserous sac that encloses:-

1. The heart
2. The roots of the great vessels.



Different layers of the pericardium.

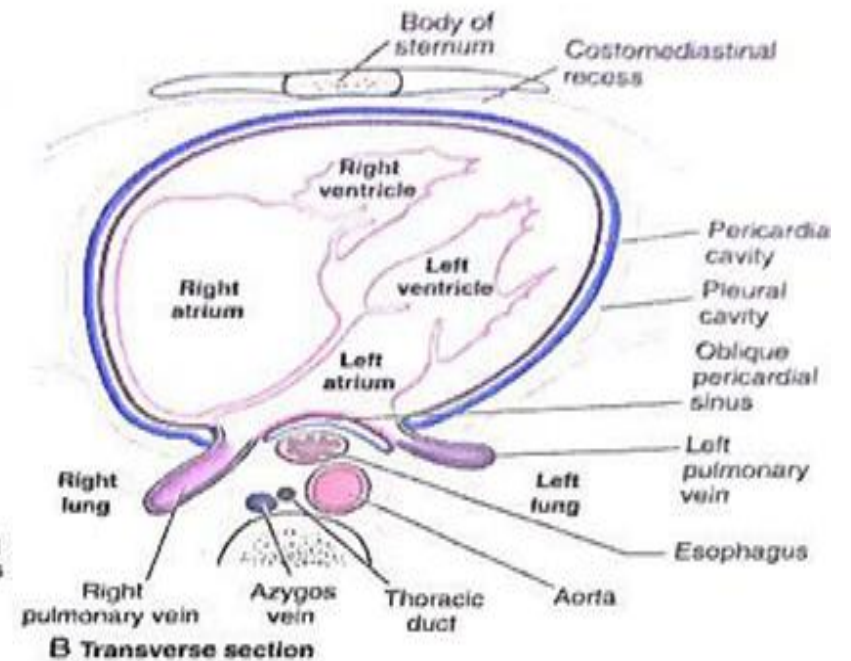
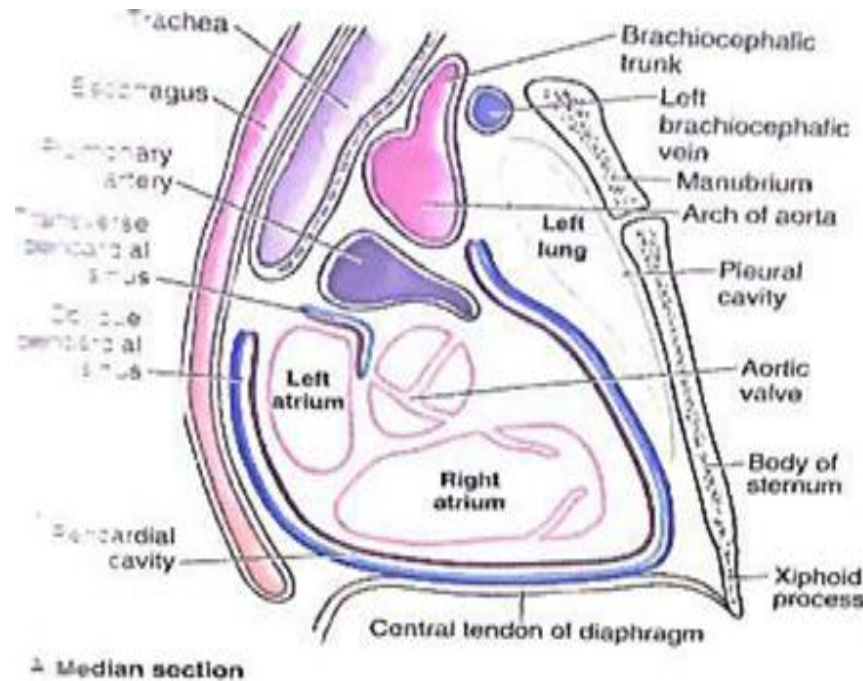
- The pericardium lies in the middle of the chest
- Behind the body of sternum
- And in front of the 5<sup>th</sup>–4<sup>th</sup> thoracic vertebrae (fig 3,5)



# Parts of the pericardium.

1. Fibrous pericardium : strong outer layer.
2. Serous pericardium : which divides into two layers.
  - a. Parietal layer : lines the fibrous part
  - b. Viscera layer : covers the heart also called (epicedium)

The pericardial cavity: is a slit-like space between the parietal and visceral layers contains about (50ml) of pericardial fluid acts as a lubricant facilitate heart's movement.





# The heart

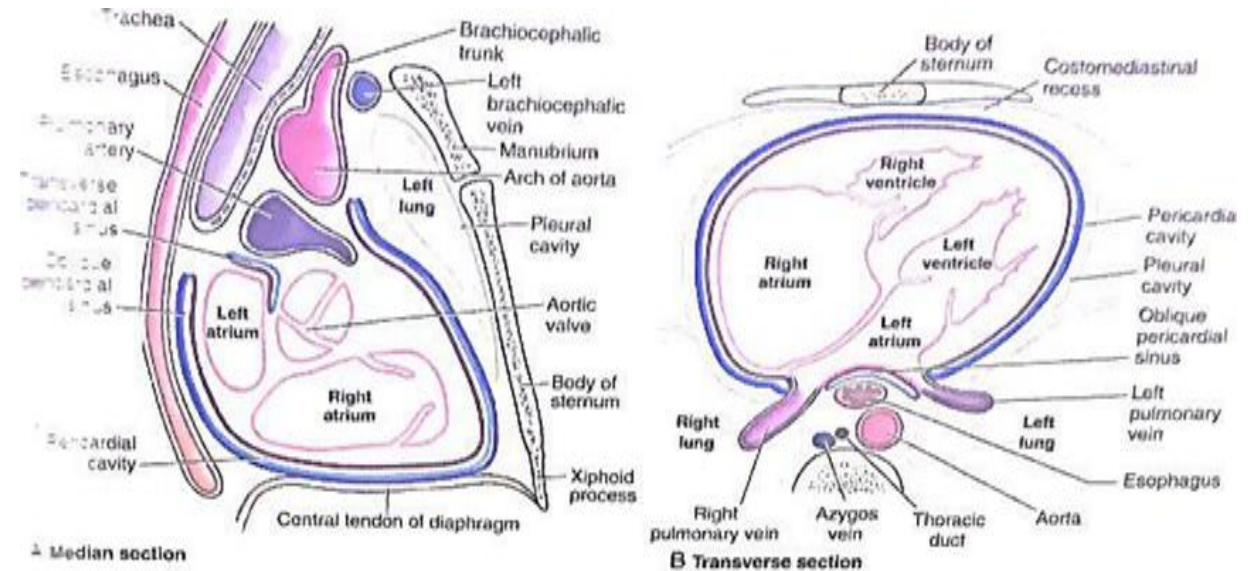
- Is a hollow muscular organ.
- Somewhat pyramid-shaped.
- It is connected at its base to the great vessels ,but otherwise lies free within the pericardium.

## Surfaces of the heart.

1. The sternocostal (anterior) surface
2. the diaphragmatic (inferior) surface
3. The base (posterior) surface

## Apex of the heart

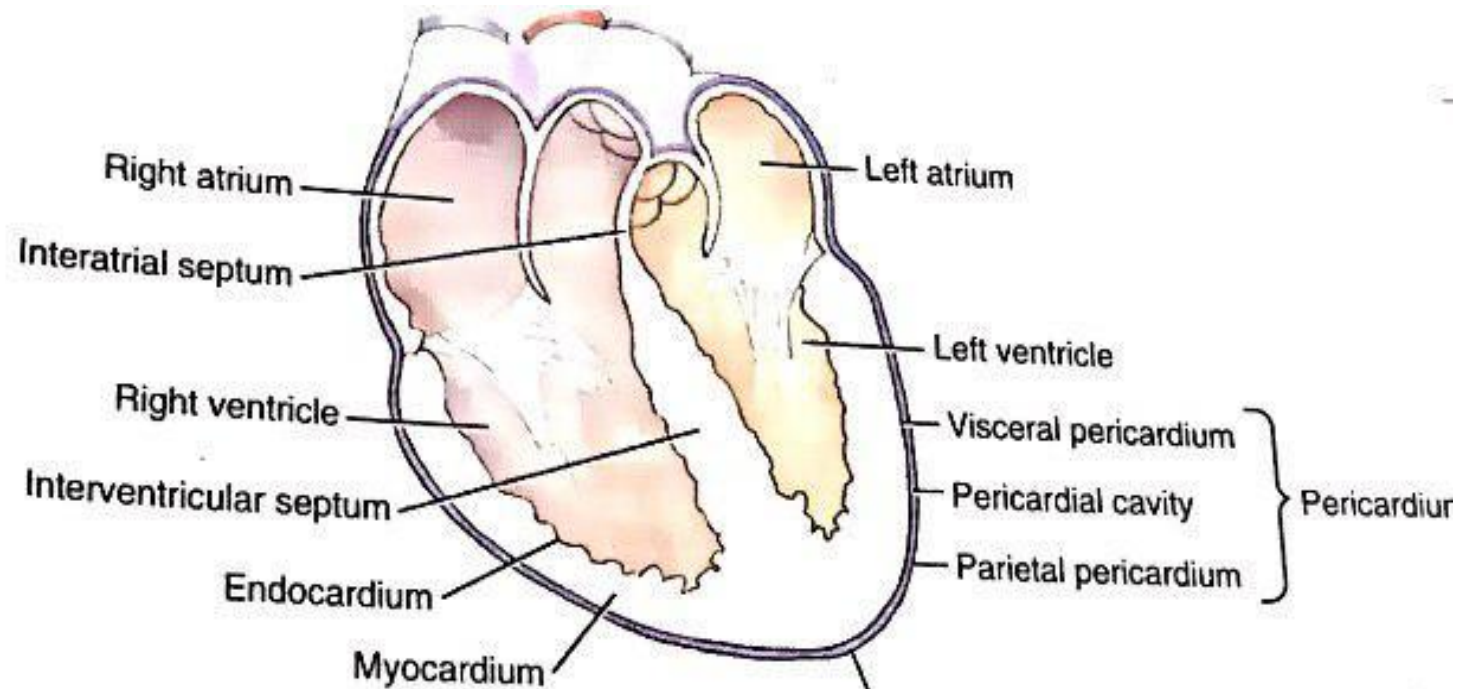
- Is directed downward , forward , and to the left.
- In the living person : it lies at the level of the left 5<sup>th</sup> intercostal space , 9cms from the midline.



# Chambers of the heart

The heart is divided by the vertical septum into four chambers.

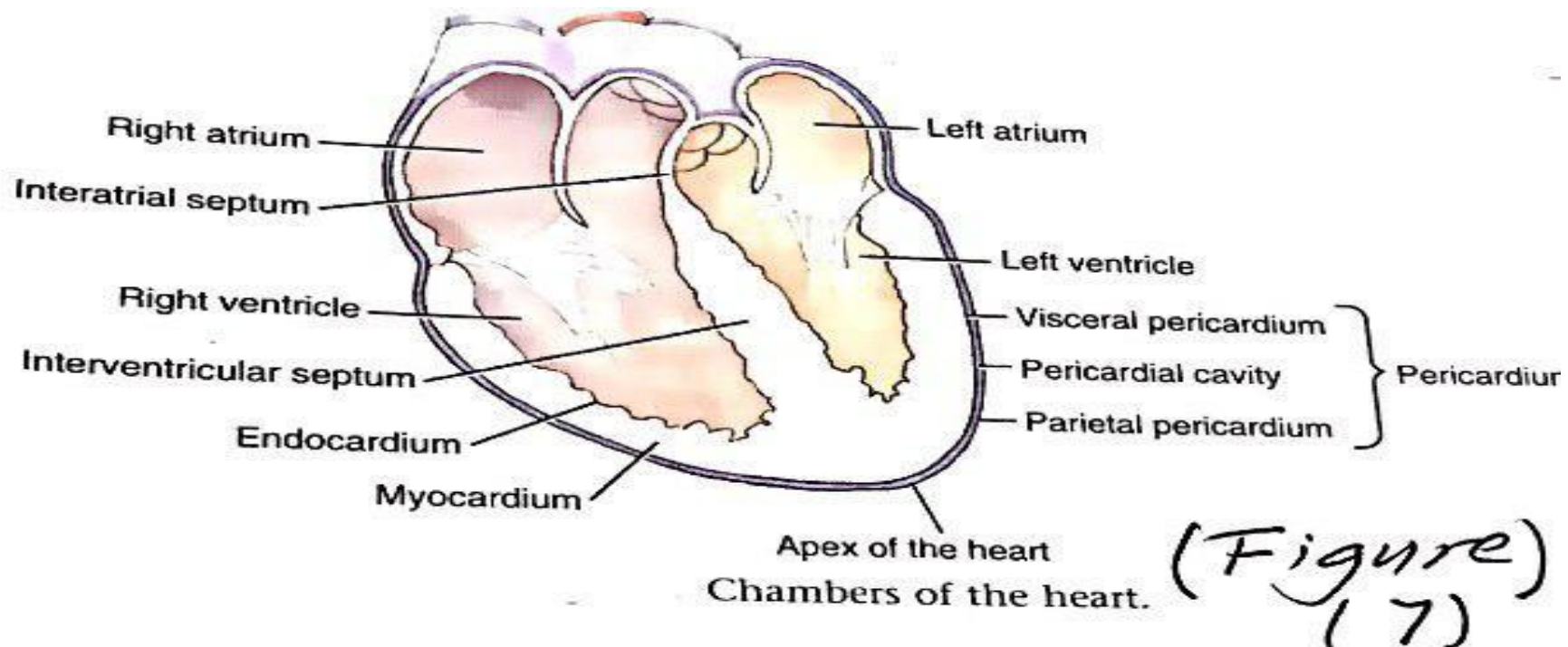
1. The right atrium.
2. The right ventricle.
3. The left atrium.
4. The left ventricle.



Chambers of the heart. (Figure)  
(7)

# The wall of the heart is composed of.

1. Cardiac muscle : (the myocardium)
2. Covered externally by the serous pericardium (the epicardium)
3. Lined internally with a layer of endothelium (the endocardium)



# Openings of the chambers of the heart

## A. the right atrium

### 1. The superior vena cava.

Opens in the upper part.

It returns blood from the upper part of the body

### 2. The inferior vena cava.

Opens in the lower part.

It returns blood from the lower part of the body

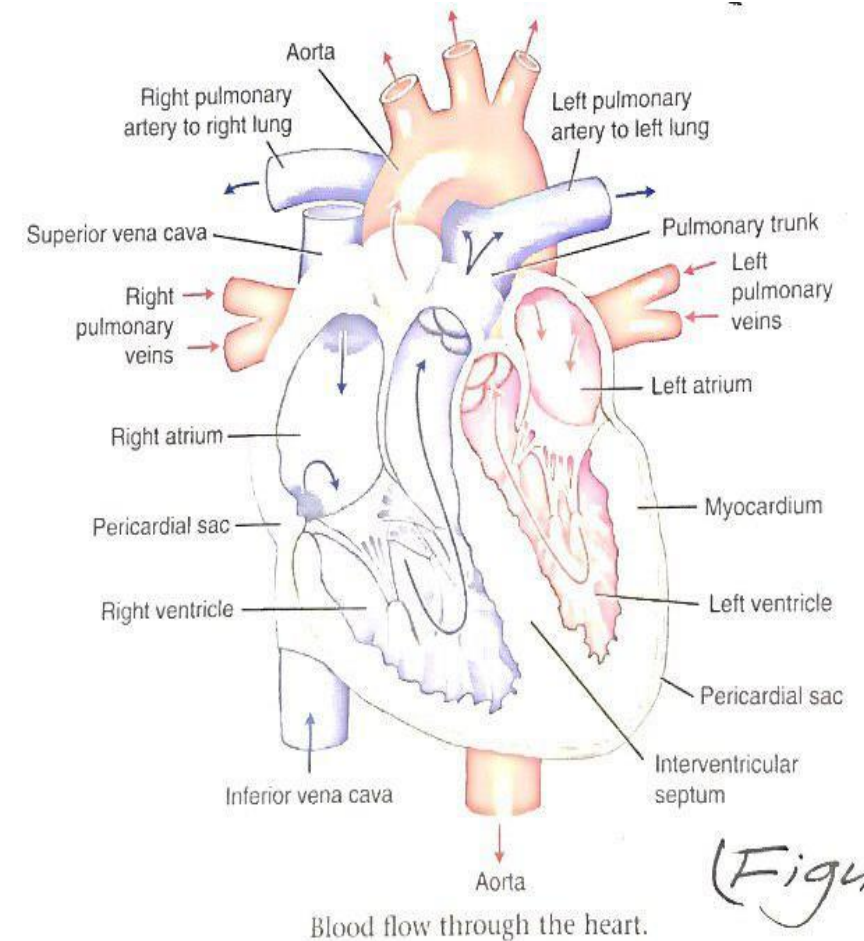
It is larger than the superior vena cava

### 3. The coronary sinus.

Drains blood from the wall of the heart .

### 4. The Right atrioventricular orifice

- Communicate the right atrium with the right ventricle.
- It is guarded by the Tricuspid valve.



# Openings of the chambers of the heart

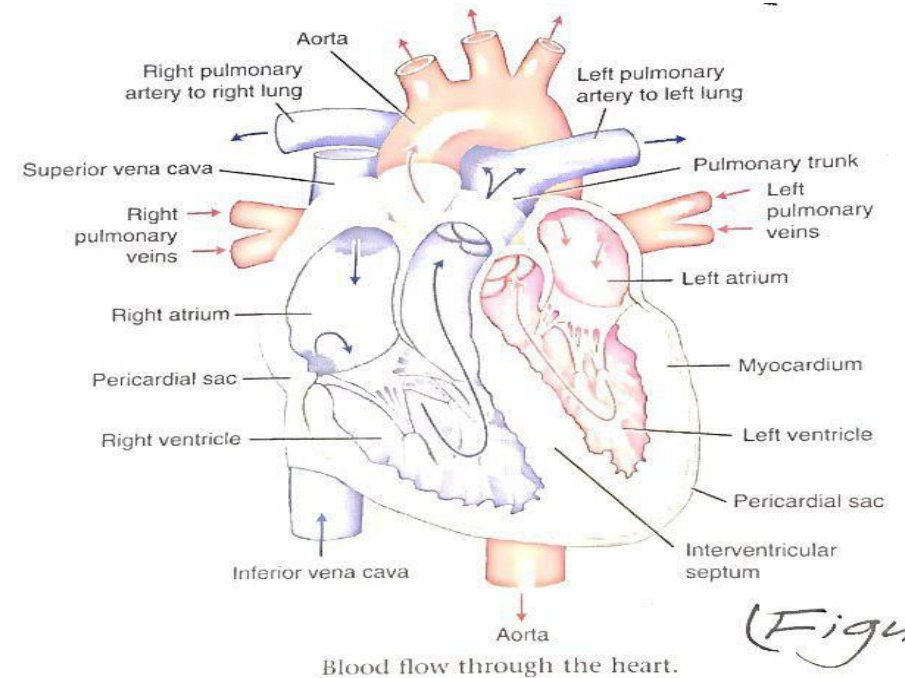
## B. the right ventricle.

### 1. The right atrioventricular orifice.

It is guarded by the Tricuspid valve.

### 2. The pulmonary orifice.

- Leads to pulmonary trunk which delivers blood to the lungs.
- It is guarded by the pulmonary valves



(Figure 8)

# Openings of the chambers of the heart

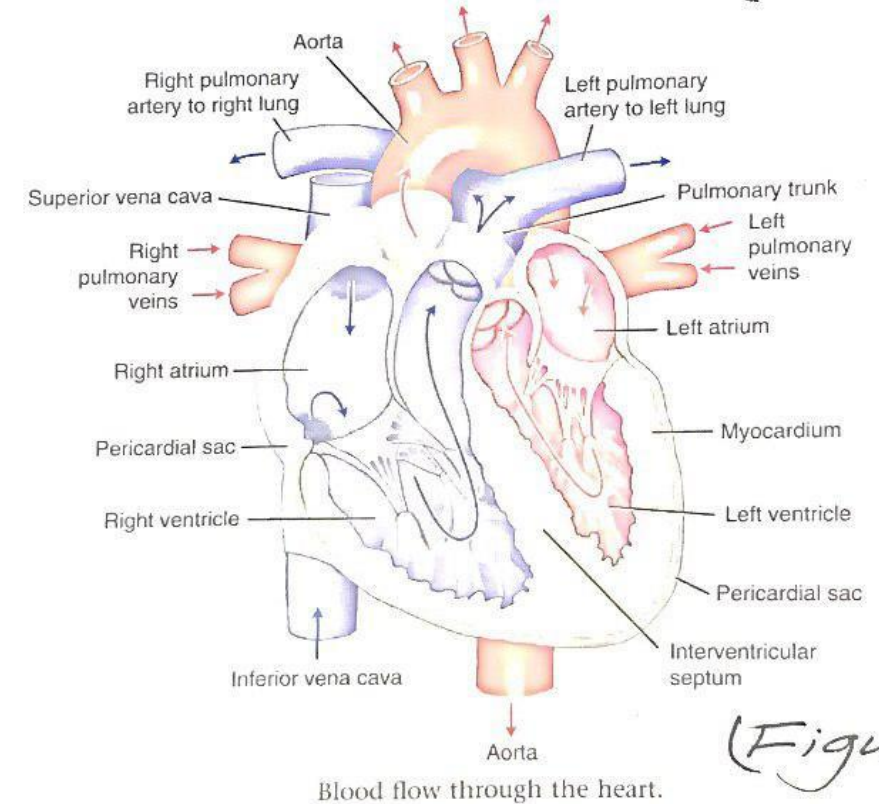
## C. The left Atrium

### 1. The four pulmonary veins.

- Two from each lung
- Have **no valves.**

### 2. The left atrioventricular orifice .

- Communications the left atrium with the left ventricle.
- It is guarded by **the mitral valve .**



(Figure

(Figure 8)

# Openings of the chambers of the heart

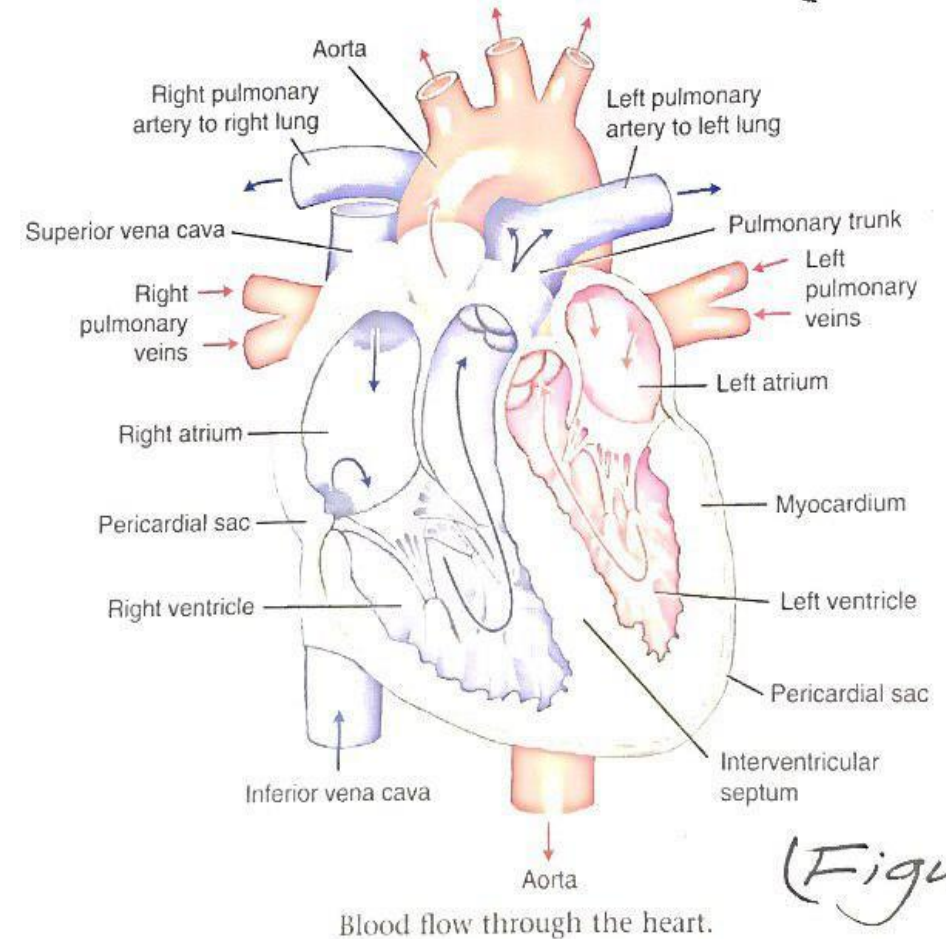
## D. The left ventricle

### 1. The left atrioventricular orifice.

- Guarded by the mitral valve.

### 2. The Aortic orifice

- Leads to the Aorta, which delivers blood to all parts of the body.
- It is guarded by the aortic valve



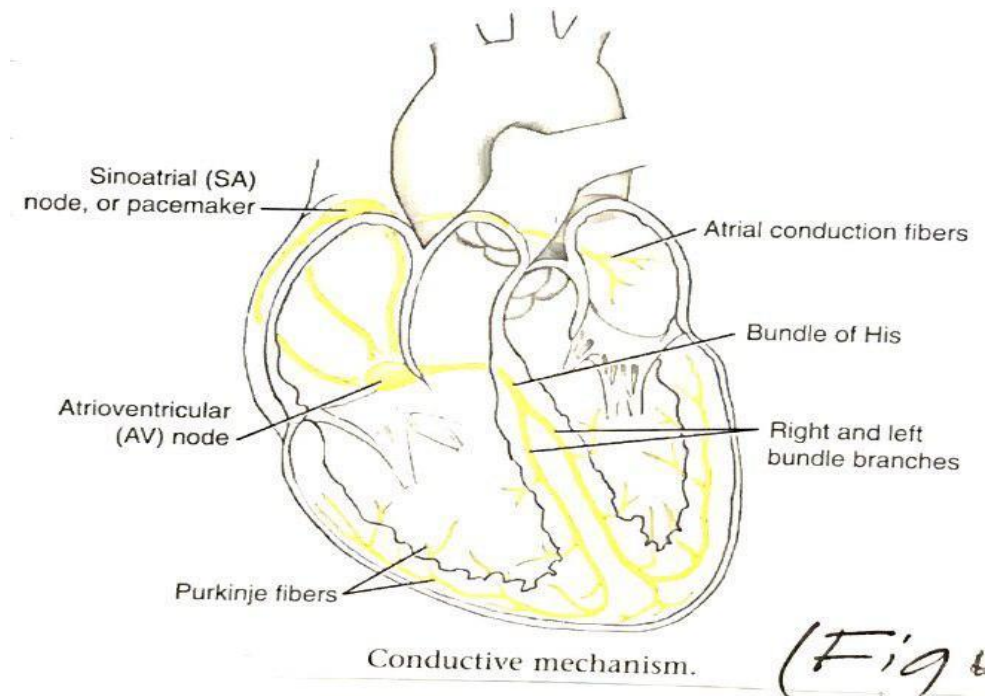
## The conducting system of the heart.

- Normally ; the heart contracts rhythmically , at about 70-90 beats per minute , in resting position .
- The rhythmically contractions originate spontaneously in the conducting system , and the impulses travel in different directions in the heart .
- The atria contract first and together , to be followed by contraction of both ventricles.

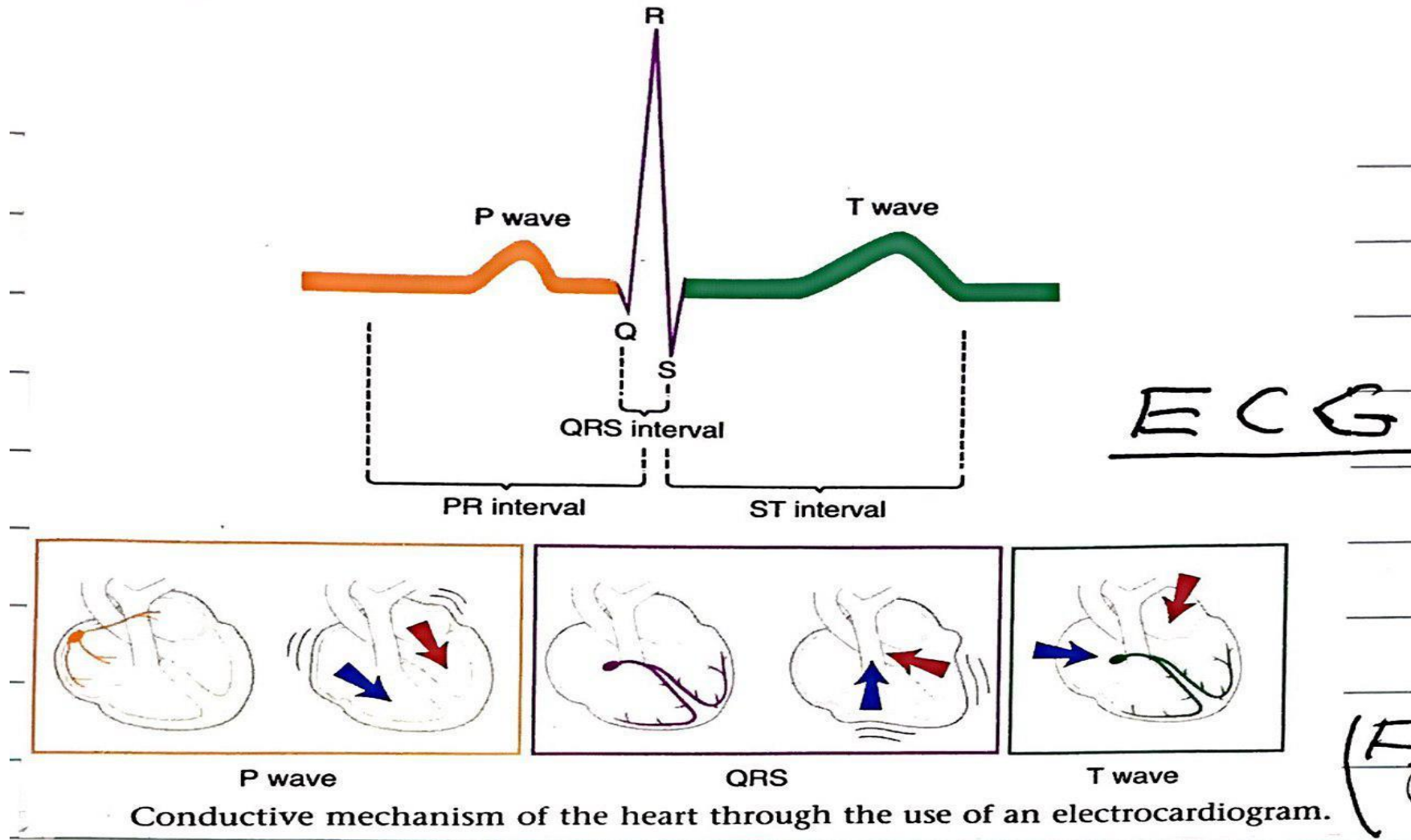


# Parts of the conducting system.

1. The sinu-atrial node (SAN)
2. The atrioventricular node (AVN)
3. The atrioventricular bundle (Bundle of His)
4. The right and left bundle branches
5. The subendothelial plexus of Purkinje fibers



(Figure 9)



The activity of the conducting system of the heart can be recorded by the [Electrocardiography](#) ECG.

# Innervation of the heart

- The heart is innervated by the autonomic nervous system and its divisions ;  
The sympathetic and the parasympathetic .

- Regulating :

1. The heart rate
2. Force of the contraction
3. Cardiac output

## A. Parasympathetic stimulation :

through the vagus nerve [x] Cause :

1. Decrease heart rate
2. Reduce force of contraction
3. Constricts the coronary arteries

## B. Sympathetic stimulation

Through the cardiac sympathetic nerves cause :

1. Increase heart rate
2. Increase the force of contraction

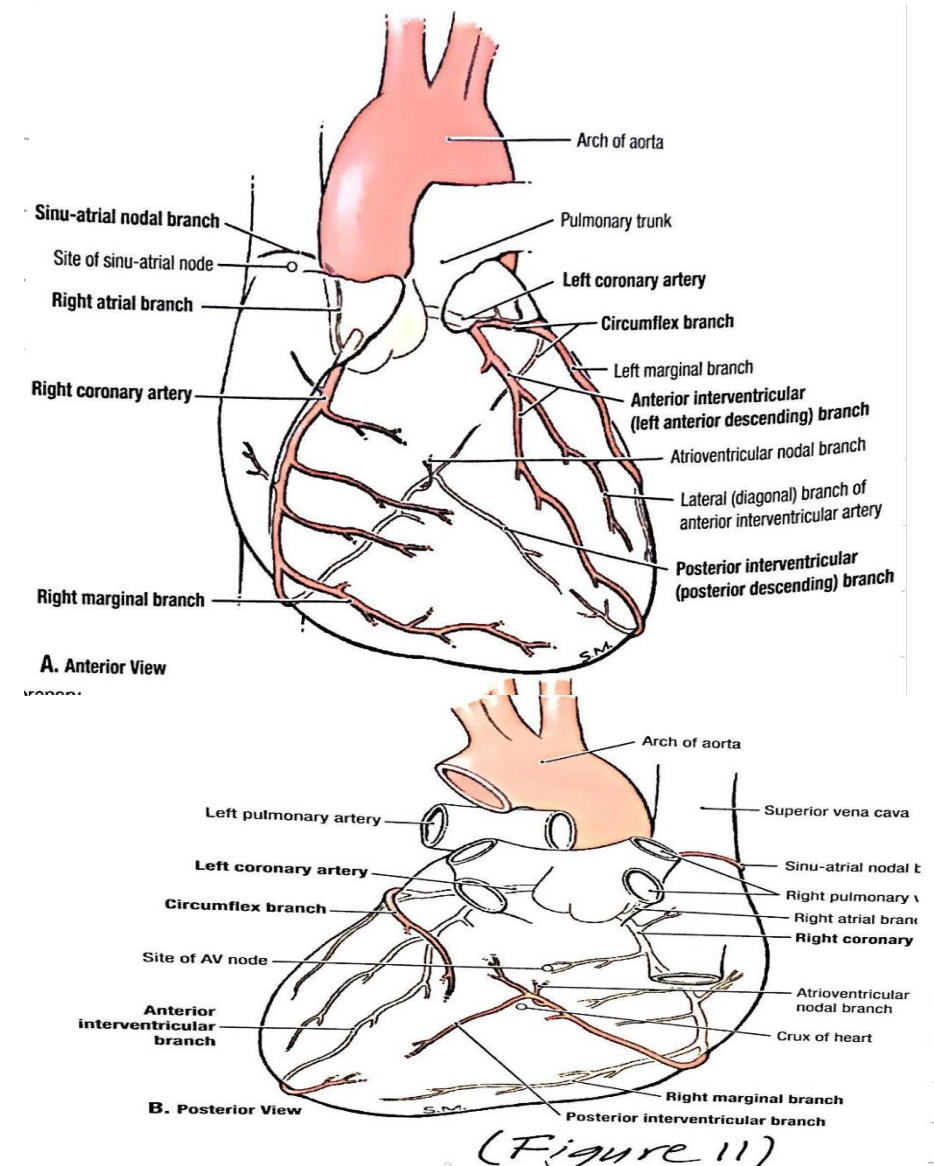
# Arterial blood supply to the heart

## The coronary arteries

### Right and left coronary arteries.

#### ❖ **The right coronary artery :**

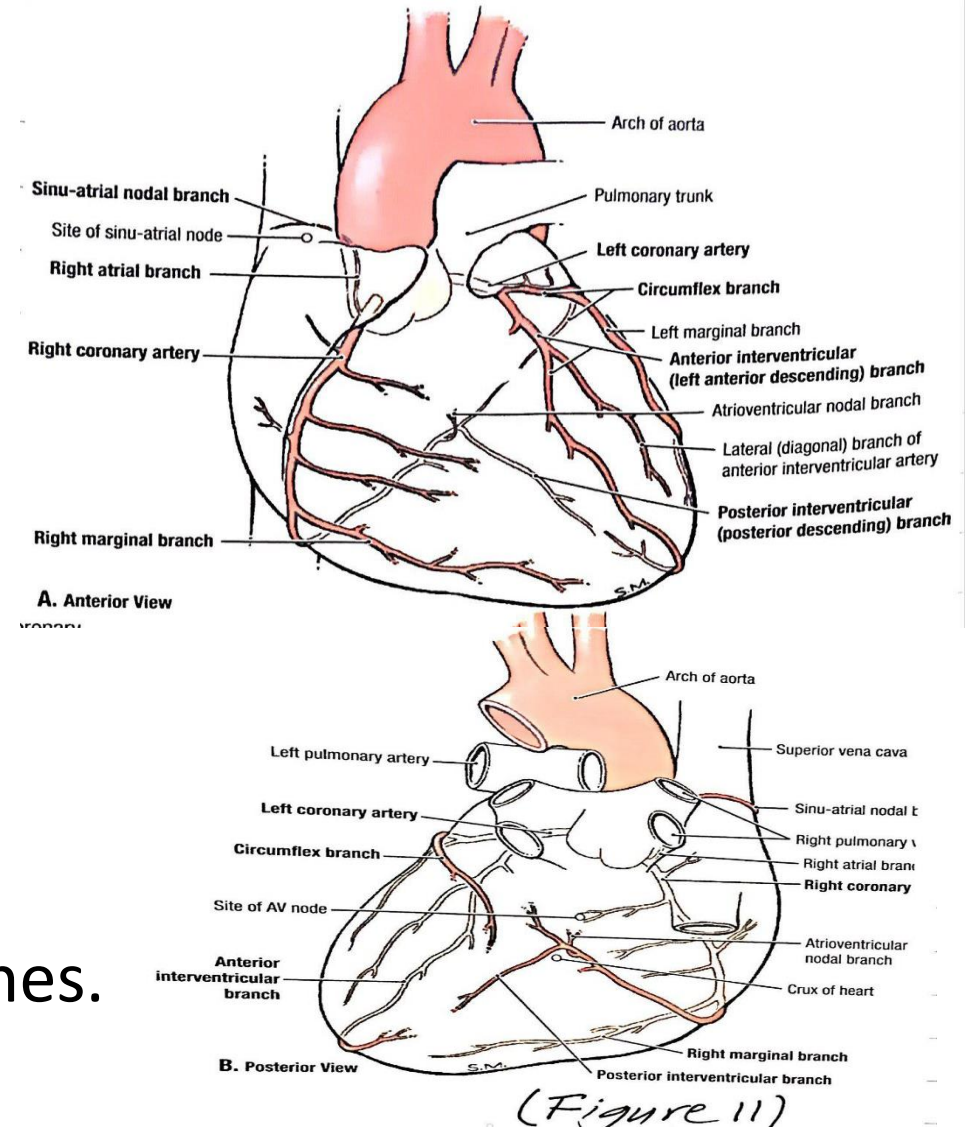
- Arises from ascending aorta.
- Supplies the right atrium and right ventricle the sinu-atrial node and the atrioventricular node and parts of the left atrium and left ventricle by many branches
- The terminal branch (the posterior inter – ventricular) anastomose with the anterior interventricular branch of the left coronary artery (to form collateral circulation).



# Arterial blood supply

## ❖ The left coronary artery to the heart

- Arises from the ascending aorta.
- Divides into two terminal branches.
  1. The anterior interventricular branch.
  2. 2-the circumflex branch
- supplies.
  - left atrium.
  - left ventricle.
  - the interventricular septum.
  - the atrioventricular bundle and its branches.



# The venous drainage of the heart the cardiac veins

Receive blood from the wall of the heart and drain into the right atrium.

The veins are

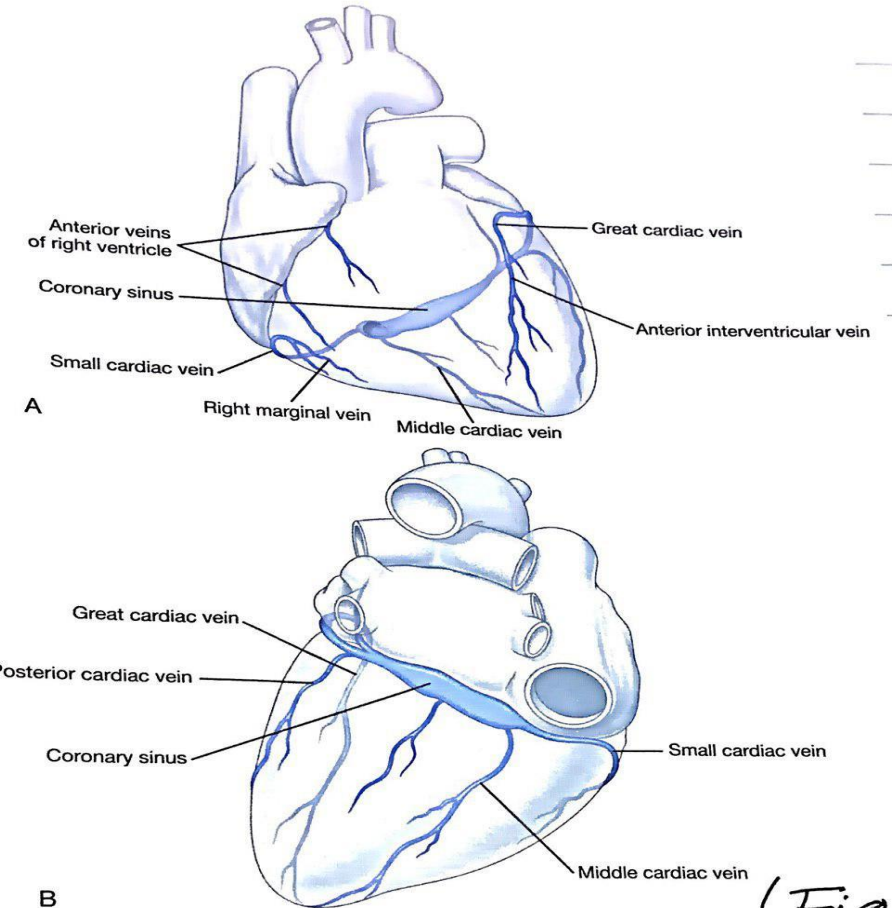
- the coronary sinus and its tributaries.

1.The great cardiac vein.

2.The middle cardiac vein.

3.The small cardiac vein.

4.The posterior cardiac vein.



Major cardiac veins. A. Anterior view of major cardiac veins. B. Posteroinferior view of major cardiac veins.

(Figure 12)

# The Arteries.

- convey oxygenated blood from the heart (left ventricle) to various parts of the body.
- carry deoxygenated blood from the heart (right ventricle) to the lungs.

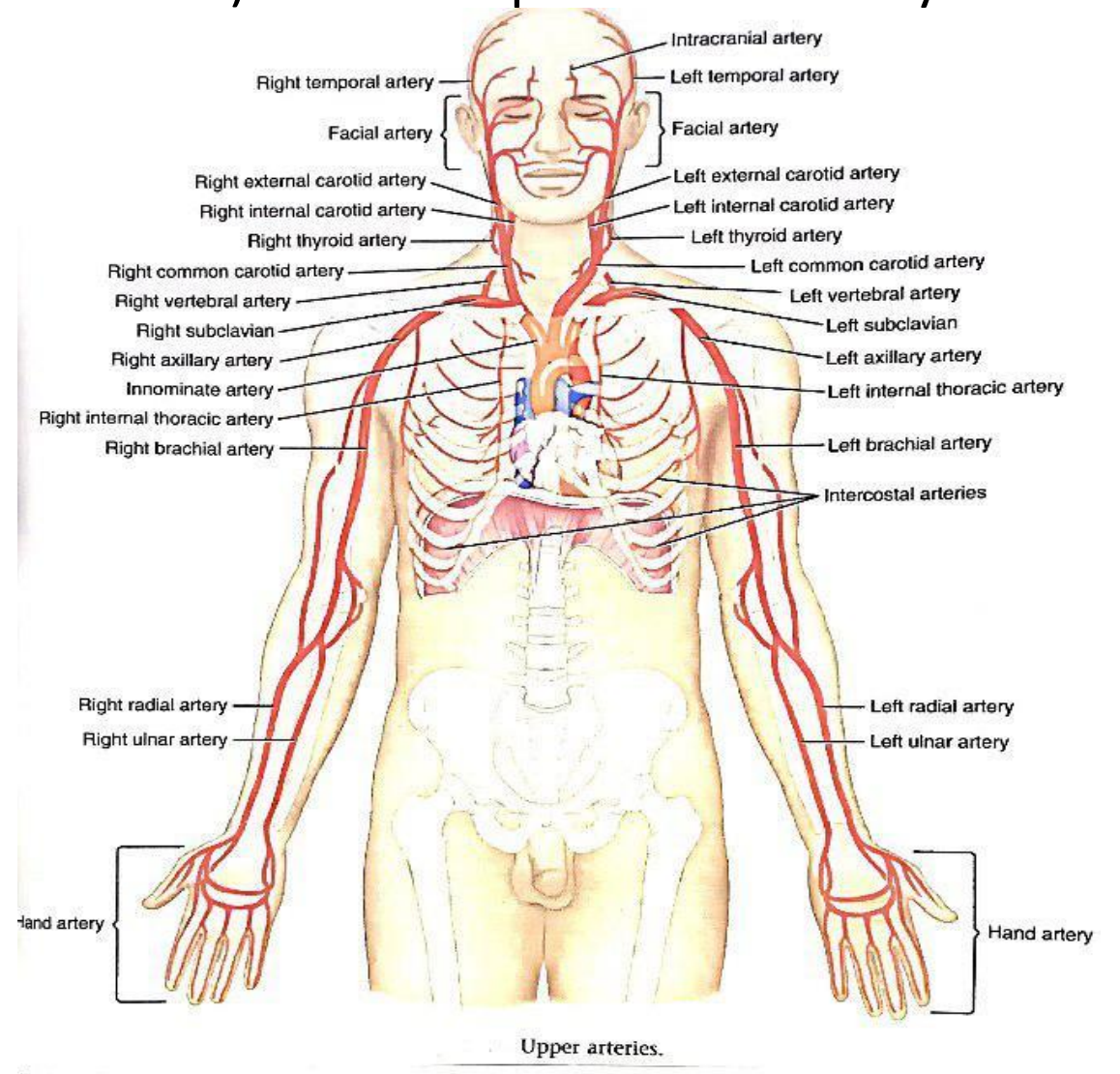
## Main Arteries:

### The Aorta

the main arterial trunk  
(takes blood from the left ventricle  
of the heart to various part of the body)

### Part of the Aorta:

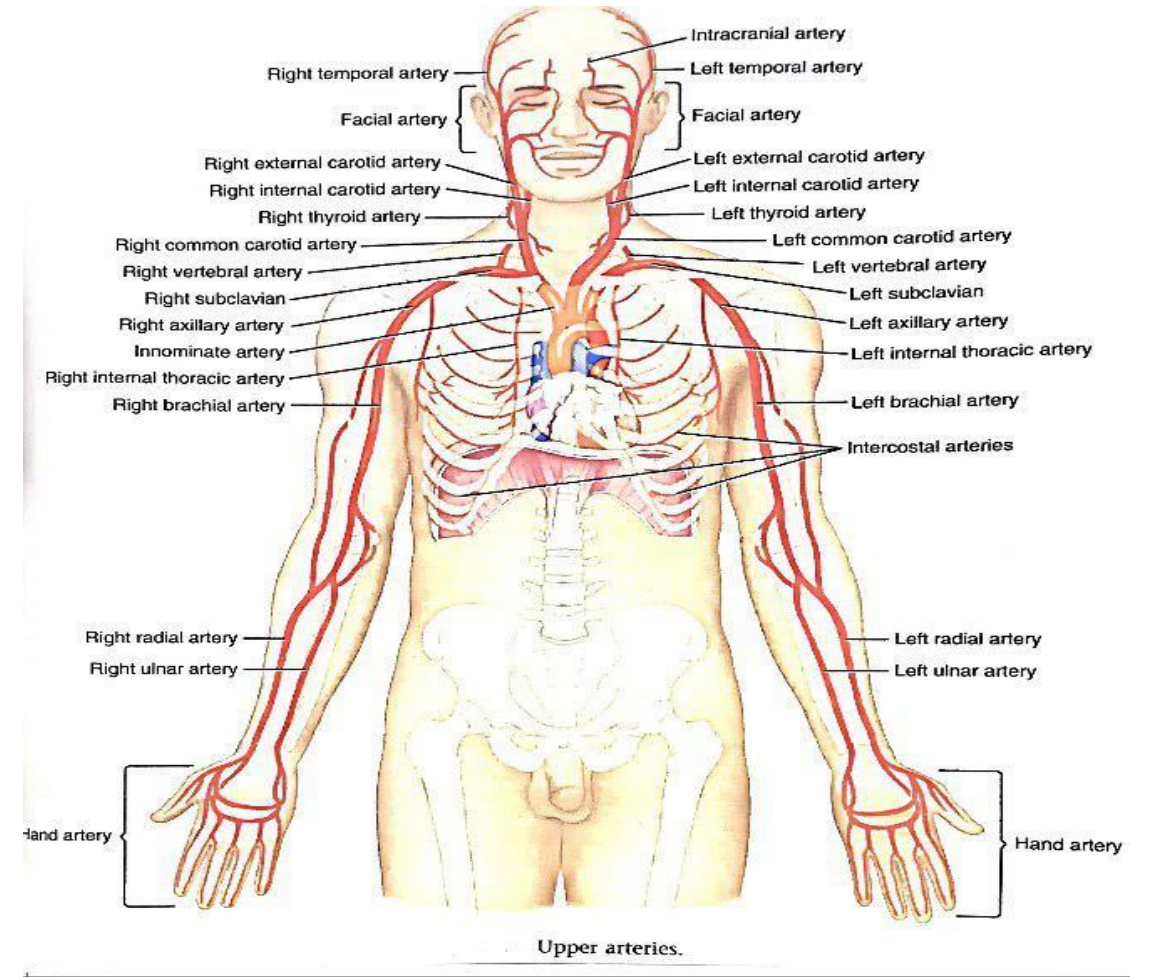
- 1-Ascending Aorta.
- 2-Arch of the Aorta.
- 3-Descending Aorta.
- 4-Abdominal Aorta.



(figure 13)

# 1-the Ascending Aorta

- begins from the left ventricle of the heart .
- Gives two branches :  
The right and left coronary arteries.



(Figure 13)



## 2-The Arch of Aorta

Branches:

- A. the left common carotid Artery .
- B. the left subclavian artery .
- C. the brachiocephalic artery.

which divided into :

- 1) the right common carotid artery.
- 2) the right subclavian artery.

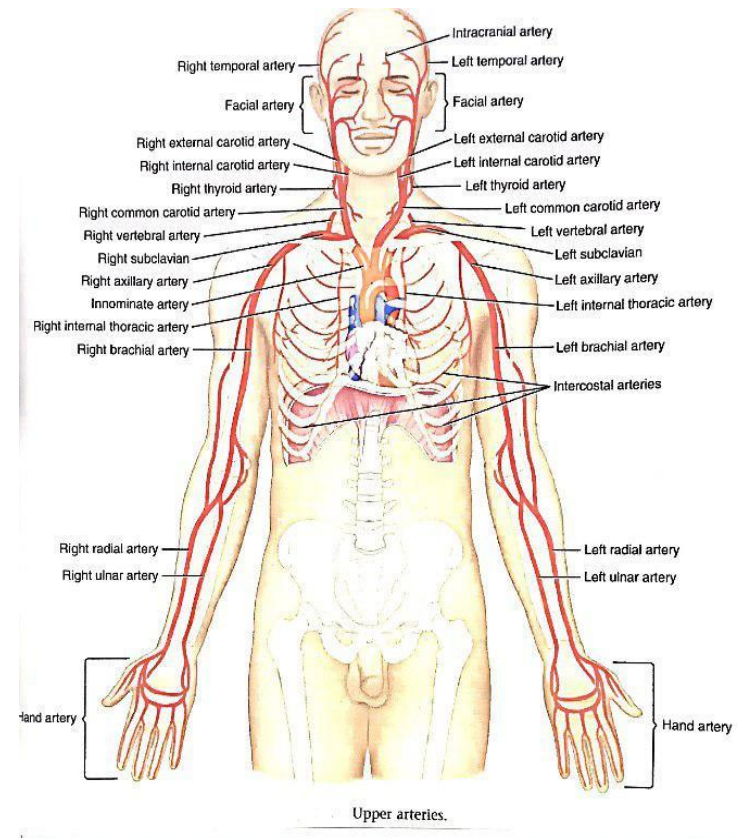
❖ **The common carotid artery on both sides(right and left) divide in two branch:**

1. the External carotid artery.
2. the Internal carotid artery.

They supply arterial blood to the head and neck region.

❖ **The subclavian artery on both side :** (right and left):- continue into the axilla become the **Axillary artery** which is the main artery of the upper limb.

- The axillary artery continues in the arm as the **Brachial artery** which divides at the elbow into two branches the **Radial** an **ulnar artery** which supply the forearm and the hand.



### 3- the Descending Aorta

- Is the continuation of the arch of the aorta.
- Descends at the posterior part of the chest in front of the 4<sup>th</sup>-12<sup>th</sup> thoracic vertebrae
- It passes behind the diaphragm at the level of 12<sup>th</sup> thoracic vertebra , and through the aortic opening in the diaphragm and enters the abdominal cavity to become the abdominal aorta.

It gives branches to :

- A. the intercostal spaces.
- B. pericardial branches.
- C. Esophageal branched.
- D. Bronchial branches (to the lungs).

## 4- The Abdominal Aorta

Is the continuation of the Descending Aorta in the abdominal cavity.

### ➤ Branches of the abdominal Aorta

#### A. Three anterior visceral branches.

- 1-the celiac artery.
- 2-the superior mesenteric artery.
- 3-the inferior mesenteric artery.

#### B. three Lateral visceral branches.

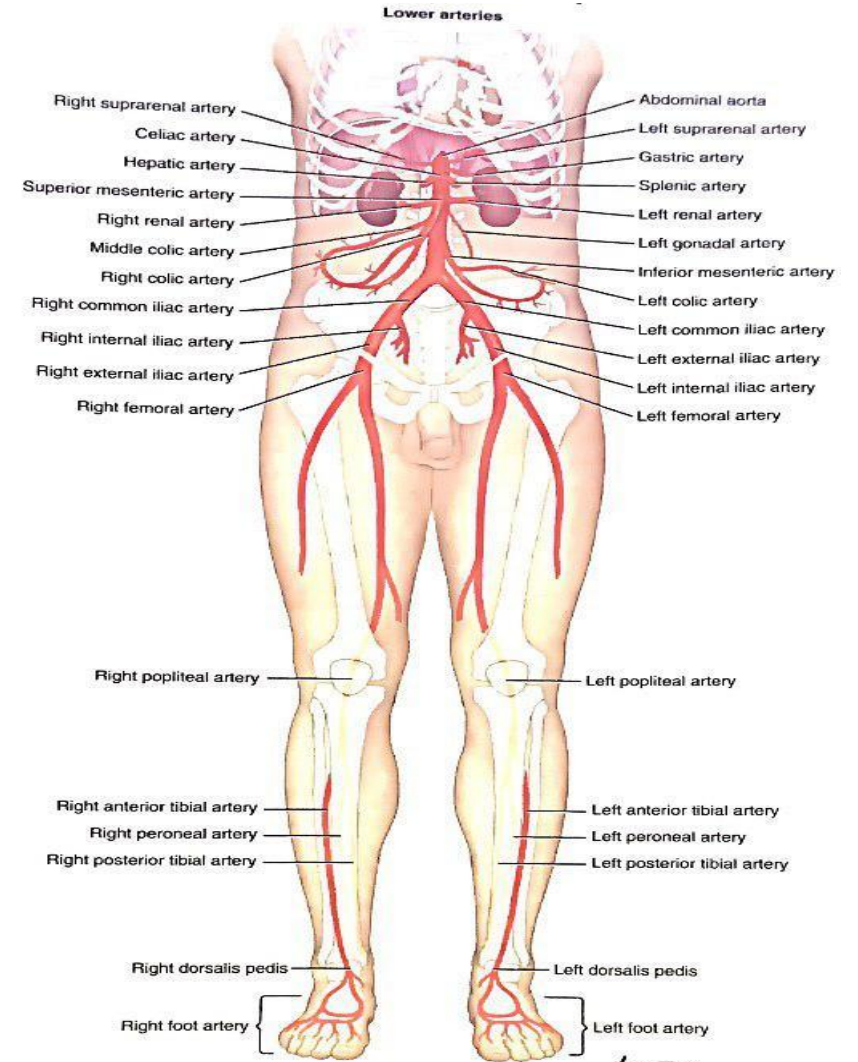
- 1-Right and left suprarenal arteries.
- 2-Right and left Renal arteries.
- 3-Right and left Testicular (ovarian) arteries.

#### C. Five lateral abdominal arteries.

- 1-Right and left phrenic arteries.
- 2—5:four right and left lumbar arteries.

#### D. Two terminal branches.

right and left common iliac arteries.



(Figure 14)

# The common Iliac Arteries .

- Bifurcation of the Abdominal aorta at the level of 4<sup>th</sup> lumbar vertebra.
- Each common Iliac artery divides into.

## 1-The Internal Iliac artery

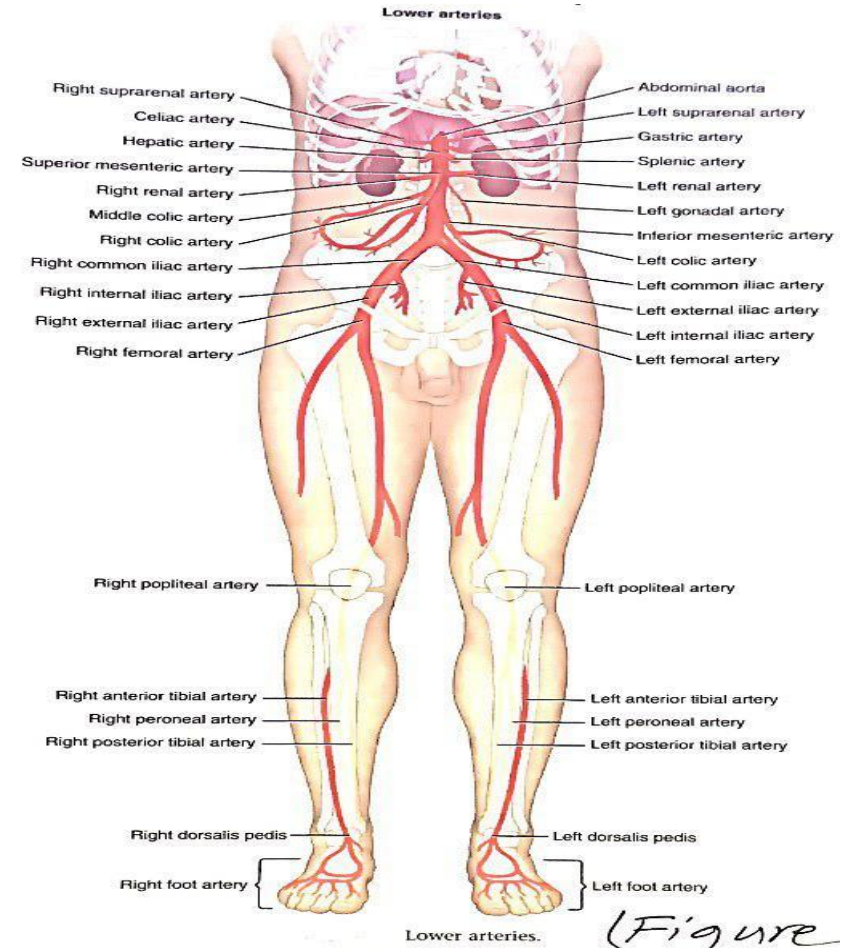
which supplies the pelvic organs and the gluteal region.

## 2-The External Iliac artery

which enters the lower limb to become the Femoral artery

which is the main artery to the lower limb .

- Continues in the popliteal fossa at the knee.
- Below the knee it divides into two branches to supply the leg and foot.

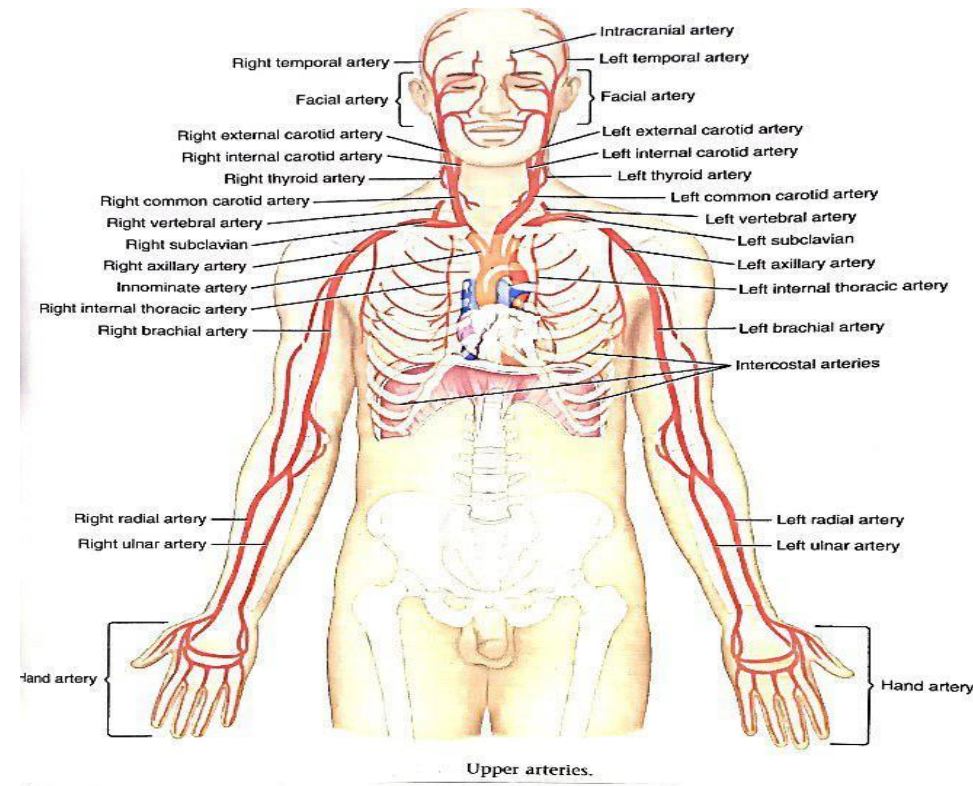


(Figure

(figure 14)

## The pulmonary Trunk.

- carries the deoxygenated blood from the right ventricle of the heart to the lung .
- it is 5 cm long .
- divides into right and left pulmonary arteries , that enter the right and left lungs respectively.



(figure 13)

# The veins

- Convey deoxygenated blood from various parts of the body to the heart (right atrium).
- convey oxygenated blood from the lungs to the heart (left atrium).

## Main Veins.

### ➤ The superior Vena cava.

Formed by the union of the right and left brachiocephalic veins.

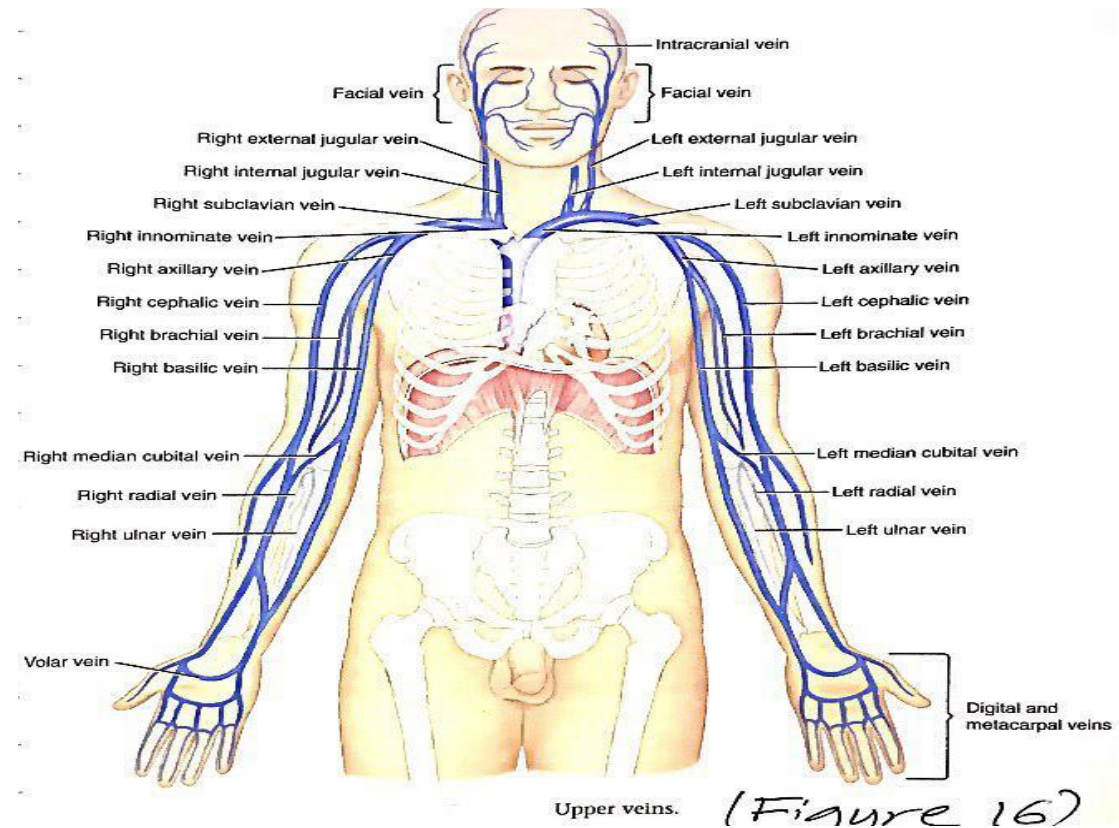
- It descends vertically to drain into the right atrium.

### ➤ The Brachiocephalic veins

- Formed by the union of the :
  1. Subclavian vein . And the
  2. Internal jugular vein.

The Subclavian vein is the continuation of the axillary vein drain the upper limb

The Internal jugular vein drain the head an neck region.



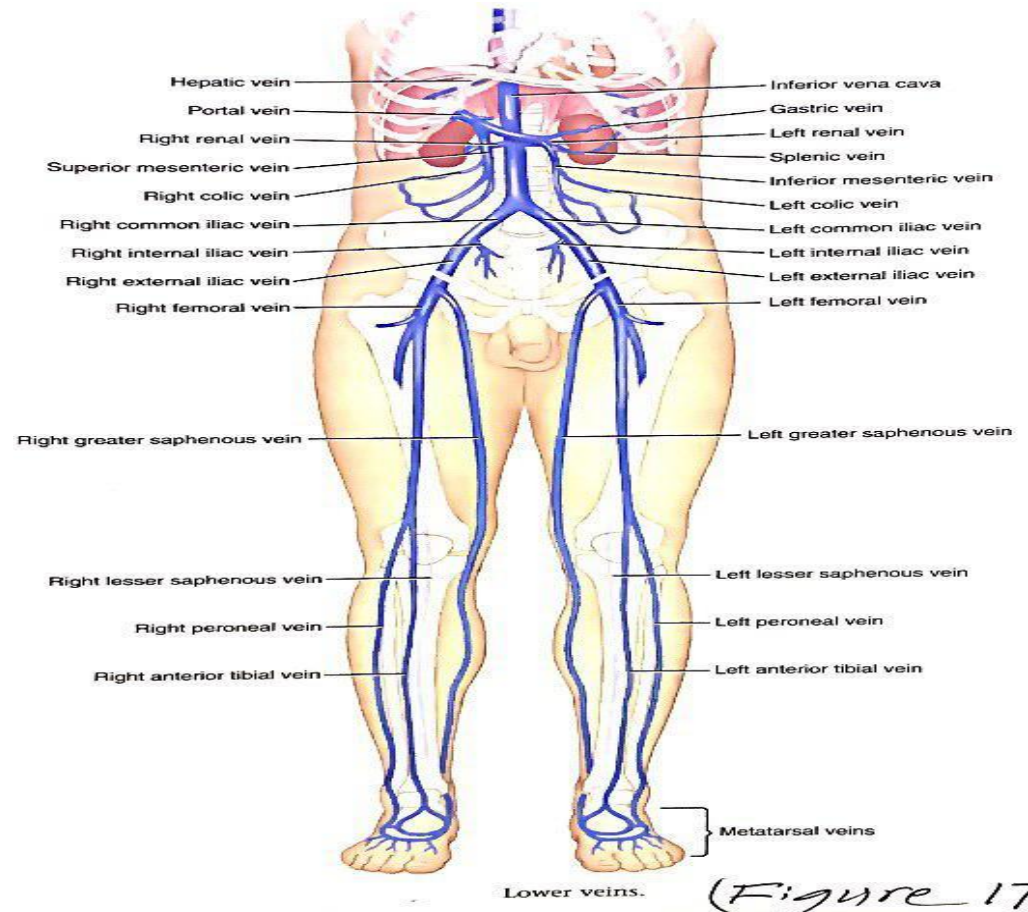
## Main Veins.

### The inferior vena cava

- is formed by the union of right and left common Iliac veins.
- It ascends upward from the abdominal cavity , and pierces the central tendon of the diaphragm to enters the chest , and drains into the right atrium of heart.

## Tributaries.

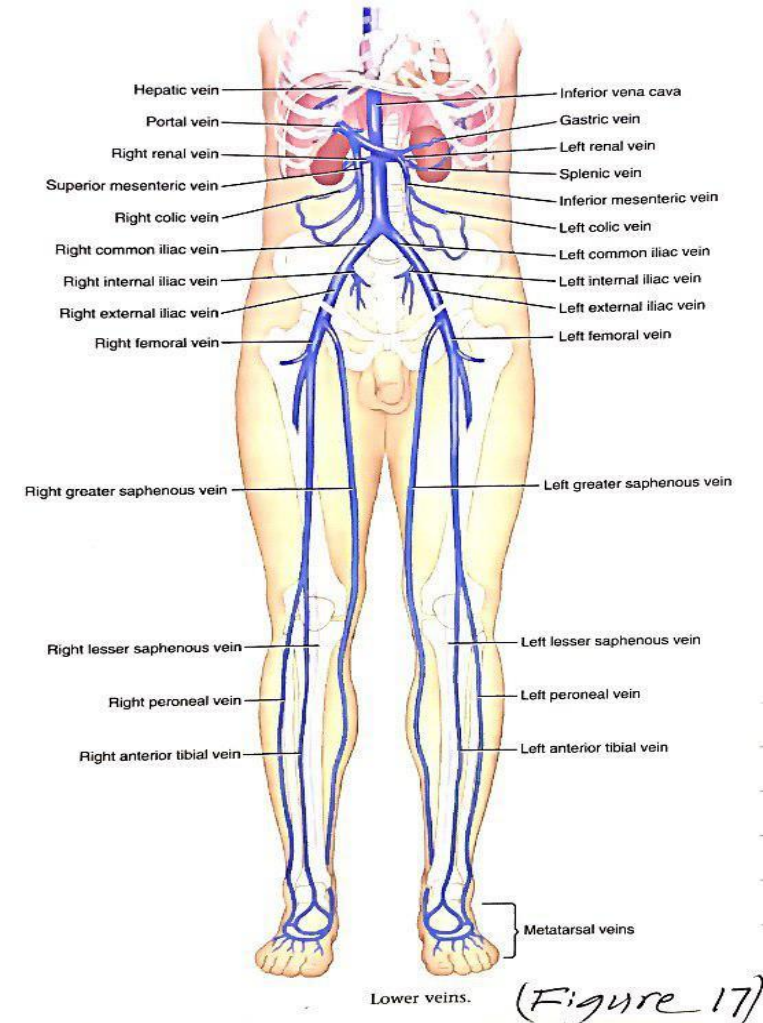
1. Right suprarenal vein.
2. Right and left renal veins.
3. Right testicular (ovarian) veins.
4. four lumbar veins.
5. Hepatic veins ( from the liver )



# The common Iliac vein

Is formed by the union of the external and internal iliac veins.

- ❖ The external iliac vein is the continuation of the femoral vein which drains lower limbs .
- ❖ The internal iliac vein drains the organs of the pelvis .

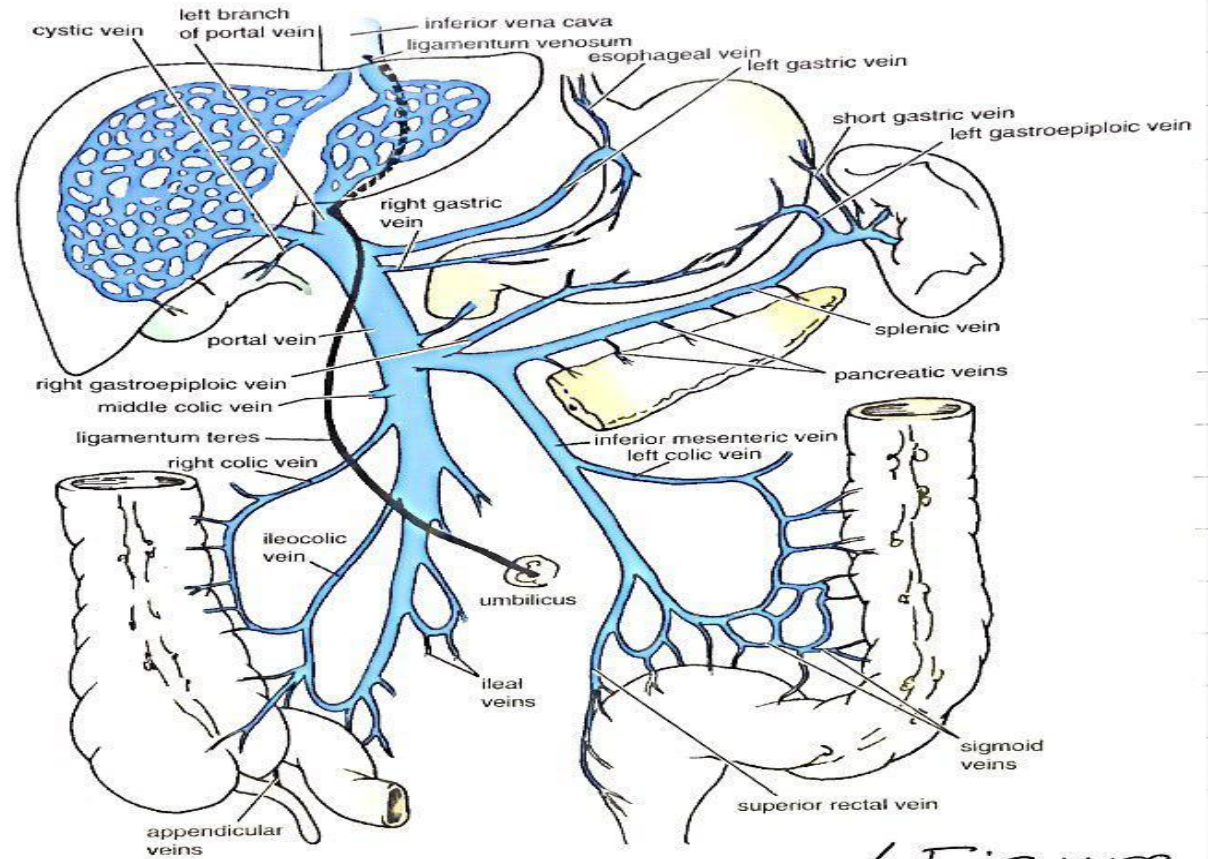




# The portal venous system

It is the venous drainage of the spleen , pancreas , gallbladder , and the abdominal part of the alimentary tract (except the inferior part of the rectum ).

The venous blood is drained from these structures to the liver.



Tributaries of the portal vein. (Figure

(figure 18)

## ➤ The portal vein

- Is 5cm long
- Is the final common pathway for the venous blood of:
  1. The lower 1/3 of the esophagus
  2. Gastrointestinal tract down to the inferior part of the rectum
  3. The spleen
  4. The pancreas
  5. The gallbladder

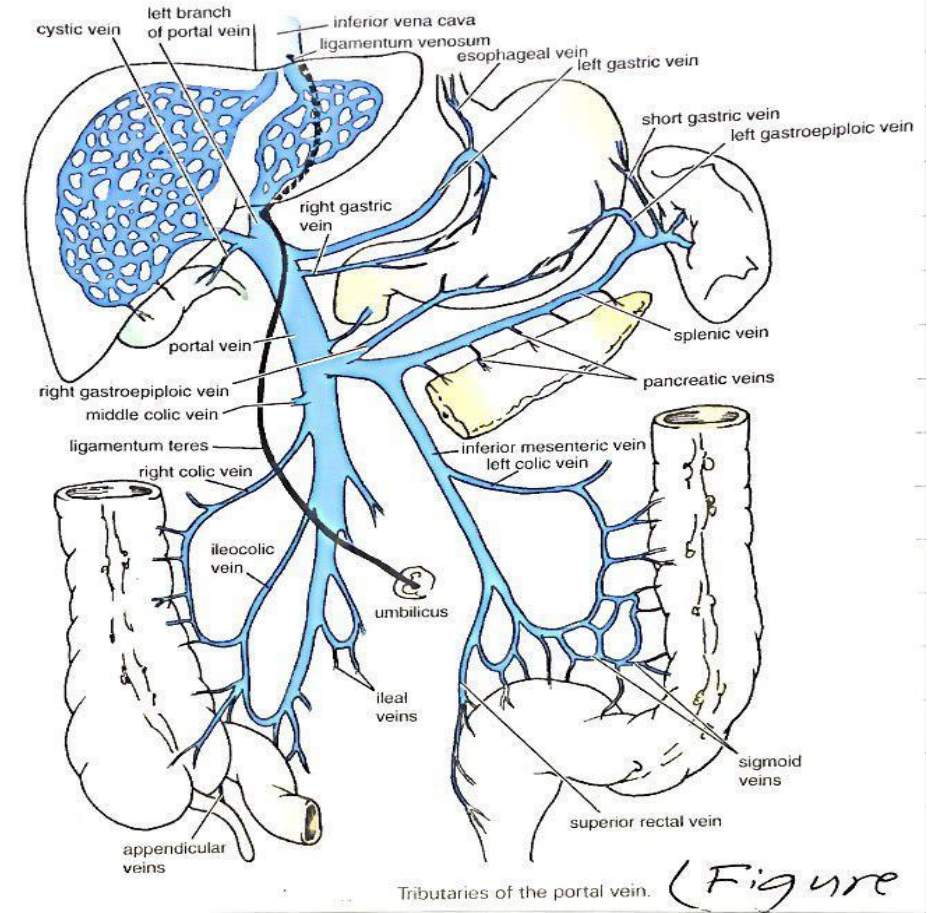
### ➤ The portal vein is formed by the union of the:

1. The splenic vein
2. The superior mesenteric vein

- Posterior to the neck of the pancreas.
- Ascending upward posterior to the duodenum
- It enters the liver at the porta hepatis

### ➤ Tributaries to the portal veins

1. Right and left gastric veins ; draining the stomach and abdominal esophagus
2. The inferior mesenteric vein (which joins the splenic veins)
3. Cystic veins from the gallbladder
4. Pancreatic veins (join the splenic vein )



# The lymphatic vascular systems .

Lymphatic system consists of :

## 1. Lymphatic tissue

Which is concerned essentially with the immunological defence mechanism .

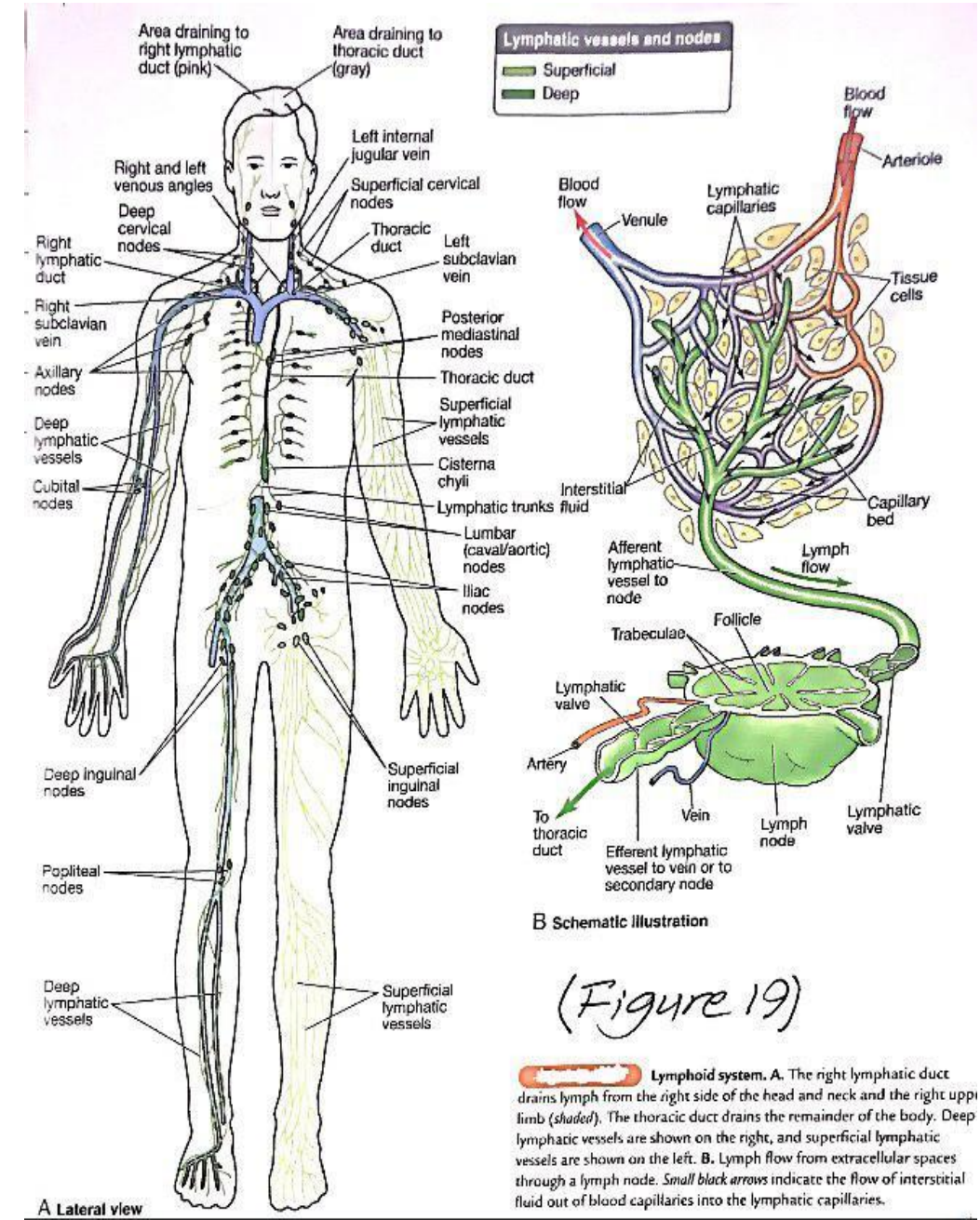
- And is represented by lymphatic organs: such as spleen ,thymus , lymph nodes ,tonsils and other lymphoid tissues in the respiratory and digestive system.

## 2. Lymphatic vessels .

(Lymphatic vascular system).

Lymphatic vessels form an extensive and complex network of channels.

- which begins as “porous “blind-ended lymphatic capillaries in the interstitial spaces in the tissues of the body.
- converge to form a number of larger vessels , which ultimately connect with large veins in the neck.



(Figure 19)

**Lymphoid system.** A. The right lymphatic duct drains lymph from the right side of the head and neck and the right upper limb (shaded). The thoracic duct drains the remainder of the body. Deep lymphatic vessels are shown on the right, and superficial lymphatic vessels are shown on the left. B. Lymph flow from extracellular spaces through a lymph node. Small black arrows indicate the flow of interstitial fluid out of blood capillaries into the lymphatic capillaries.

## Functions of the lymphatics :

1. collect fluid from the vascular capillary beds , during the nutrient exchange processes and deliver it back to venous side of the vascular system.
  2. carry other materials that are included in the interstitial fluid such as:
    - a) pathogens.
    - b) cells of lymphatic system  
(because lymphatics on their way to the venous system , must at least, pass into one or more lymph node )
    - c) cell products (such as hormones)
    - d) cell debris .
- The lymph : is the clear and colorless fluid in the lymphatic's .
  - The flow in lymphatic's is unidirectional.



# Cardiovascular System

***THANKS***