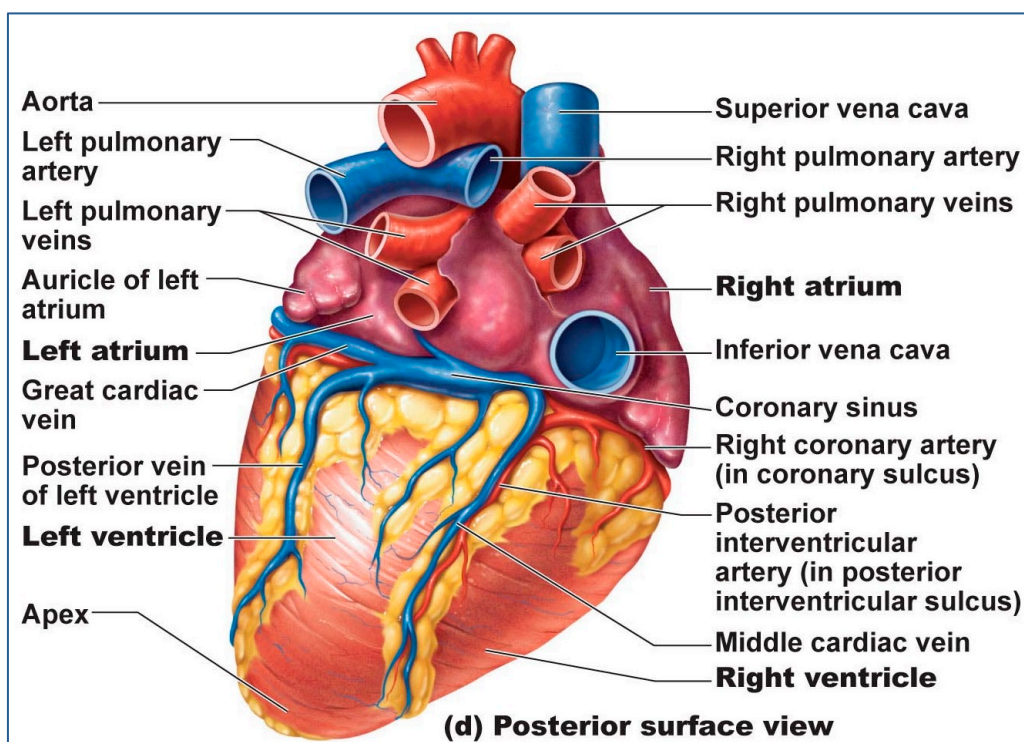
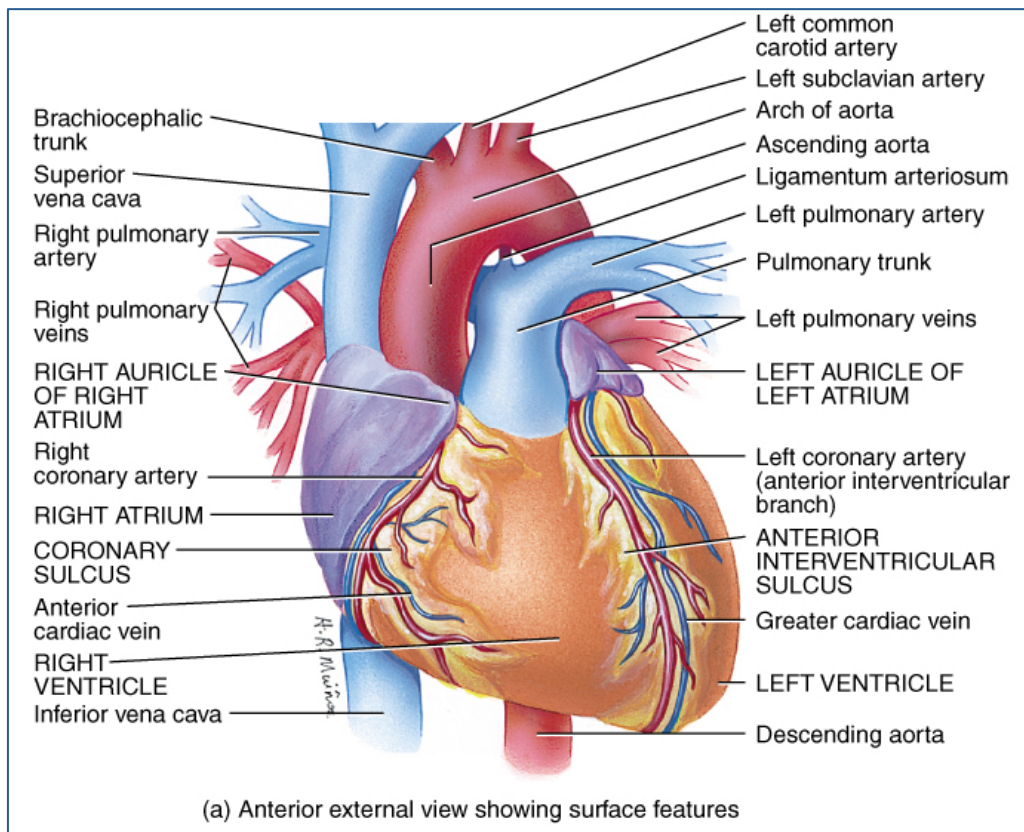


The heart:

It lies in the middle mediastinum, surrounded by a fibroserous sac called pericardium, which is differentiated into:

- Outer fibrous layer (Fibrous pericardium).
- Inner serous sac (Serous pericardium).



The Arteries:

Arteries carry blood from the heart to the body.

All arteries carry oxygenated blood, **EXCEPT** the PULMONARY ARTERY, which carry deoxygenated blood to the lungs.

General Principles Of Arteries

- The flow of blood depends on the pumping action of the heart.
- Arteries have an ELASTIC WALL containing NO VALVES.
- The branches of arteries supplying adjacent areas normally **ANASTOMOSE** with one another freely providing backup routes for blood to flow if one artery is blocked, e.g. *arteries of limbs*.
- The arteries whose terminal branches do not anastomose with branches of adjacent arteries are called "END ARTERIES". They are of two types:
 - Anatomic (True) End Artery:
When NO anastomosis exists, e.g. *artery of the retina*.
 - Functional End Artery:
When an anastomosis exists but is incapable of providing a sufficient supply of blood, e.g. *splenic artery, renal artery*.

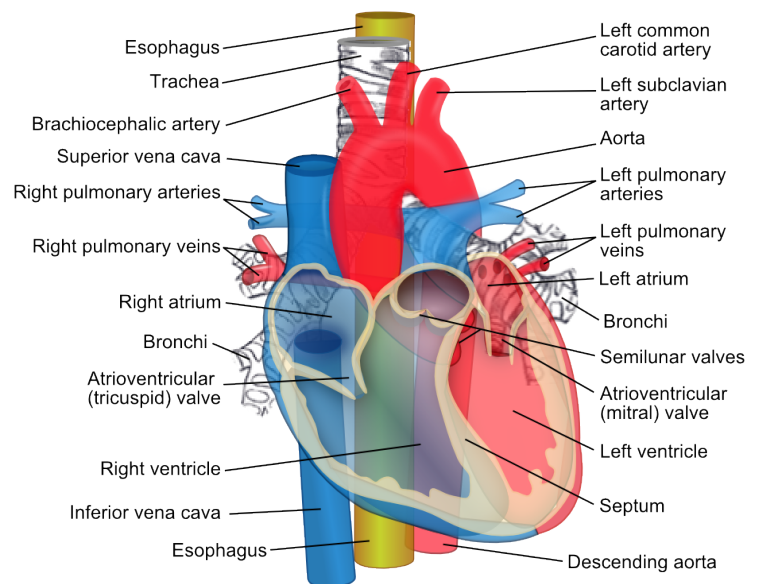
Veins:

Veins are blood vessels that bring blood back to the heart.

All veins carry deoxygenated blood with the exception of the **pulmonary veins** and **umbilical veins**.

There are two types of veins:

- Superficial veins: close to the surface of the body & NO corresponding arteries
- Deep veins: found deeper in the body & With corresponding arteries
- Veins of the systemic circulation:
 - Superior and inferior vena cava with their tributaries
- Veins of the portal circulation: Portal vein



The Heart is somewhat pyramidal in shape, having:

1. Apex:

Directed downwards, forwards and to the left, it's formed by the **left ventricle**.

Lies at the level of **left 5th intercostal space** 3.5 inch from midline.

Note: the base of the heart is called the base because the heart is pyramid shaped; the base lies opposite the apex. The heart rests on its diaphragmatic (inferior) surface.

2. Sterno-costal (anterior surface):

Formed **mainly** by the **right atrium** and the **right ventricle**, and it's divided by coronary (atrio-ventricular) groove into:

- Atrial part: formed mainly by right atrium.
- Ventricular part:

The right 2/3 is formed by right ventricle, while the left 1/3 is formed by left ventricle.

The 2 ventricles are separated by anterior interventricular groove, which lodges:

- **Anterior interventricular artery (branch of left coronary).**
- **Great cardiac vein.**
- The coronary groove lodges the right coronary artery.

3. Base (posterior surface):

Formed by the 2 atria, mainly left atrium, into which open the 4 pulmonary veins. It is directed backwards. And Lies opposite middle thoracic vertebrae (5-7)

Is separated from the vertebral column by:

- Descending aorta.
- Esophagus
- Oblique sinus of pericardium

Bounded inferiorly by post part of coronary sulcus, which lodges the coronary sinus.

4. Diaphragmatic (inferior surface):

Formed by the 2-ventricles, mainly left ventricle (left 2/3).

Slightly concave as it rests on diaphragm. Directed inferiorly & backward.

Separated from base of heart by posterior part of coronary sulcus

The 2-ventricles are separated by posterior interventricular groove, which lodges:

- Posterior interventricular artery
- Middle cardiac vein

Borders of the Heart:

Upper border: Is formed by the 2 atria. It is concealed by ascending aorta & pulmonary trunk.

Right border: Is formed by right atrium

Lower border: Is formed mainly by right ventricle + apical part of left ventricle.

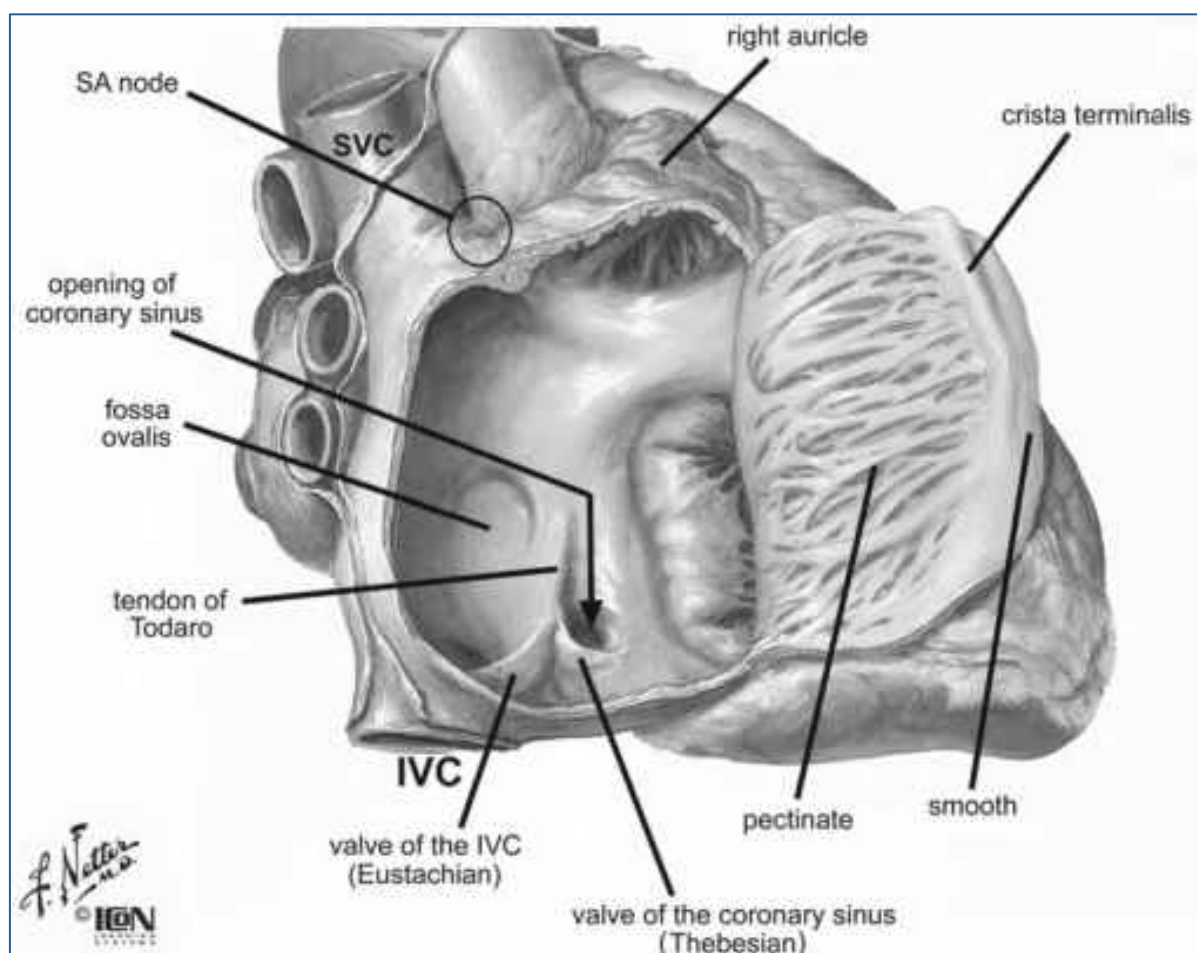
Left border: Is formed mainly by left ventricle + auricle of left atrium.

Chambers of the heart:

The heart is divided by vertical septa into four chambers: the right and left atria and the right and left ventricles. The right atrium lies anterior to the left atrium, and the right ventricle lies anterior to the left ventricle.

Right Atrium:

- Consists of a **main cavity** and a small out pouching, the **auricle**.
- **On the outside** of the heart at the junction **between** the **right atrium** and the **right auricle** is a vertical groove, the **sulcus terminalis**, which **on the inside** forms a ridge, the **crista terminalis**.



Cavity of Right Atrium:

- Crista terminalis divides right atrium into:

1- Anterior part: rough and trabeculated by bundles of muscle fibers (**musculi pectinati**).

2- Posterior part (sinus venarum) is smooth.

- The interatrial septum carries an oval depression called *Fossa ovalis*. The margin of this depression is called *Anulus ovalis*.

- The blood leaves right atrium to right ventricle via **tricuspid valve**.

Openings in right atrium:

➤ SVC has no valve but IVC is guarded by a valve.

➤ Coronary sinus: has a well-defined valve.

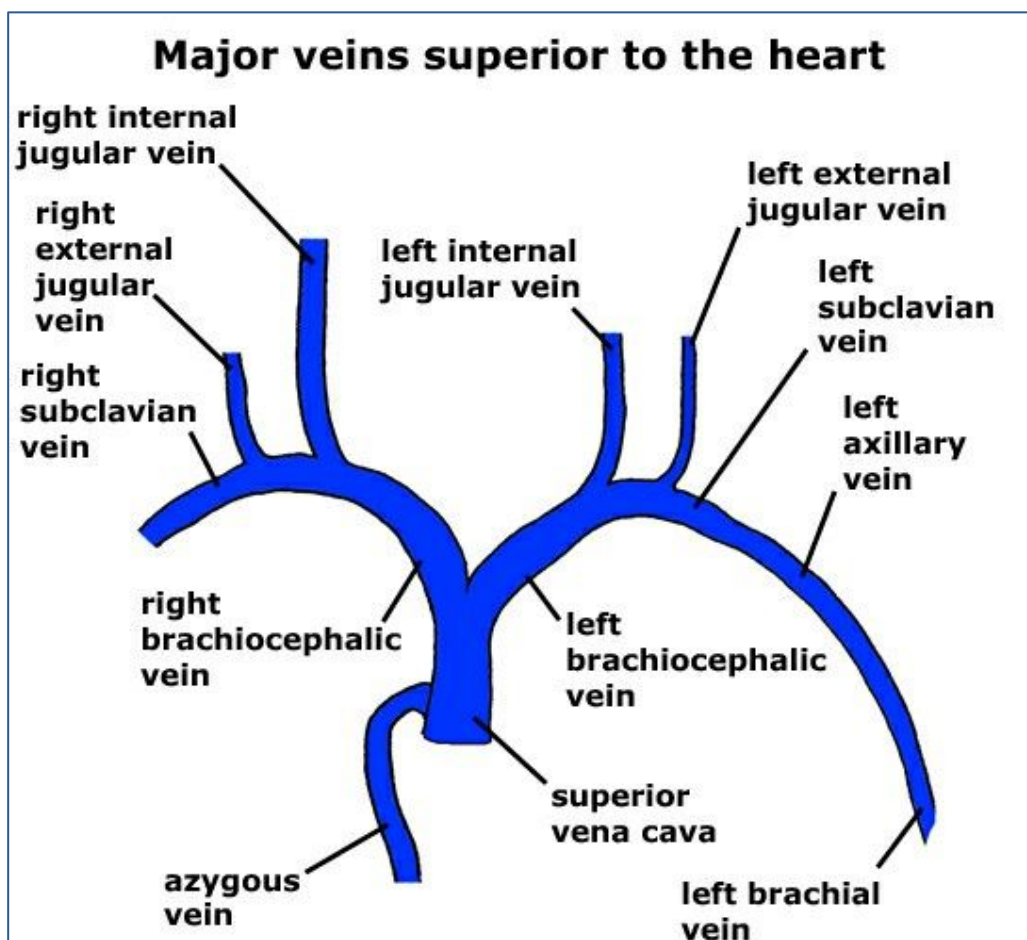
➤ Right atrioventricular orifice lies anterior to IVC opening; it is surrounded by a fibrous ring which gives attachment to the **tricuspid valve**.

➤ Small orifices of small veins.

➤ **Superior Vena Cava:** Formed by the union of the right and left Brachiocephalic veins.

***Brachiocephalic veins** are formed by the union of **internal jugular and subclavian veins**.

- **Drains venous blood from:** Head, neck, thoracic wall and upper limbs
- It **Passes downward** and enters the right atrium.
- Receives **azygos vein on the posterior aspect** just before it enters the heart.



SVC has two divisions:

➤ Superficial Veins

1) External Jugular veins:

- Lies superficial to the sternomastoid muscle
- It passes down the neck and it is the only tributary of the subclavian vein.
- It drains blood from:
 - ❖ Outside of the skull.
 - ❖ Deep parts of the face.

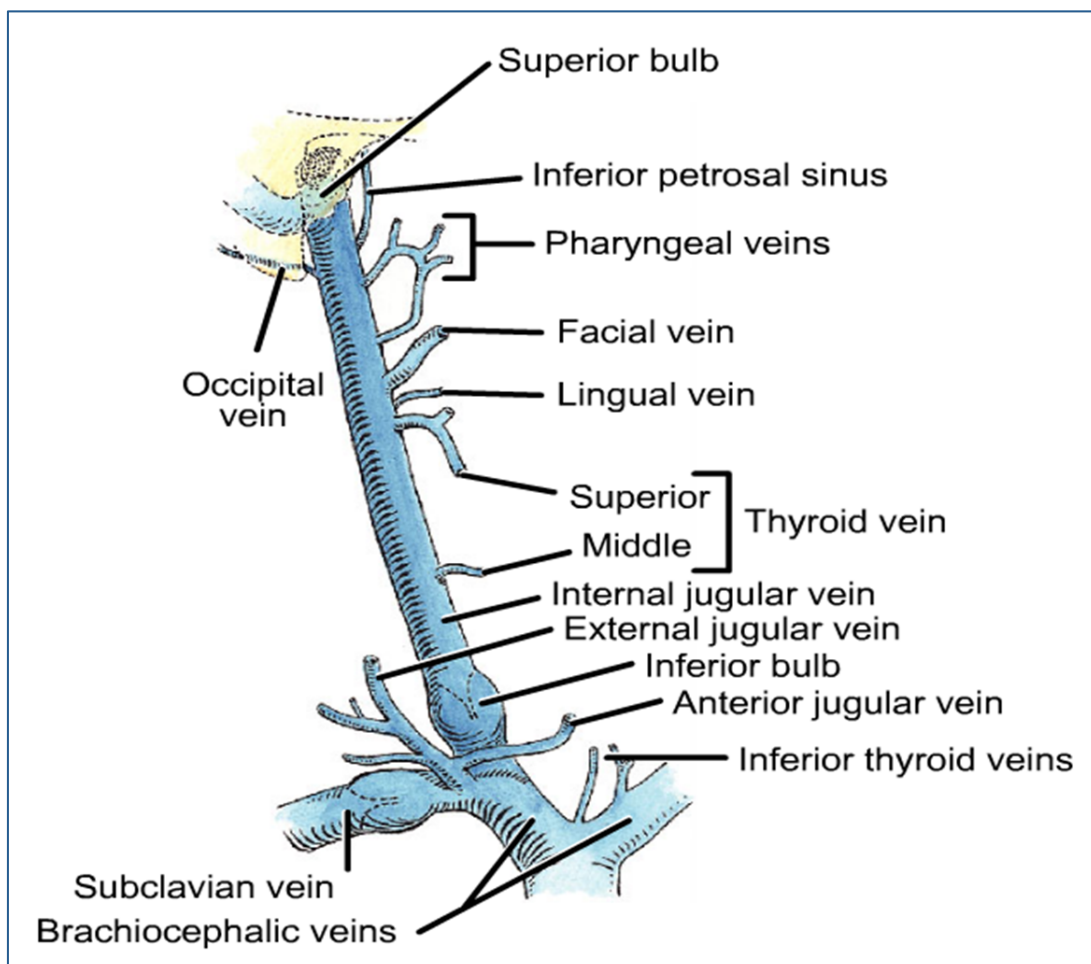
2) Anterior jugular veins:

- It begins in the upper part of the neck by the union of the submental veins.
- It descends close to the median line of the neck, medial to the sternomastoid muscle.
- At the lower part of the neck, it passes laterally beneath that muscle to drain into the external jugular vein.
- Just above the sternum the two anterior jugular veins communicate by a **transverse vein to form the jugular arch.**

➤ Deep Veins

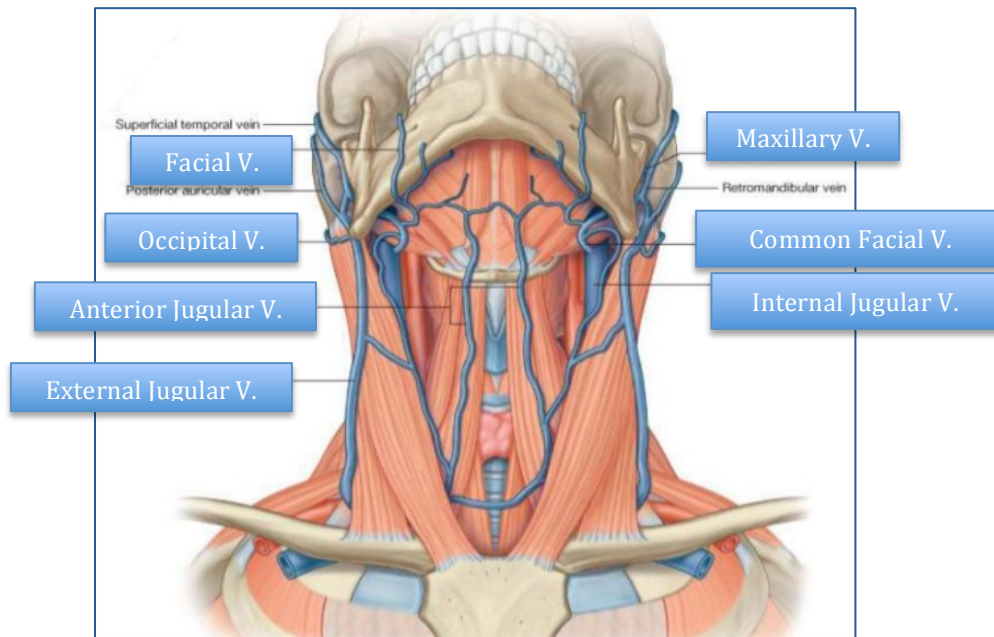
3) Internal Jugulars veins:

- **Drains** blood from the brain, face, head & neck.
- **It descends in the neck along with** the **internal** and **common carotid** arteries and **vagus nerve**, within the **carotid sheath.**
- **Joins** the **subclavian vein** to form the **brachiocephalic vein.**



Tributaries of SVC:

Superior thyroid – **Lingual** – **Facial** - **Pharyngeal**- Occipital veins - **Dural venous sinuses** (inferior petrosal sinus).



➤ **Inferior Vena Cava:**

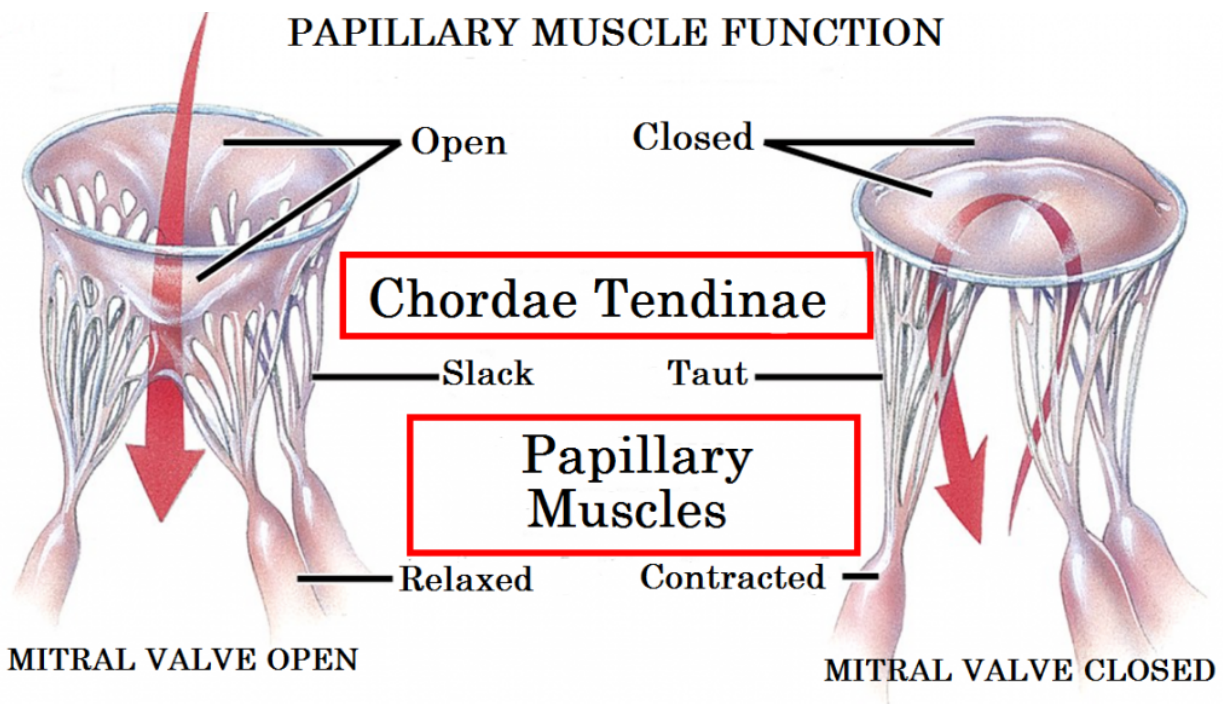
- **Drains** most of the **blood** from the body below the diaphragm to the **right atrium**.
- **Formed by the union of the 2 common iliac veins behind** the right common iliac artery **at the level of the 5th lumbar vertebra**.
- **Ascends** on the **right side** of the **aorta**
- **Pierces** the central tendon of **diaphragm** at the **level of the 8th thoracic vertebra**.

Tributaries of Inferior Vena Cava:

- ❖ Two common iliac veins
- ❖ Median sacral vein
- ❖ Four paired lumbar veins
- ❖ Right gonadal vein (the left vein drains into the left renal vein)
- ❖ Paired renal veins
- ❖ Right suprarenal vein (the left vein drains into the left renal vein)
- ❖ Hepatic veins
- ❖ Paired inferior phrenic vein

Cavity of right ventricle:

- **Its wall** is **thinner** than that of left ventricle
- **Its wall** contains projections called ***trabeculae carnae***.
- **The right ventricle communicates with right atrium** through:
 - **Right atrioventricular orifice**
 - **Pulmonary trunk through pulmonary orifice.**
- As **the cavity** approaches the pulmonary orifice it **becomes funnel shaped**, at which point it is referred to as the **infundibulum**.
- Large projections arise from the walls called ***papillary muscles*** :
 - ***Anterior papillary muscle***
 - ***Posterior papillary muscle***
 - ***Septal papillary muscle***
- Each papillary muscle is attached to the cusps of tricuspid valve by tendinous threads called ***chordae tendinae***.



- **Blood** leaves the right ventricle to pulmonary trunk through pulmonary orifice.
- The wall of infundibulum (***conus arteriosus***) is smooth and contains no trabeculae.
- **Interventricular septum** is connected to anterior papillary muscle by a muscular band called moderator band

Right atrio-ventricular (tricuspid) orifice:

- About one inch wide, admitting tips of 3 fingers.
- It is guarded by a fibrous ring which gives attachment to the cusps of tricuspid valve.
- It has 3-cusps (anterior-posterior-septal or medial).
- The atrial surface of the cusps are smooth, while their ventricular surfaces give attachment to the chordae tendinae.

Pulmonary orifice:

- Surrounded by a fibrous ring which gives attachment to the **cusps of the pulmonary valve**.
- The valve is formed of **3 semilunar cusps: 2 anterior and one posterior** which are concave superiorly and convex inferiorly.
- **No chordae tendineae or papillary muscles** are attached to these cusps

Left atrium of the heart:

- The left atrium communicates with the left ventricle through the left atrioventricular orifice.
- It forms the greater part of base of heart.
- Its wall is smooth except for small musculi pectinati in the left auricle.
- Receives 4 pulmonary veins which have no valves.
- Sends blood to left ventricle through the left atrioventricular orifice which is guarded by mitral valve (Bicuspid valve).

Left ventricle:

- Its wall is thicker than that of right ventricle.
- It receives blood from left atrium through left atrio-ventricular orifice which is guarded by mitral valve (bicuspid)
- Its wall contains **trabeculae carnae**.
- Its wall contains 2 large papillary muscles (anterior & posterior). They are attached by **chordae tendinae** to cusps of mitral valve.
- The blood leaves the left ventricle to the ascending aorta through the aortic orifice.
- The part of left ventricle leading to ascending aorta is called aortic vestibule
- The wall of this part is fibrous and smooth.

Left atrio-ventricular (mitral) orifice:

- Smaller than the right, admitting only tips of 2 fingers.
- Guarded by a mitral valve.
- Surrounded by a fibrous ring which gives attachment to the cusps of mitral valve.
- Mitral valve is composed of 2 cusps:
 - **Anterior cusp: lies anteriorly and to right.**
 - **Posterior cusp: lies posteriorly and to left.**
- The atrial surfaces of the cusps are smooth, while ventricular surfaces give attachment to chordae tendinae.

Aortic orifice:

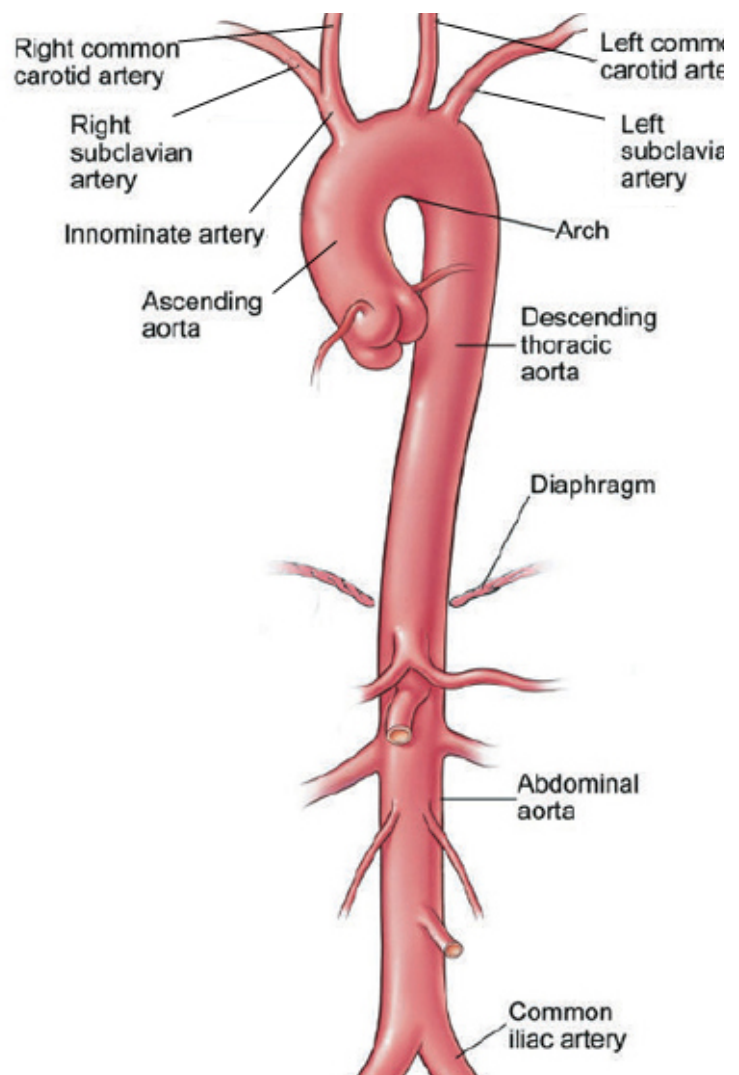
- Surrounded by a **fibrous ring, which** gives attachment to the **cusps of aortic valve**.
- **Aortic valve** is formed of **3 semilunar cusps**, which are similar to those of pulmonary valve, but the position of the cusps differs being **one anterior and 2 posterior**.

AORTA:

- The **largest** artery in the body
- Carries oxygenated blood to all parts of the body
- Is divided into 4 parts:

1. Ascending aorta:

- **Originates from left ventricle.**
- Continues as the **arch of aorta**
- Has three dilatations at its base, called **aortic sinuses**
- **Branches:**
 - **Right & Left coronary arteries (supplying heart)**, arise from aortic sinuses
 - **They are distributed over the cardiac surface, within the subepicardium connective tissue.**
 - **They arise from the initial part of the Ascending Aorta (Aortic Sinuses), immediately above the aortic valve.**



Right:

- ❑ Arises from the anterior aortic sinus of the ascending aorta.
- ❑ Descends in the right atrioventricular groove *between the Right Auricle and the Pulmonary trunk*.
- ❑ At the inferior border of the heart it continues posteriorly to anastomose with the left coronary.
- ❑ (RCA) Supplies:
 - Right atrium,
 - Right ventricle,
 - Part of Left Atrium,
 - Left ventricle & atrioventricular septum.
 - Most of conducting system

Branches:

→ Right Conus;

For infundibulum and upper part of anterior wall of the right ventricle.

→ Anterior ventricular branches;

2-3 branches supply anterior surface of the right ventricle.

→ Marginal artery

- Is the largest branch, runs along the lower margin of the sternocostal surface.
- It is accompanied by the Small Cardiac vein.

→ Atrial branches;

- Supply anterior and lateral surfaces of the right atrium
- One branch supplies posterior surface of both atria

→ Artery of the Sinuatrial Node

- Supplies the SAN and both atria
- In 35% it arises from the left coronary.

→ Posterior ventricular branches;

About 2 supply the diaphragmatic surface of the right ventricle.

→ Posterior Interventricular artery;(accompanied by Middle Cardiac vein)

Lies in the posterior interventricular groove, it supplies the Right and Left Ventricles, including their inferior wall, posterior part of ventricular septum, **Not the Apical part,**

Left:

- ❑ The Larger of the two coronaries.
- ❑ Arises from the left posterior aortic sinus of the ascending aorta.
- ❑ Descends:
 1. Between the pulmonary trunk and the left auricle.
 2. In the IV groove to the apex of the heart.

Divides into two terminal branches:

Anterior Interventricular & Circumflex arteries.

Branches

○ Anterior Interventricular

- Descends in the anterior interventricular groove to the apex of the heart (accompanied by the Great cardiac vein)
- In most individuals it passes around the apex to anastomose with terminal branches of the right coronary, in 1\3 it ends at the apex) It supplies the right and left ventricles and anterior part of ventricular septum
- It gives:
 1. Left conus artery for pulmonary conus.
 2. Anterior ventricular and Posterior ventricular;
Supply left ventricle
 3. Atrial branches:
Supply greater part of left atrium
 4. Left diagonal artery:
One of the ventricular branches or may arises from left coronary,

○ Circumflex Artery;

Winds around the left margin of the heart in the atrioventricular groove

○ C. Left Marginal artery:

Supplies the left margin of the left ventricle down to the apex

Variations of the Coronary Arteries:

▪ Right Dominance:

In (90 %) of population, the Posterior Interventricular artery is a branch of the Right Coronary.

▪ Left Dominance:

In the rest (10%), the Posterior Interventricular artery arises from the Circumflex branch of the Left Coronary Artery.

Coronary Anastomosis:

- In MOST of people, the terminal branches of the right and left coronaries anastomose in [the posterior part of the IV groove.](#)
- However this anastomoses is not large enough to provide adequate blood supply in case of coronary occlusion, (Functional End arteries).

Arterial Supply of Conducting System:

- SAN, AVN & AVB are usually supplied by Right coronary.
- Right Bundle Branch (RBB) of (AVB) is supplied by Left coronary
- LBB of (AVB) is supplied by both Right and Left coronaries

Coronary Sinus:

- Drains most of the Venous Blood of the heart.
- It lies in the Posterior part of the AV groove.
- **Origin:** [It is the direct continuation of the Great Cardiac Vein.](#)
- **Tributaries:**

(3) Cardiac Veins:

- A. [Great.](#)
- B. [Middle.](#)
- C. [Small.](#)

- Oblique vein of left atrium (vein of Marshall).
- **Termination:**
 - *It empties into Right Atrium.*
 - **Its opening is inferior & to the left of the IVC opening.**
 - **It is guarded by a valve.**

Veins Draining outside Coronary Sinus:

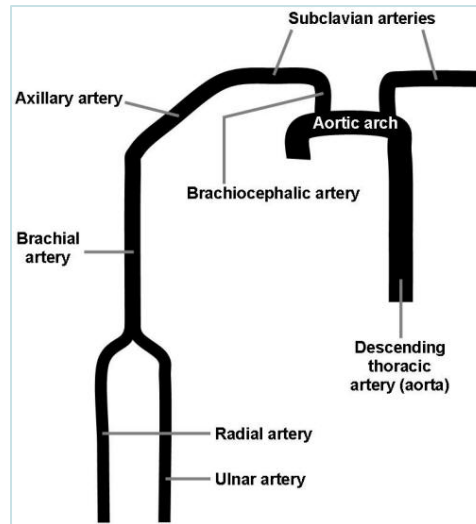
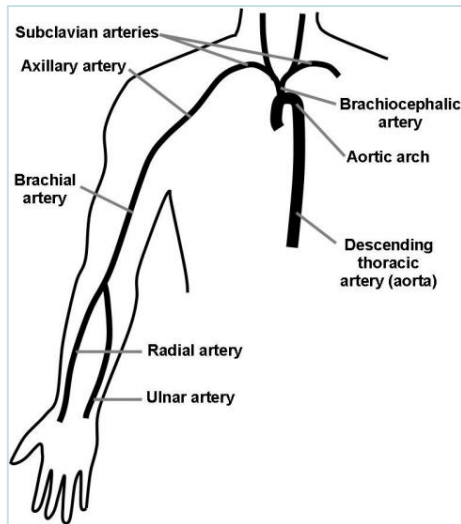
1. Anterior cardiac veins:
 - a. [Open directly into the Right Atrium.](#)
2. Venae Cordis minime (small cardiac veins):
 - b. [Open into the heart chambers.](#)

Arch of aorta:

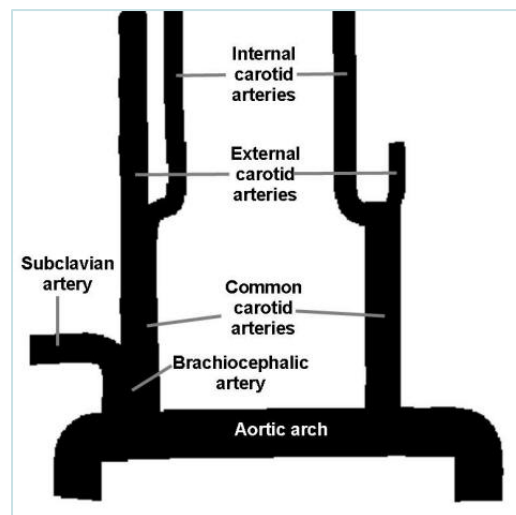
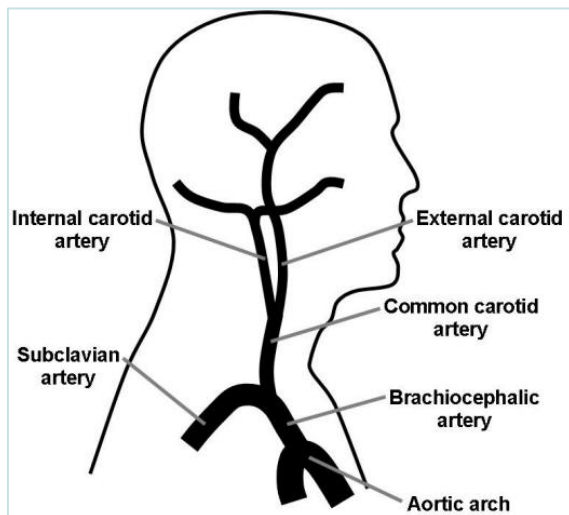
- Continuation of the ascending aorta. Leads to descending aorta.
- Located behind the lower part of manubrium sterni and on the left side of trachea.

• **Branches:**

→ **Brachiocephalic trunk.**



→ **Left common carotid artery:** divides into two branches:



➤ **Internal carotid:**

- Has **NO** branches in the neck
- Enters the cranial cavity, joins the **basilar artery** (formed by the union of two vertebral arteries) and forms '**arterial circle of Willis**' to supply **brain**.
- In addition, it supplies the **Nose, Scalp, Eye**.

➤ **External carotid:**

- It divides **behind neck of mandible** into: **Superficial temporal & maxillary arteries**
- It supplies:
 - **Scalp:** Superficial temporal, occipital, & posterior auricular arteries
 - **Face:** Facial artery
 - **Maxilla & mandible:** Maxillary artery
 - **Tongue:** Lingual artery
 - **Pharynx:** ascending pharyngeal artery
 - **Thyroid gland:** Superior thyroid artery

*** brachiocephalic trunk gives the right common carotid artery**

→ **Left subclavian artery:**

- **Origin:**
 - LEFT:** from **arch of aorta**
 - RIGHT:** from **brachiocephalic trunk**
- It continues, at lateral border of first rib, as **axillary artery: artery of upper limb**
- **Main branches:**
 - **Vertebral artery:** supplies **brain & spinal cord**
 - **Internal thoracic artery:** supplies **thoracic wall**

Descending thoracic aorta:

It is the **continuation of aortic arch**. At the level of the **12th thoracic vertebra**, it passes through the diaphragm and continues as the **abdominal aorta**

- **Branches:**
 - **Pericardial**
 - **Esophageal**
 - **Bronchial**
 - **Posterior intercostal**

Abdominal aorta:

It enters the abdomen through the **aortic opening of diaphragm**. At the level of lower border of L4, it divides into **two common iliac arteries**.

- **Main branches of abdominal aorta:** divided into two groups:
 - a. Single branches **supplying gastrointestinal tract**.
 - b. Paired branches

Branches of common iliac artery:

- **External Iliac Artery:**

Continues (at midpoint of inguinal ligament) as **femoral artery** the main supply for **lower limb**

→ **Femoral Artery**

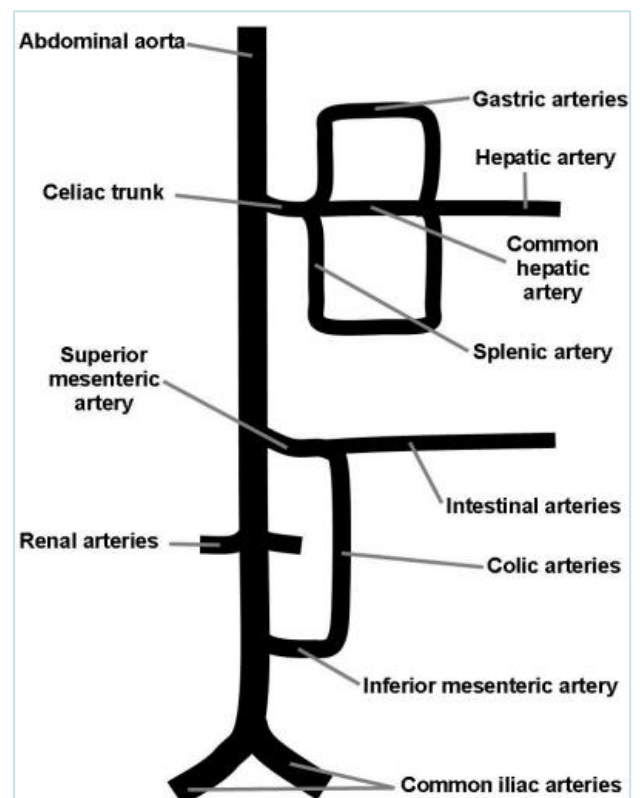
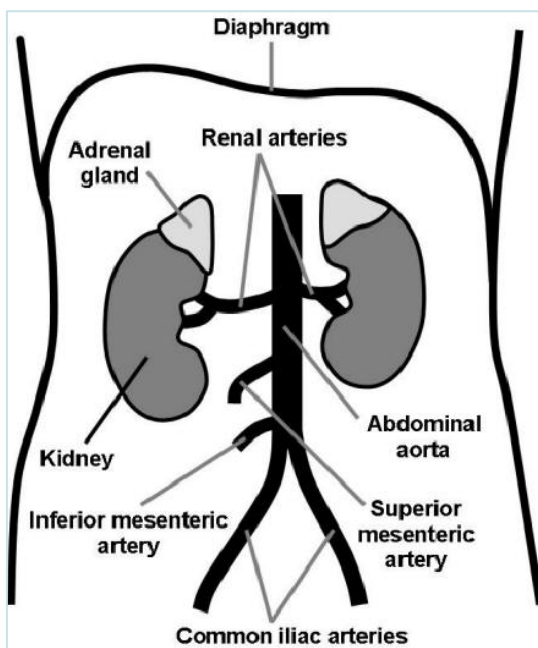
- Is the main arterial supply to lower limb
- Is the continuation of external iliac artery **behind the midpoint of the inguinal ligament**
- Passes **through adductor hiatus** and continues as:

→ **Popliteal Artery**

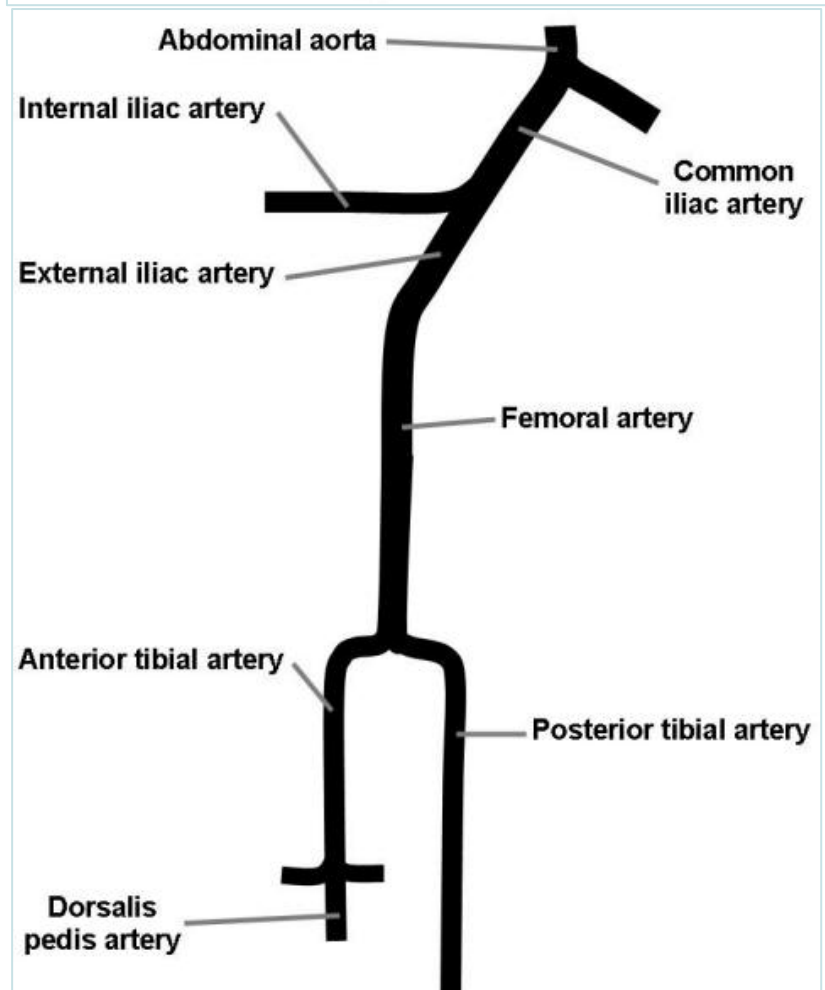
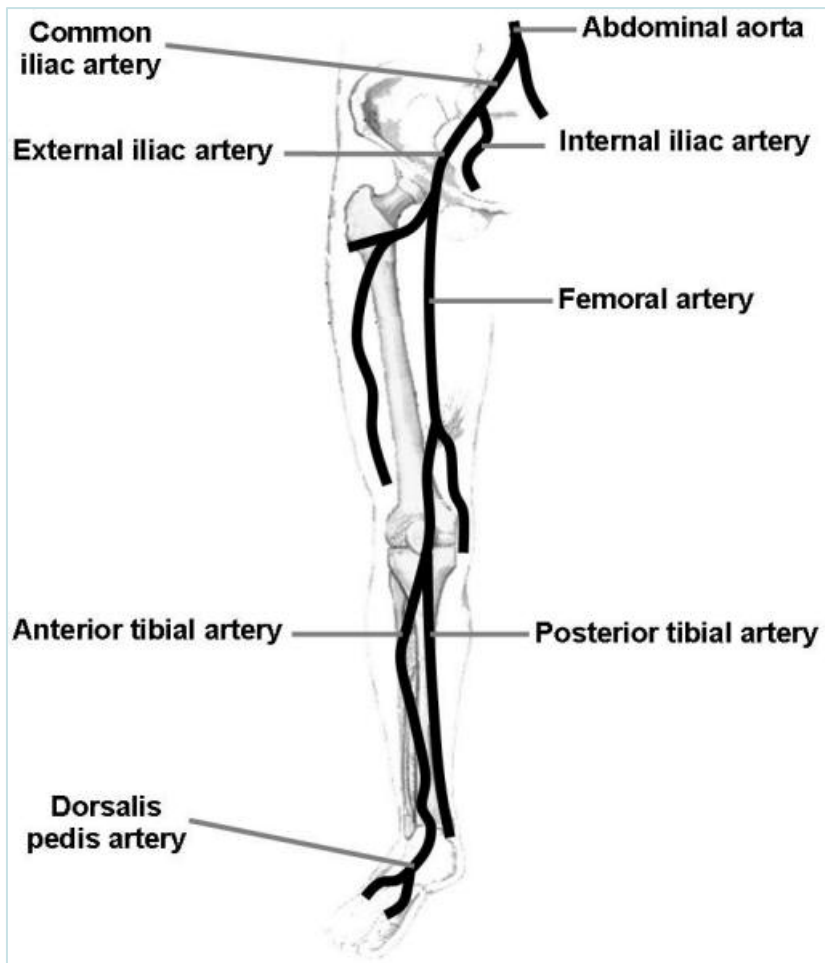
- Deeply placed in the **popliteal fossa**.
- Divides, at **lower end of popliteal fossa** into:

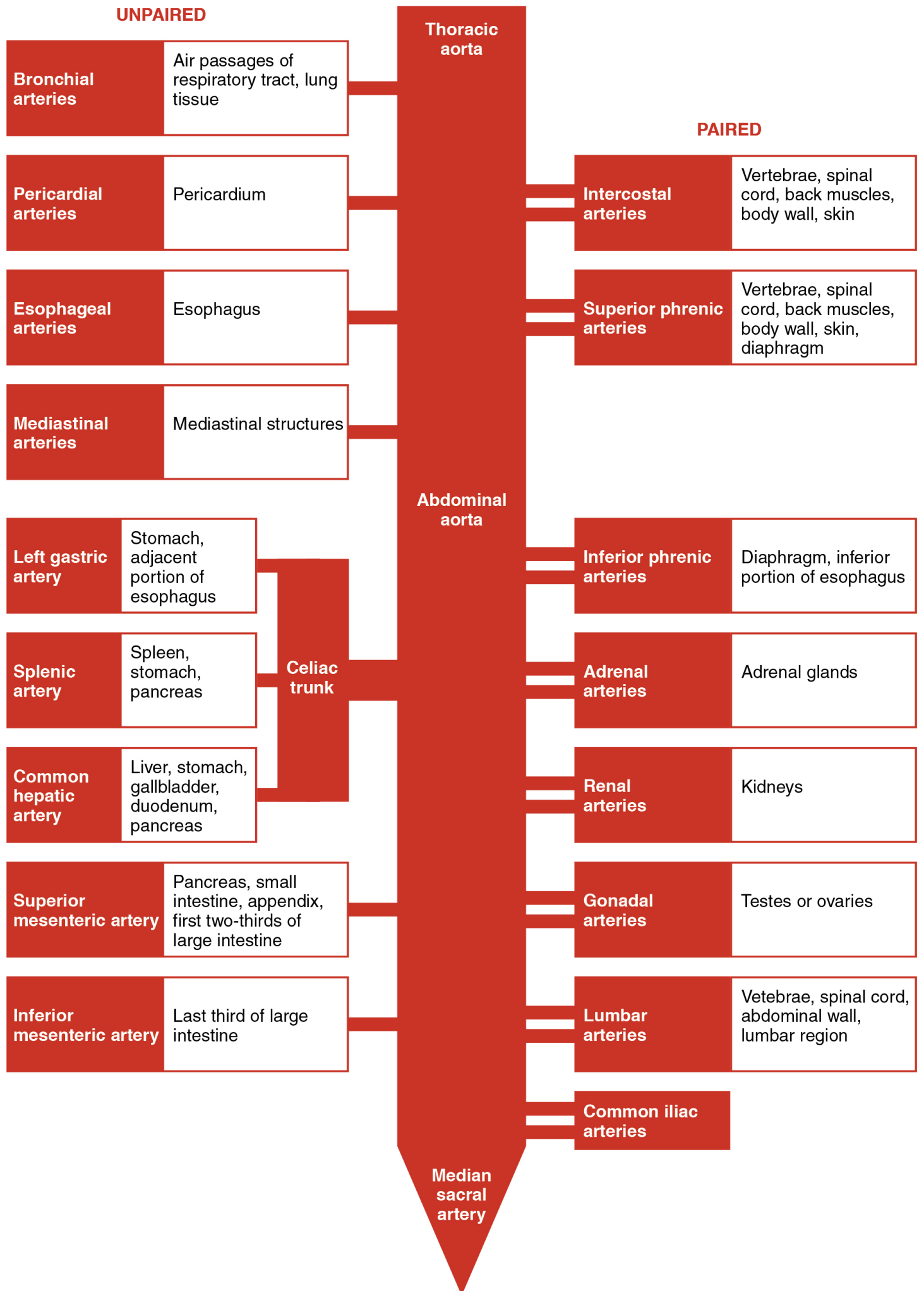
1. **Anterior Tibial Artery**
2. **Posterior Tibial Artery**

- **Internal Iliac Artery: Supplies Pelvis**



Arteries of the lower limb:





Veins of Upper Limbs are two divisions:

➤ Superficial Veins:

❖ Cephalic vein:

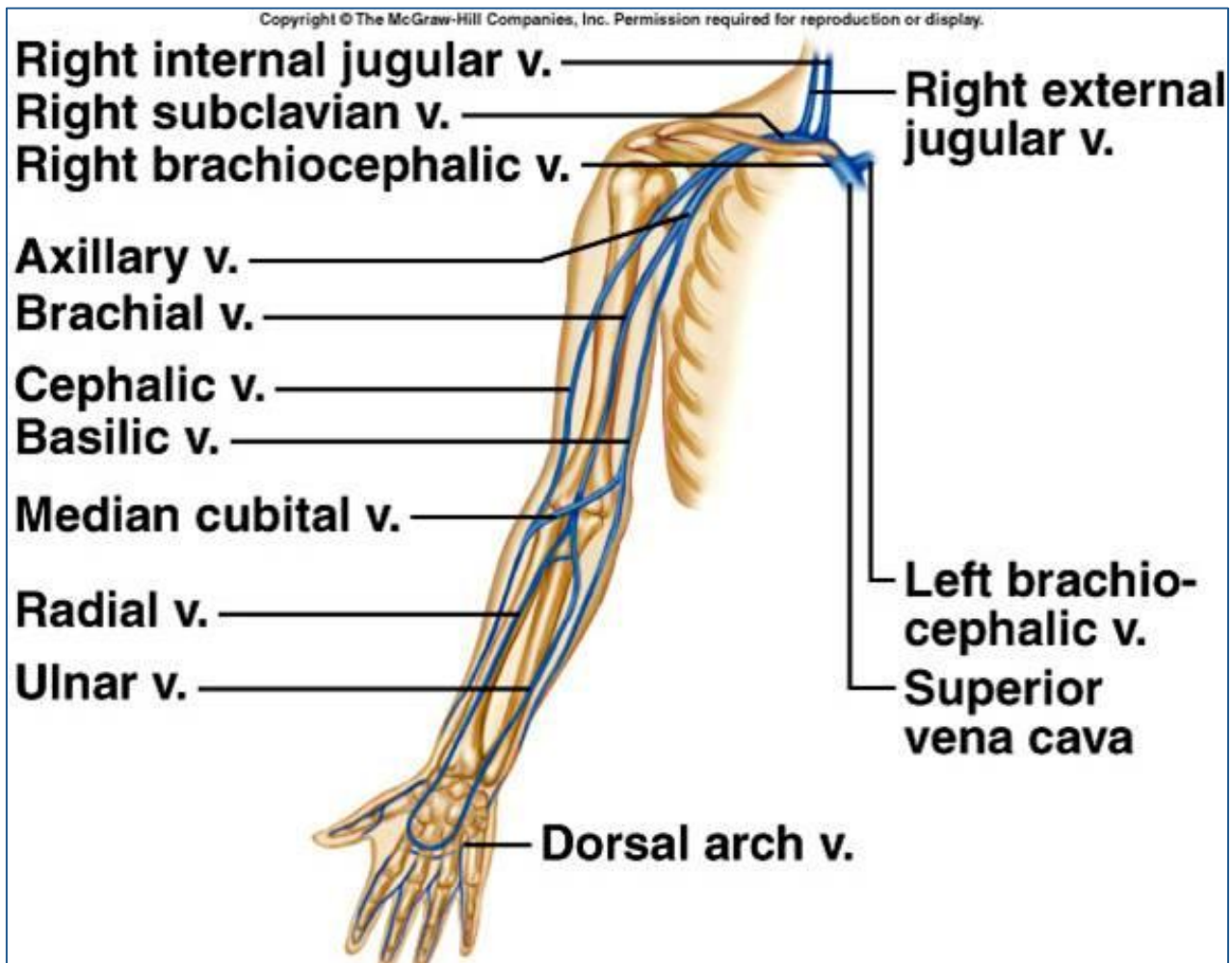
- **Ascends** in the superficial fascia on the **lateral side** of the **biceps**.
- **Drains into** the **Axillary vein**.

❖ Basilic vein:

- **Ascends** in the superficial fascia on the **medial side** of the **biceps**.
- **Halfway up the arm**, it **pierces the deep fascia**
- **At the lower border** of the **teres major** it joins the **venae comitantes** of the **brachial artery** to form the **Axillary vein**.

➤ Deep Veins:

- ❖ **Venae comitantes:** Which accompany all the large arteries, usually in pairs.
- ❖ **Axillary vein.**



Veins of Lower Limbs:

❖ Two divisions:

- **Superficial Veins:** Form a network in the **subcutaneous tissue**. Pattern is variable.

They are the **tributaries** of the:

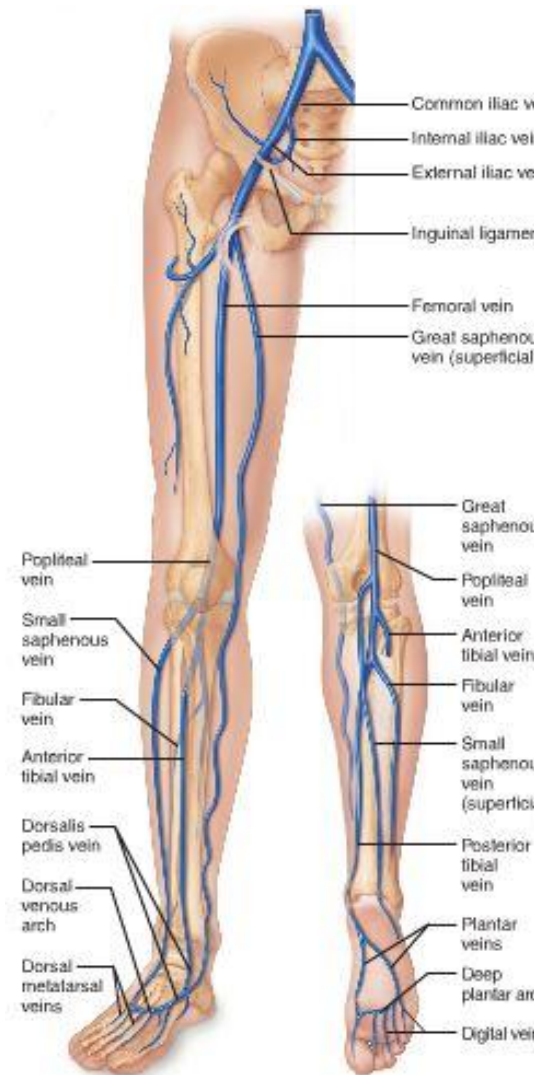
❖ **Great (long) saphenous vein: The longest vein.**

- Begins from the medial end of the dorsal venous arch of the foot
- Passes upward in front of the medial malleolus with the saphenous nerve.
- Then it ascends in accompany with the saphenous nerve in the superficial fascia over the medial side of the leg.
- Ascends obliquely upwards, and lies behind the medial border of the patella.
- Passes behind the knee and curves forward around the medial side of the thigh.
- Hooks through the lower part of the saphenous opening in the deep fascia to join the femoral vein about 1.5 in. (4 cm) below and lateral to the pubic tubercle.

- It is connected **to** the **small saphenous vein** by one or two branches that pass **behind the knee**.
- Numerous **perforating veins** connect the great saphenous vein **with the deep veins (femoral vein)**
- The **perforating veins** have **valves** which allow blood flow from superficial to deep veins.
- The great saphenous vein is **used in venous grafting** and **saphenous vein cutdown** (take care of the **saphenous nerve**)

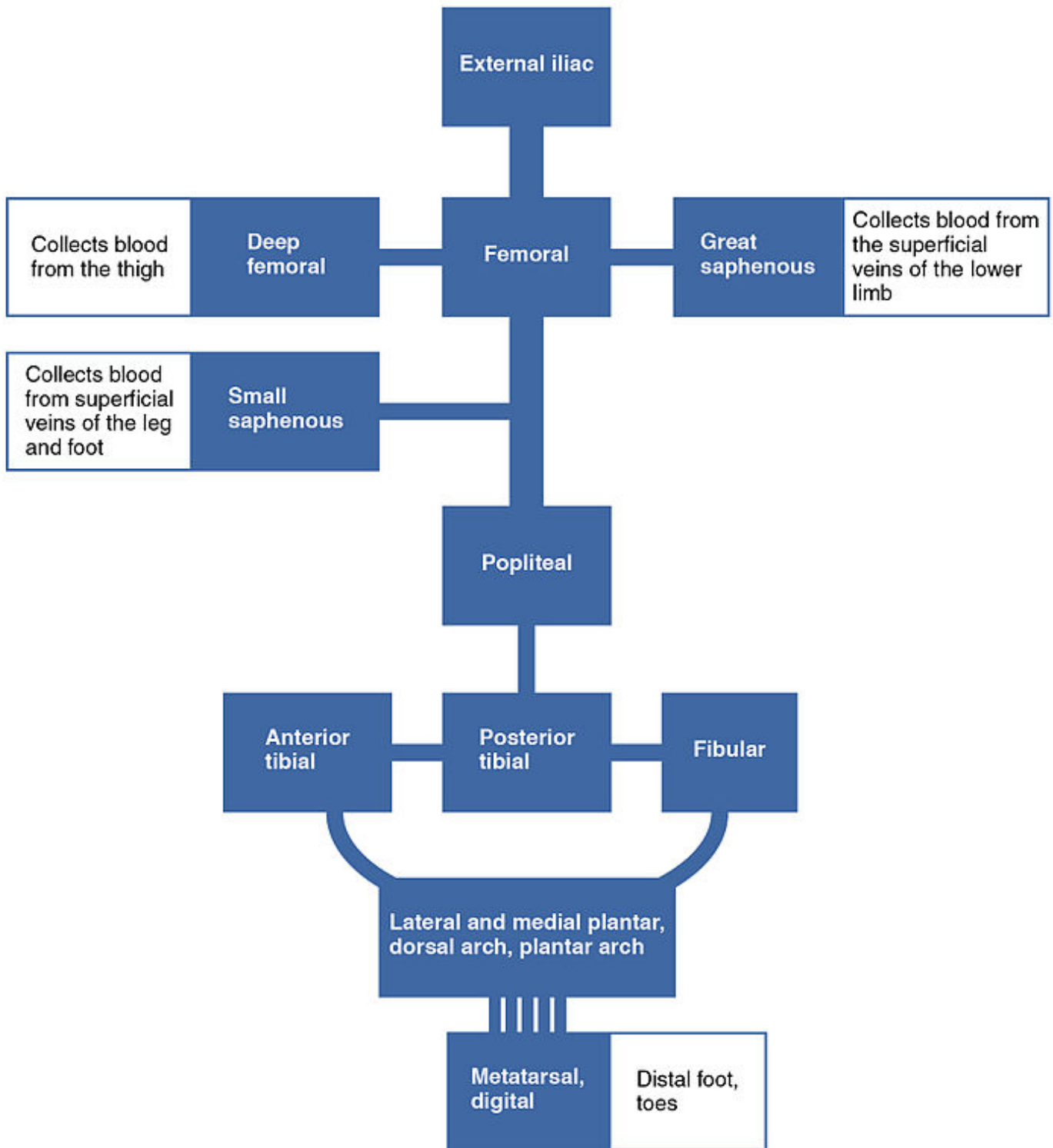
❖ **Small (short) saphenous vein:**

- Arises from the lateral end of the dorsal venous arch.
- Ascends behind the lateral malleolus in company with the sural nerve.
- Follows the lateral border of the tendocalcaneus and then runs up to the middle of the back of the leg.
- Pierces the deep fascia in the lower part of the popliteal fossa
- Drains into the popliteal vein. It has numerous valves along its course.
- Anastomosis freely with great saphenous vein.



➤ Deep Veins:

- Comprise the venae comitantes, which accompany all the large arteries, usually in pairs.
- **Venae comitantes** unite to form the **popliteal vein**, which **continues as the femoral vein**.
- **Receive** blood from **superficial veins** through **perforating veins**



Mechanism of Venous Return from Lower Limb (FYI):

- ❖ Much of the **saphenous blood** passes from **superficial** to **deep veins** through the **perforating veins**
- ❖ **The blood is pumped upwards** in the **deep veins** by the **contraction** of the **calf muscles** (calf pump).
- ❖ This action of '**calf pump**' is **assisted** by the **tight sleeve of deep fascia** surrounding these muscles.

❖ **Varicose veins:**

If the **valves** in the **perforating veins** become **incompetent**, the direction of **blood flow is reversed** and the superficial veins become **varicosed**. Most common in **posterior & medial** parts of the **lower limb**, particularly in old people.

Portal Circulation:

- ❖ A **portal venous system** is a **series of veins** or **venules** that **directly connect two capillary beds**.
- ❖ **Examples** of such systems include:
 - **Hepatic portal vein:**
 - Drains blood from the gastrointestinal tract and spleen
 - It is formed by the union of the superior mesenteric and splenic veins.
 - **Immediately before reaching the liver, the portal vein divides into right and left that enter the liver.**
- ❖ **Tributaries:** right and left Gastric veins, cystic vein, para-umbilical veins, hypophyseal portal system.
- ❖ **Portocaval Anastomosis:**

A portacaval anastomosis (also known as portal systemic anastomosis) is a specific type of **anastomosis** that occurs between the **veins of portal circulation** and those of **systemic circulation**.

The anastomotic channels become **dilated (varicosed)** in case of **portal hypertension**.

Sites of Portocaval Anastomosis

- ❖ **Lower end of esophagus: (esophageal varices)** left gastric vein & azygos vein.
- ❖ **Lower part of rectum: (Hemorrhoids)** superior, middle rectal and inferior rectal veins.
- ❖ **Para umbilical region: (Caput Medusae)** Para umbilical veins & superficial epigastric vein
- ❖ **Retroperitoneal:** Veins draining colon & veins of the posterior abdominal wall
- ❖ **Patent ductus venosus: (intrahepatic):** Left branch of portal vein & inferior vena cava.

Nerve supply of the heart:

By **sympathetic & parasympathetic fibers** via the **cardiac plexus** situated below arch of aorta.

- **The sympathetic fibers** arise from the cervical & upper thoracic ganglia of sympathetic trunks.
- **The parasympathetic fibers** arise from the vagus nerves.
- **Postganglionic fibers** reach heart along – SAN, AVN & nerve plexus around coronary arteries.
 - Sympathetic Fibers → accelerate heart rate but
 - Parasympathetic Fibers → *slow* heart rate (constriction of coronary arteries)

Conduction system of the heart:

- The **beating of the heart** is regulated by the **intrinsic conduction (nodal) system**
- **Its function** is to ensure that the chambers of the heart contract in the proper rhythm and sequence:
 - The **main center** is the **sinoatrial (SA) node**, located in the right atrium
 - The **atrioventricular (AV) node** is located at the junction of the atria and the ventricles
 - The **atrioventricular (AV) bundle (bundle of His)** is located in the interventricular septum
 - The **Purkinje fibers** are located inside the walls of the ventricles
 - The SA node is called the **pacemaker** of the heart, because it generates the impulse.

Pericardial Sinuses:

➤ **Transverse Sinus:**

It is a recess of serous pericardium **between** ascending aorta & pulmonary T. **anteriorly**, and upper parts of 2 atria & S.V.C. **Posteriorly**.

➤ **Oblique Sinus:**

It lies posterior to the heart. It is a recess of serous pericardium **behind** the base of heart (left atrium), **separate base from** descending aorta & esophagus.

Now Check Your Understanding:

1) Enumerate tributaries of superior vena cava:

- Right and left brachiocephalic veins
- Azygos vein
- Pericardial veins
- Mediastinal veins

2) At what level and which part of the diaphragm does the vena caval opening lies? Name the structures passing through it.

- Inferior vena cava opening lies at the level of the eighth thoracic vertebrae.
- It passes through the central tendon of the diaphragm and it transmits the inferior vena cava and branches of the right phrenic nerve.

3) At what level does the Aortic opening lies in the diaphragm? Name the structures passing through it.

- Aortic opening lies at the level of the 12th thoracic vertebra.
- The structures passing through it are the:
 - Aorta
 - Thoracic duct
 - And sometimes azygos vein

4) Name for contents of the posterior mediastinum

- Esophagus
- Descending thoracic aorta and its branches
- Azygos vein, hemiazygos vein and accessory hemiazygos vein
- Thoracic duct

5) Give the formation and termination of azygos vein and enumerate tributaries of it.

- It is formed by the union of lumbar azygos and right subcostal and right ascending lumbar veins.
- It ends by joining the posterior aspect of superior vena cava
- Tributaries of it are:
 - Hemiazygos vein
 - Accessory hemiazygos vein

6) Give boundaries of oblique sinus of pericardium

- It is a perietovisceral space
- Anteriorly: left Atrium
- Posteriorly: Parietal layers of the pericardium

7) Give branches of the descending thoracic aorta?

- Nine posterior intercostal arteries on each side from 3rd to 11 intercostal spaces
- Subcostal artery on each side
- Two left bronchial arteries (the upper left artery may give rise to the right bronchial artery which usually arises from the third right posterior intercostal artery)

8) Specify the level of commencement and termination and branches of arch of aorta.

- The arch of Aorta begins behind the upper border of the second right sternochondral joint and ends at the lower border of fourth thoracic vertebra
- Branches of the arch are:
 - Brachiocephalic artery
 - Left common carotid artery
 - Left subclavian artery

9) Name the structures opening into the right atrium.

- Superior vena cava
- Inferior vena cava
- Coronary sinus
- Anterior cardiac veins
- Venae cordis minimi

10) Bronchial arteries are the branches of which arteries?

- A. On the right side there is one bronchial artery which arises either from the third posterior intercostal artery or from the upper left bronchial artery
- B. On the left side there are two bronchial arteries both of which arise from the descending thoracic aorta

11) Name the contents of the pericardium.

- Heart
- Ascending aorta
- Pulmonary trunk
- Lower half of superior vena cava
- Terminal part of inferior vena cava
- Terminal parts of pulmonary veins

12) Give nerve supply of the pericardium.

- Fibrous and parietal pericardium → phrenic nerve
- Visceral pericardium → superficial and deep cardiac plexus

13) Specify the formation course and termination of the superior vena cava. Mention its tributaries.

- Superior vena cava is formed by the union of the right and left brachiocephalic veins
- It begins behind the lower border of the sternal end of the first right costal cartilage.
- It pierces the pericardium opposite second right Costal Cartilage and terminates by opening in the upper part of the right Atrium
- Tributaries of superior vena cava are several small pericardial and mediastinal vein and the azygous vein

14) Enumerate the veins draining the heart.

A. About 60% of the venous blood of the heart is drained into the coronary sinus tributaries:

- Great cardiac vein
- Small cardiac vein
- Middle cardiac vein
- Posterior vein of the left ventricle
- Oblique vein of the left ventricle
- Right marginal vein

B. 40% of the venous blood by:

- Anterior cardiac veins directly drain into infundibulum of the right ventricle and then right atrium.
- Venae cordis minimae open into different chambers of the heart directly

15) Enumerate any four arteries passing through the inlet of thorax.

- Brachiocephalic
- Left common carotid
- Left subclavian
- Internal thoracic arteries
- Superior intercostal arteries

16) Enumerate changes occurring at the level of the sternal angle T4.

- Ascending aorta ends at this level
- Arch begins and ends at this level
- Descending begins at this level
- Trachea divides into two principal branches
- Azygous vein arches over roots of the right lung and opens into the superior vena cava
- Pulmonary trunk divides into two pulmonary arteries just below this level
- Thoracic duct crosses from right to left side

Done By: Nouf Altwaijri

Good Luck.