

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



Major Veins of the Body

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Color Code

- **Important**
- **Doctors Notes**
- **Notes/Extra explanation**

Objectives

At the end of the lecture, the student should be able to:

- ✓ Define veins and understand the general principle of venous system.
- ✓ Describe the superior & inferior Vena Cava: formation and their tributaries
- ✓ **List major veins and their tributaries in:**
 - head & neck
 - thorax & abdomen
 - upper & lower limbs
- ✓ Describe the Portal Vein: formation & tributaries.
- ✓ Describe the Portocaval Anastomosis: formation, sites and importance

Veins



- Veins are blood vessels that **bring blood** back to the heart.
- All veins carry deoxygenated blood except:
 - Pulmonary veins¹.
 - Umbilical veins².
- There are two types of veins*:
 1. Superficial veins: close to the surface of the body
NO corresponding arteries
 2. Deep veins: found deeper in the body
With corresponding arteries (venae comitantes)
- Veins of the systemic circulation:
Superior and inferior vena cava with their tributaries
- Veins of the portal circulation:
Portal vein

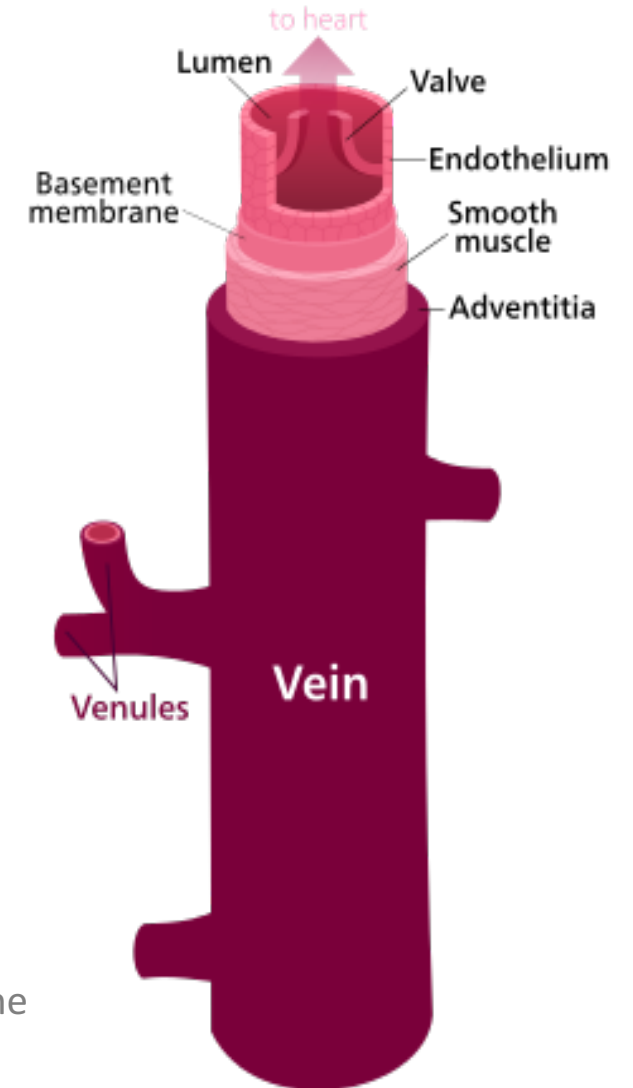
1: are large veins that receive oxygenated blood from the lung and drain into the left atrium.

2: The umbilical vein is a vein present during fetal development that carries oxygenated blood from the placenta into the growing fetus.

*Note:

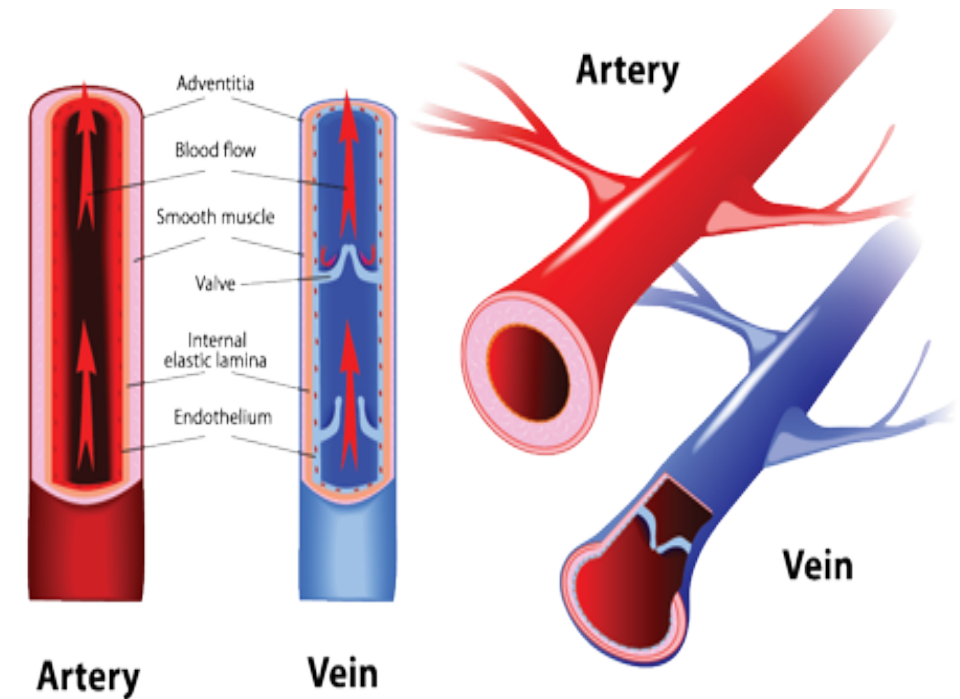
Vein can be classified in 2 ways based on:

- (1) Their location
(superficial/deep)
- (2) The circulation
(systemic/portal)



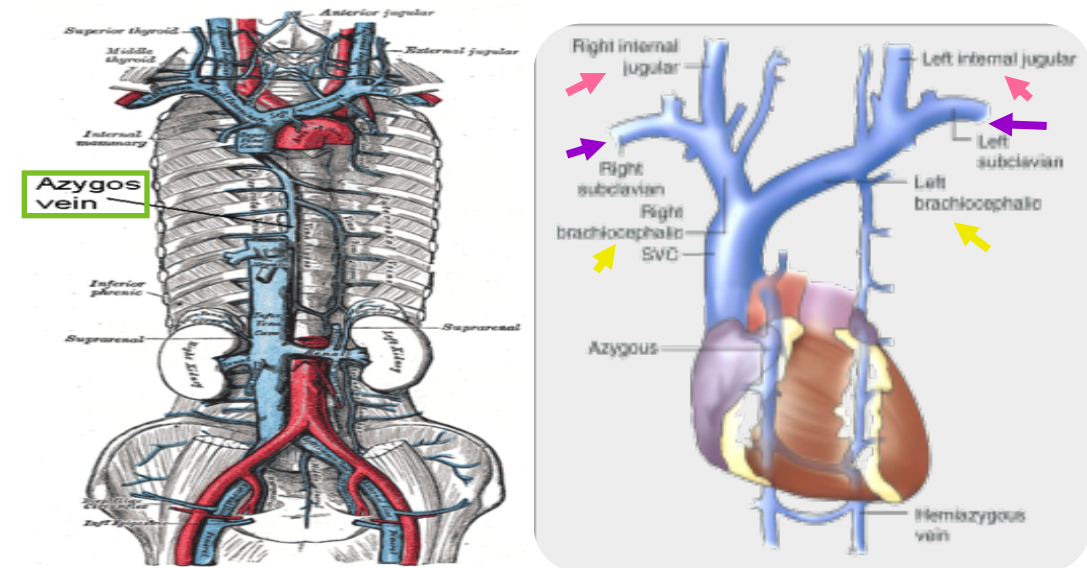
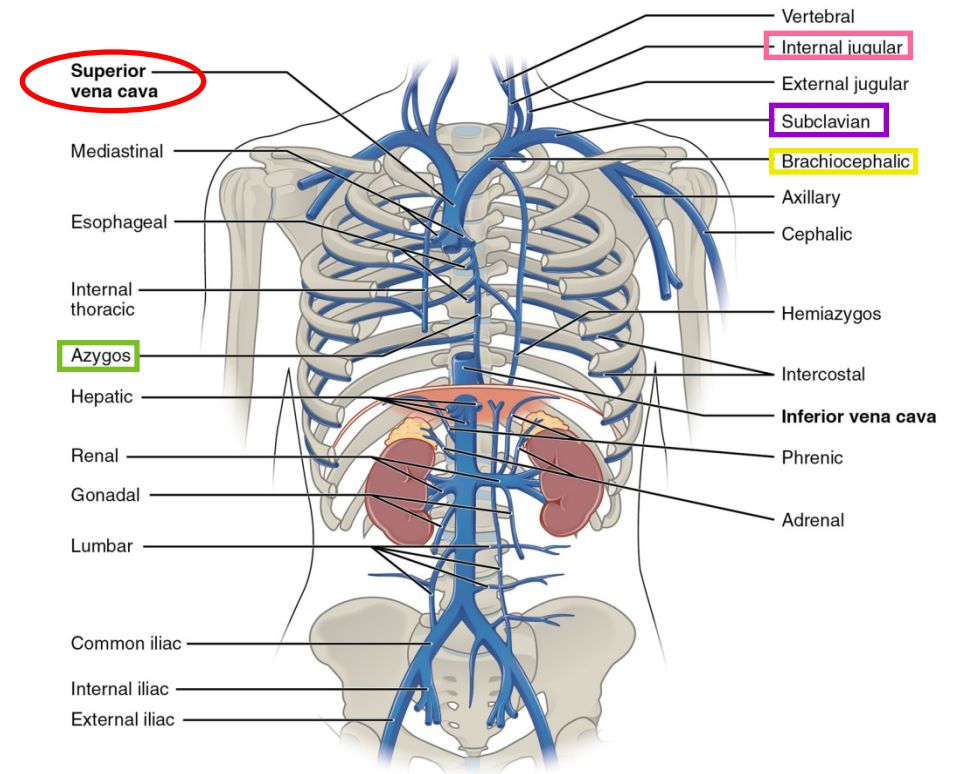
The Histology Of Blood Vessels

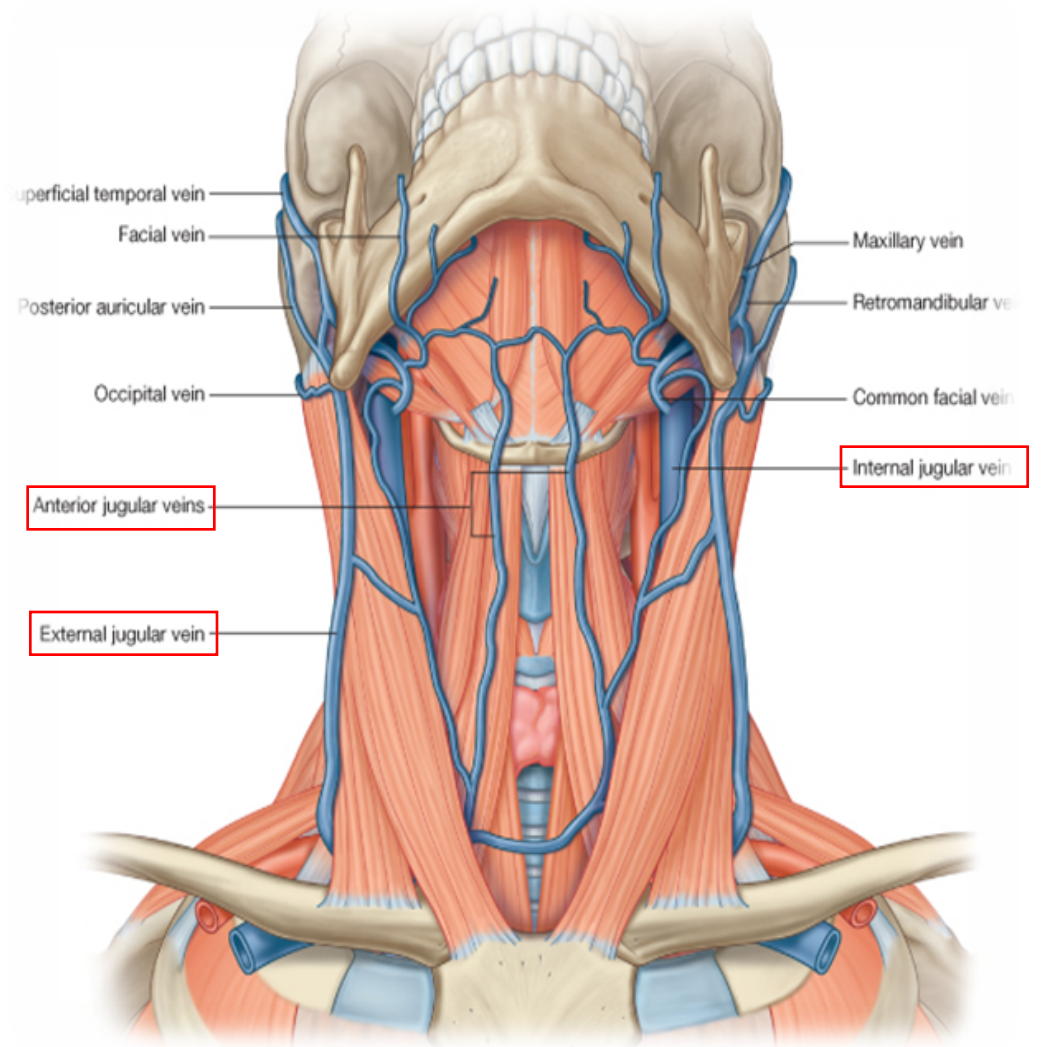
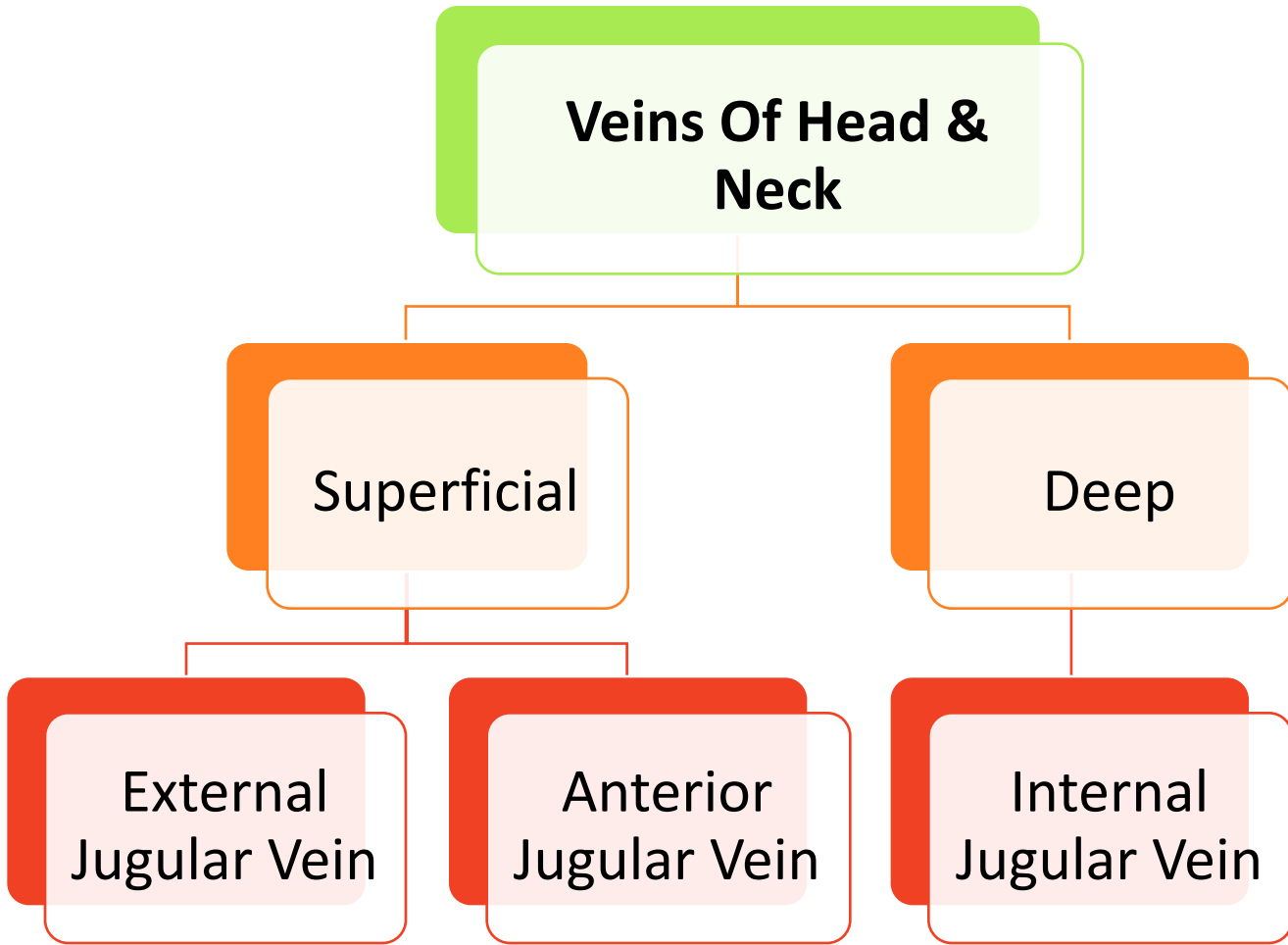
- The arteries and veins have three layers, **but the middle layer is thicker in the arteries than it is in the veins:**
 1. Tunica Intima (the thinnest layer): a single layer of simple squamous endothelial cells.
 2. Tunica Media (the thickest layer in arteries): is made up of smooth muscle cells and elastic tissue.
 3. Tunica Adventitia: (the thickest layer in veins) entirely made of connective tissue.
- **Capillaries consist of little more than a layer of endothelium and occasional connective tissue.**



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 & upper limbs.
- It Passes downward and enter the **right atrium**.
- Receives azygos vein on the posterior aspect just before it enters the heart.





Note:

Union: when two veins join together they give rise to a vein with a new name.

Tributary: when one vein drains into another, but no new vein is produced.

Jugular means of the neck.

Veins of Head and Neck

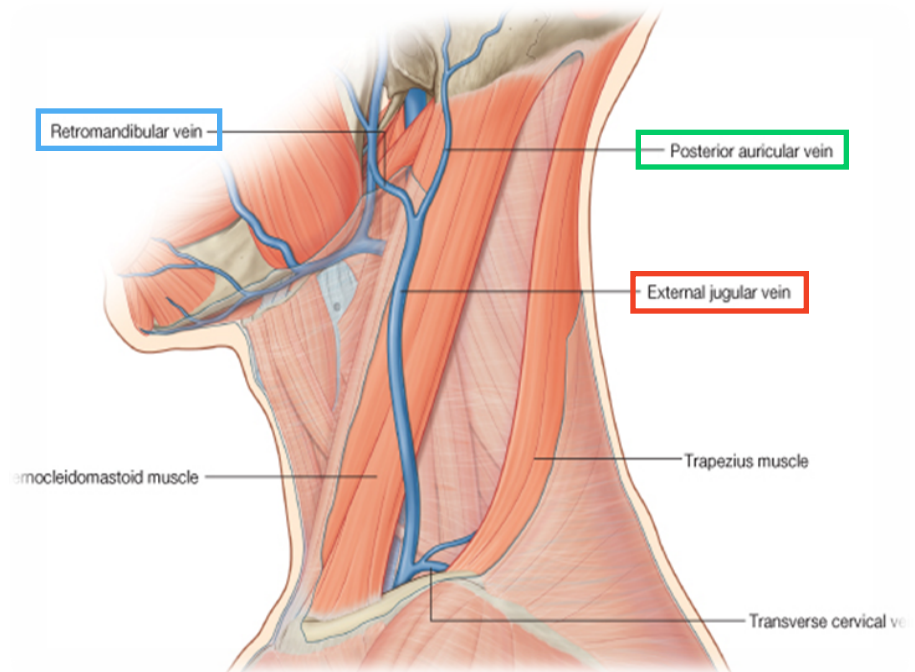
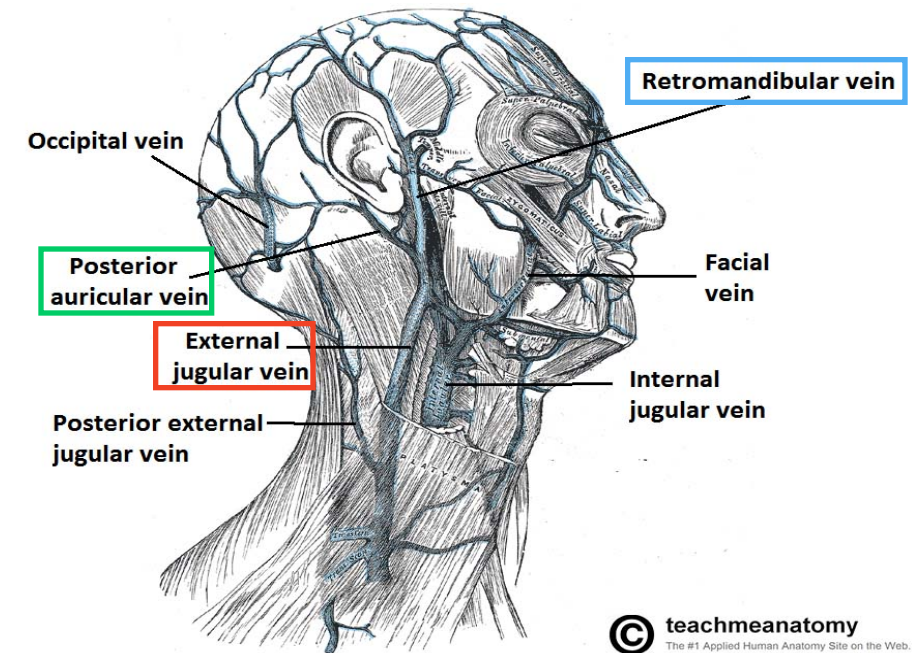
External Jugular Vein

- Lies **superficial to the sternomastoid** (sternocleidomastoid) **muscle** .
- It passes down the neck and it is the **only tributary of the subclavian vein**.
- Begins just behind angle of mandible by union of:
 - a. the posterior division of the **retromandibular vein** (temporomaxillary vein)
 - b. with the **posterior auricular vein**.
- It drains blood from:
 - a. Outside of the skull
 - b. Deep parts of the face.

Tributaries:

- *Posterior external jugular vein.*
- *Anterior jugular vein.*
- *Suprascapular vein.*
- *Transverse cervical vein.*

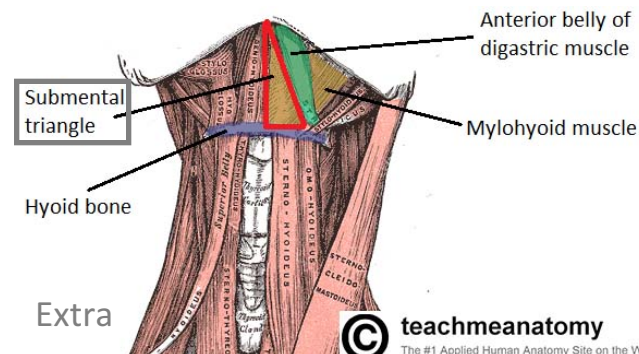
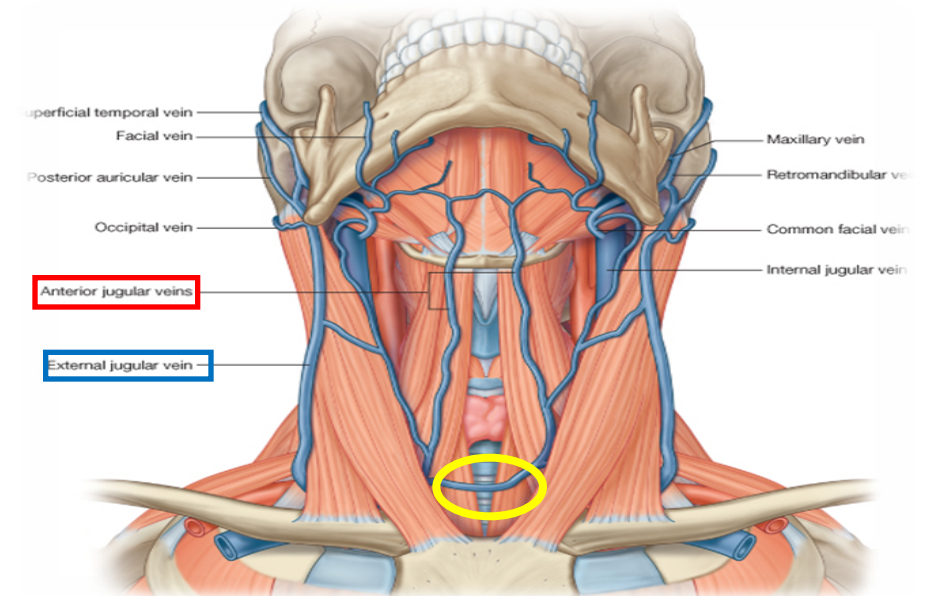
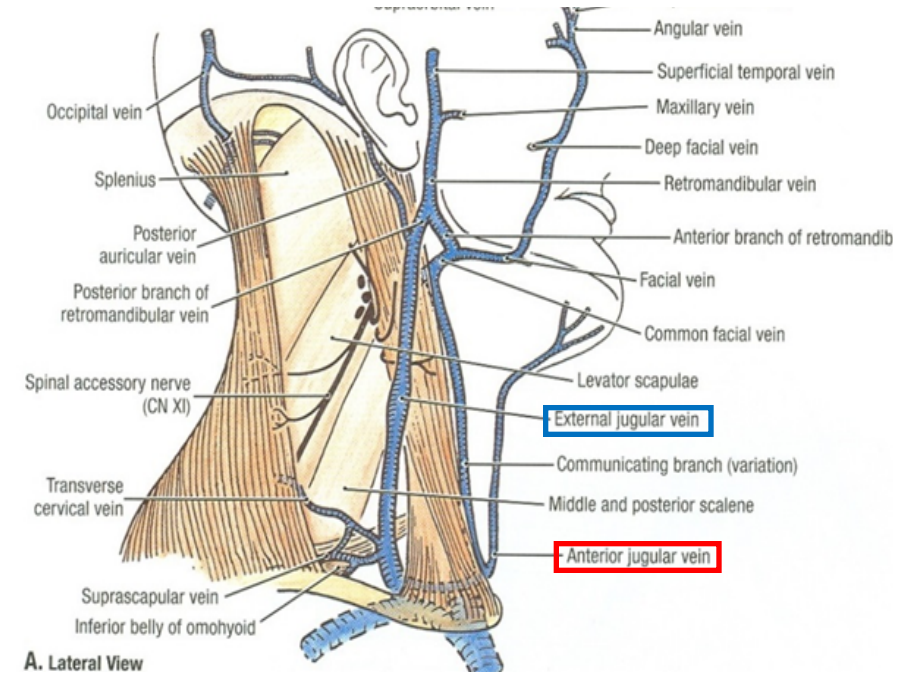
To remember: PAST



Veins of Head and Neck

Anterior Jugular Vein

- It **begins** in the upper part of the neck by the union of the **submental veins** (small veins found in an area known as the submental triangle).
- 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** (deep to) sternomastoid 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.



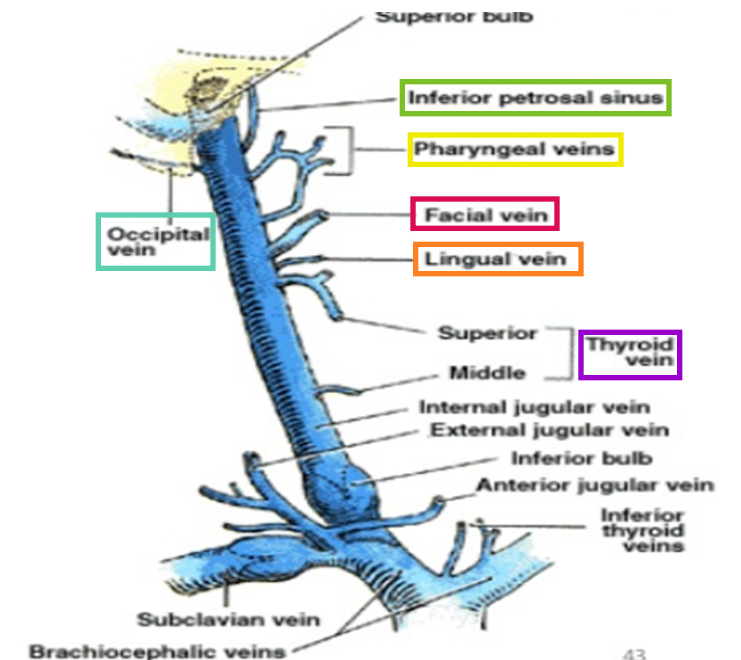
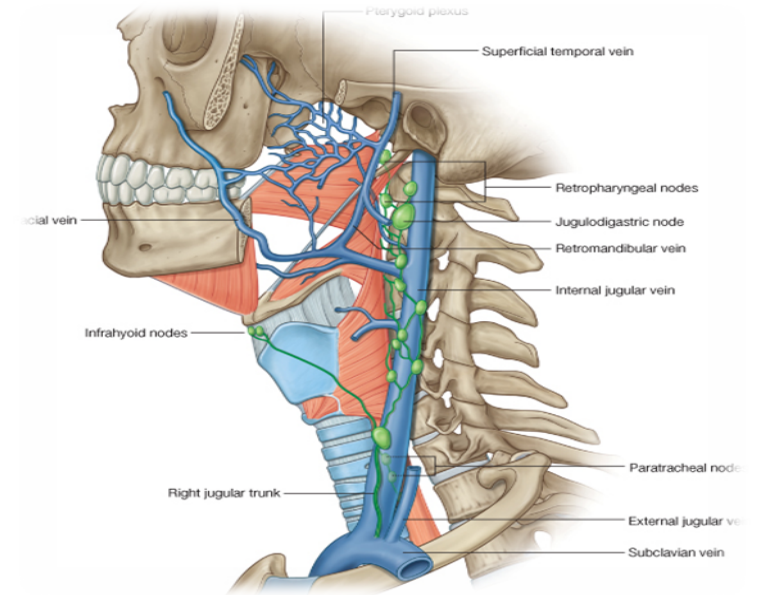
Veins of Face and Neck

Internal Jugular Veins

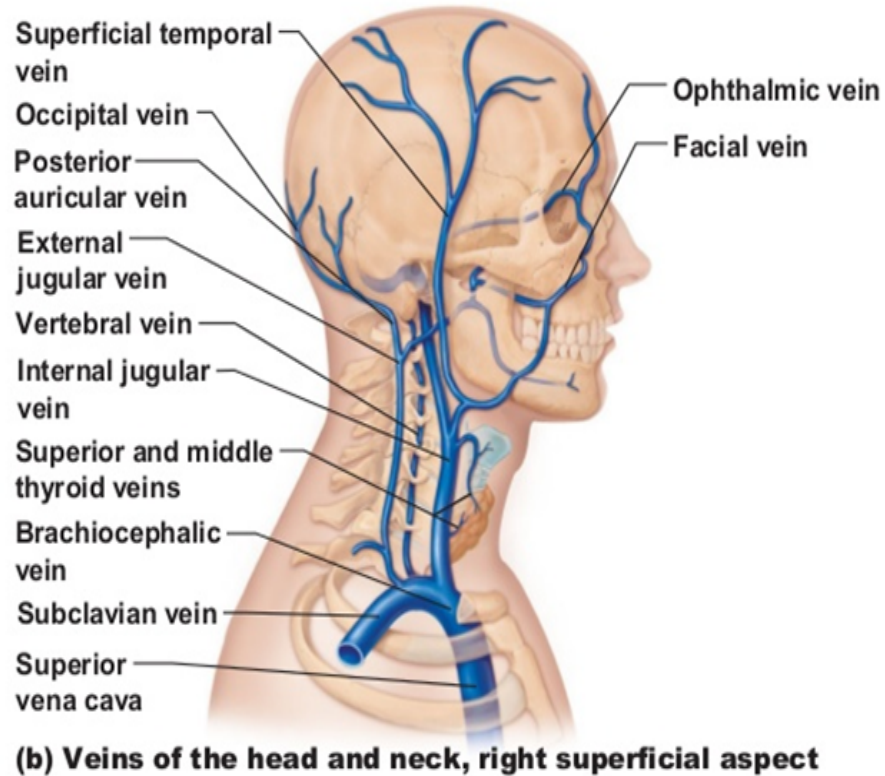
- Drains blood from the head, brain, face & neck.
- It descends in the neck along with the internal and common carotid arteries and vagus nerve, within the **carotid sheath**.
- Joins the **subclavian vein** to form the **brachiocephalic vein**.
- **Tributaries:**
 - Superior thyroid
 - Lingual (in the tongue)
 - Facial
 - Occipital veins
 - Pharyngeal veins
 - Dural venous sinuses (Inferior petrosal sinus)

Note:

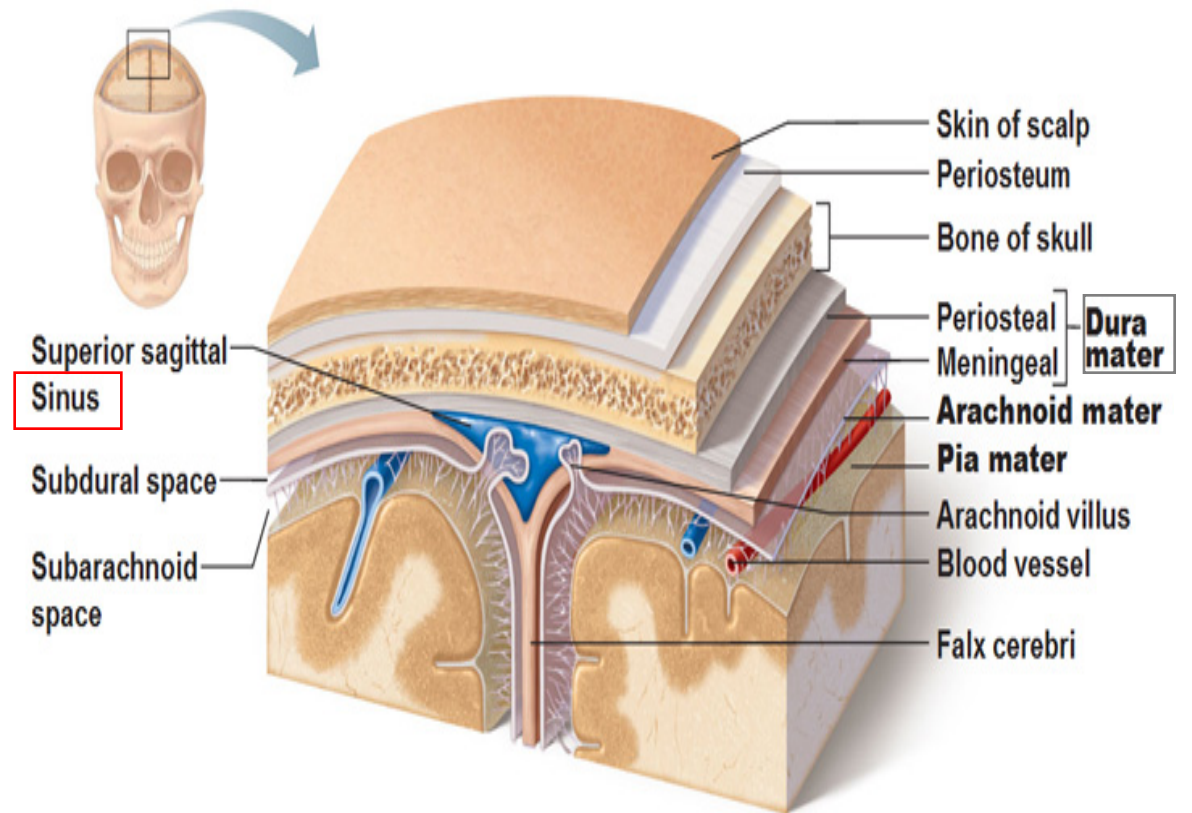
- the occipital vein's drainage can vary.
- Dural venous sinuses: these are venous sinuses found between the periosteal and meningeal layer of the dura matter (check next slide).
- The inferior part of the internal jugular vein has a dilation known as the inferior bulb. Above the bulb there is a valve.



Extra pictures for understanding



The Dura Mater



Veins Of Upper Limbs

1- Superficial Veins

A- Cephalic Vein

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

B- 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**.

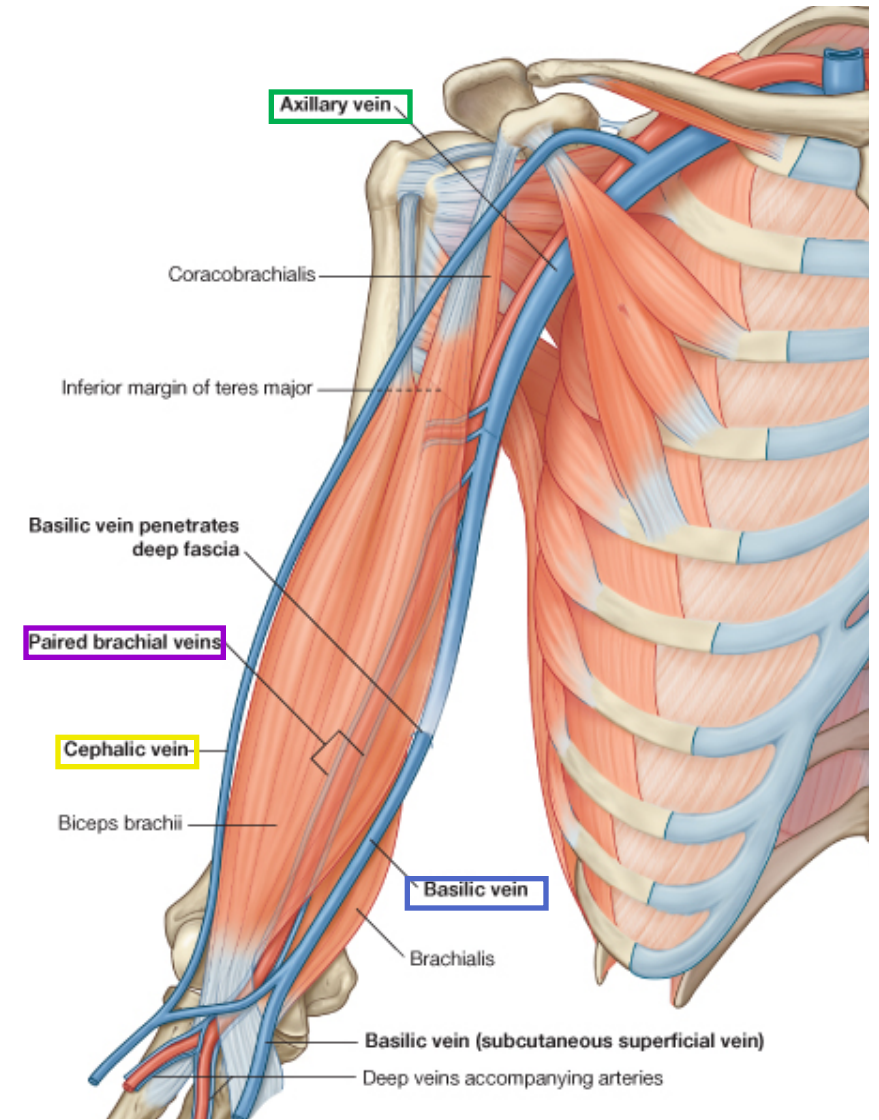
2- Deep Veins

A- Venae Comitantes

- Which accompany all the large arteries and are usually in **pairs**.

B- Axillary Vein

- Formed by the union of **basilic vein** and the **venae comitantes (brachial veins)** of the brachial artery.



Inferior Vena Cava

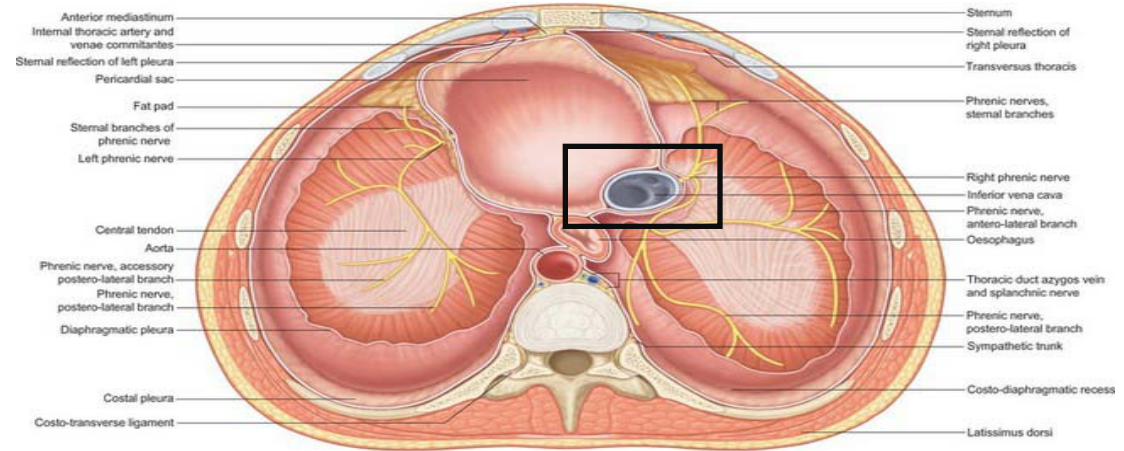
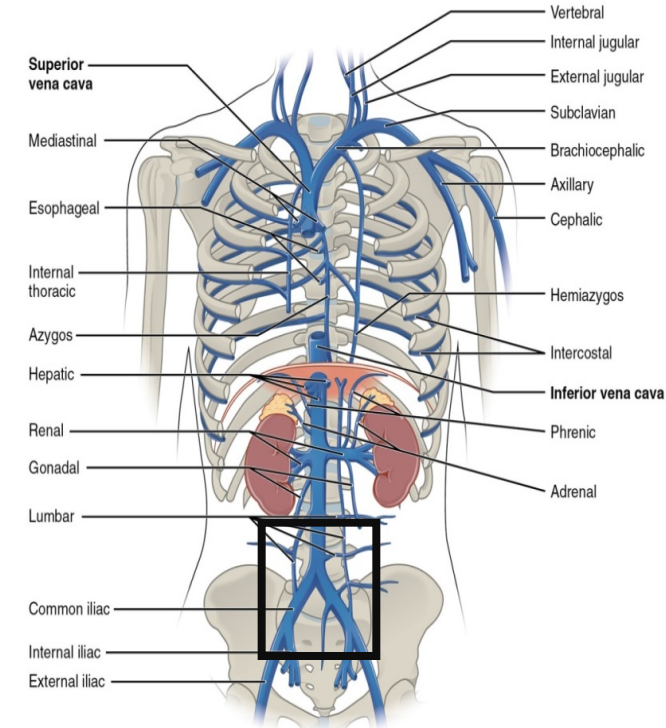
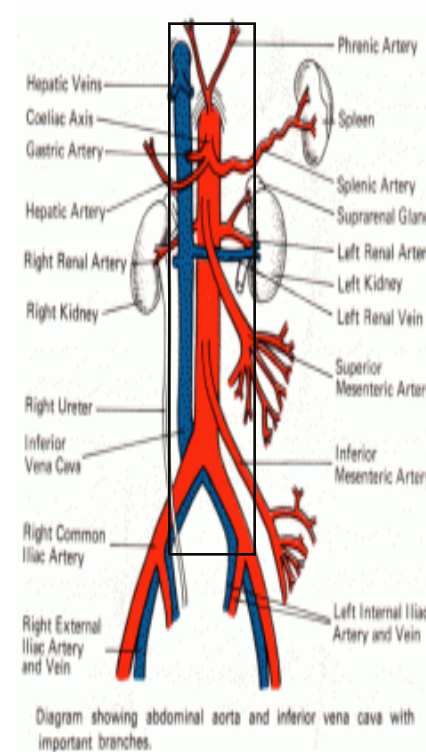
- Drains most of the blood from the body **below the diaphragm to the right atrium.**
- Formed by the union of the two common iliac veins behind the right common iliac artery at the level of **the 5th lumbar vertebra.**
- Ascends on the right side of the aorta
- Pierces the central tendon of diaphragm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

*Recall the descending aorta pierced the diaphragm at T12.

To remember:

Mnemonic of major openings of diaphragm: **I ate (8) 10 Eggs At 12.**

(I 8= inferior vena cava pierce at T8,
10 Eggs= Esophagus pierces at T10 ,
At 12 = Aorta pierces at T12)



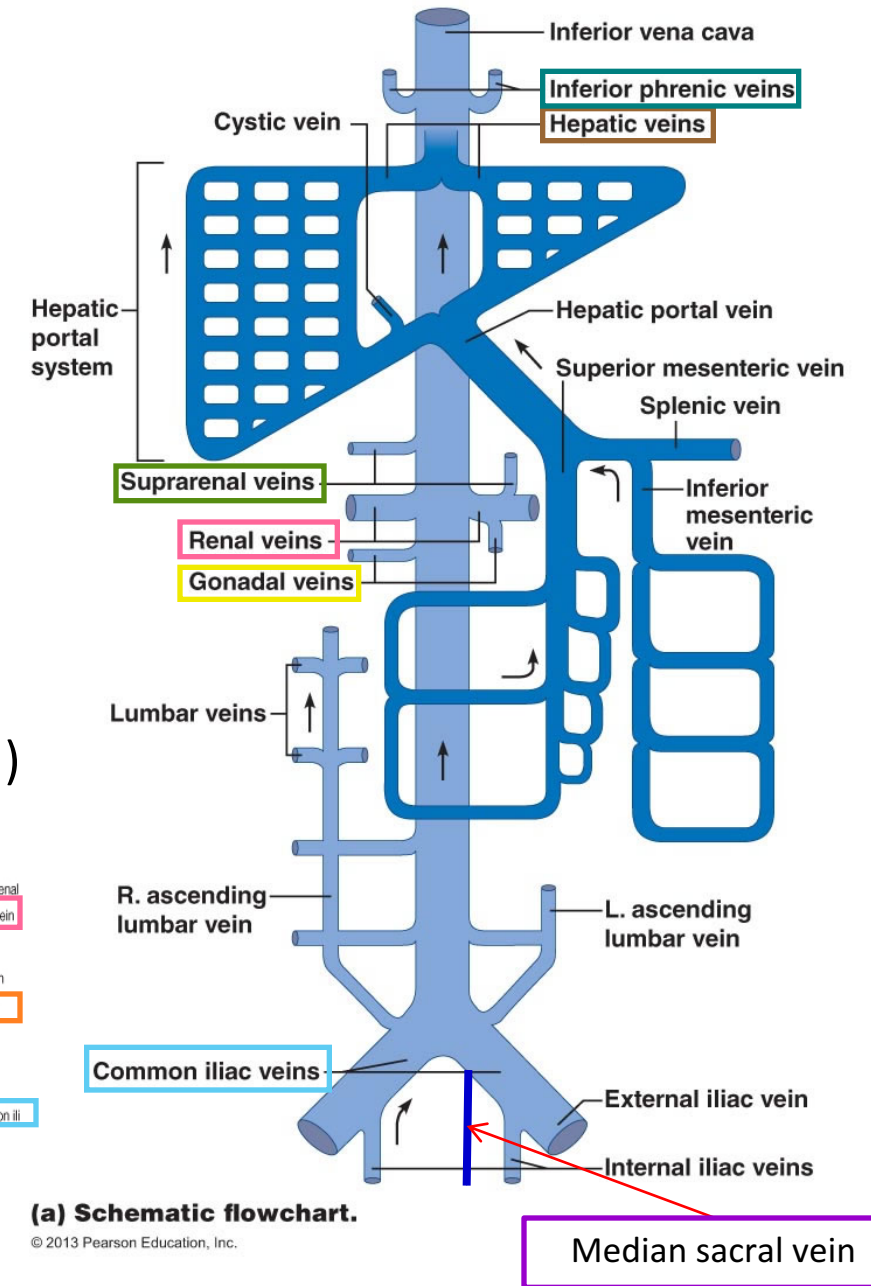
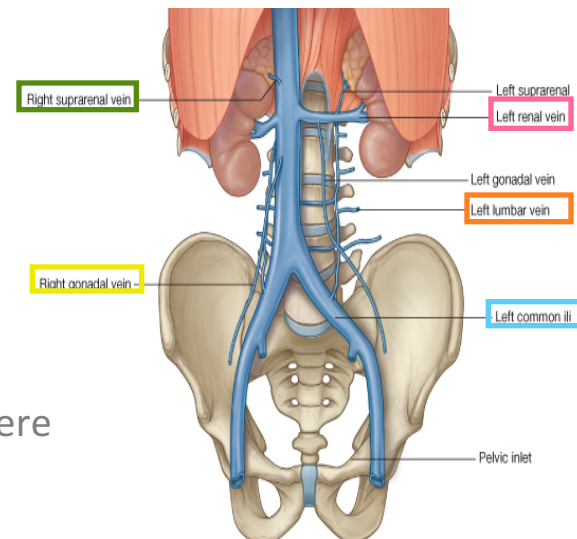
Inferior Vena Cava (Tributaries)

From bottom to top ↑

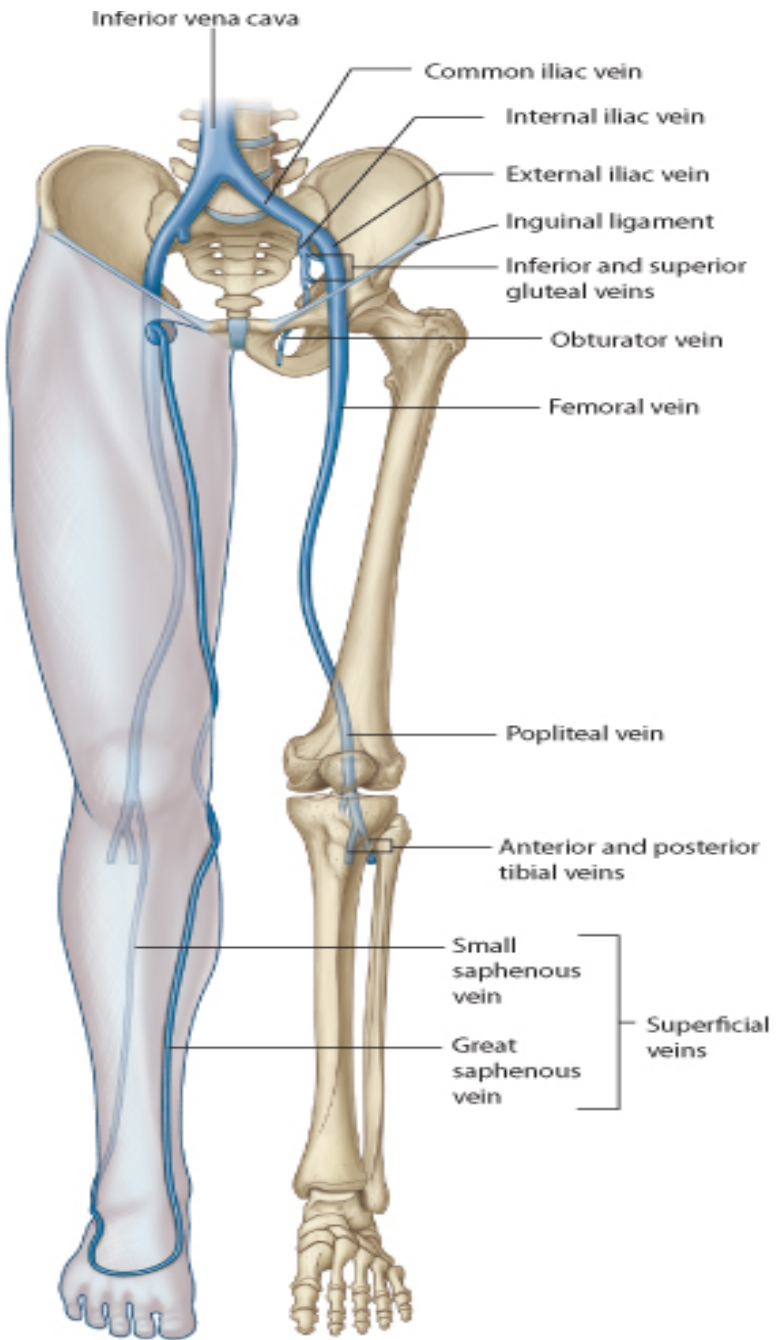
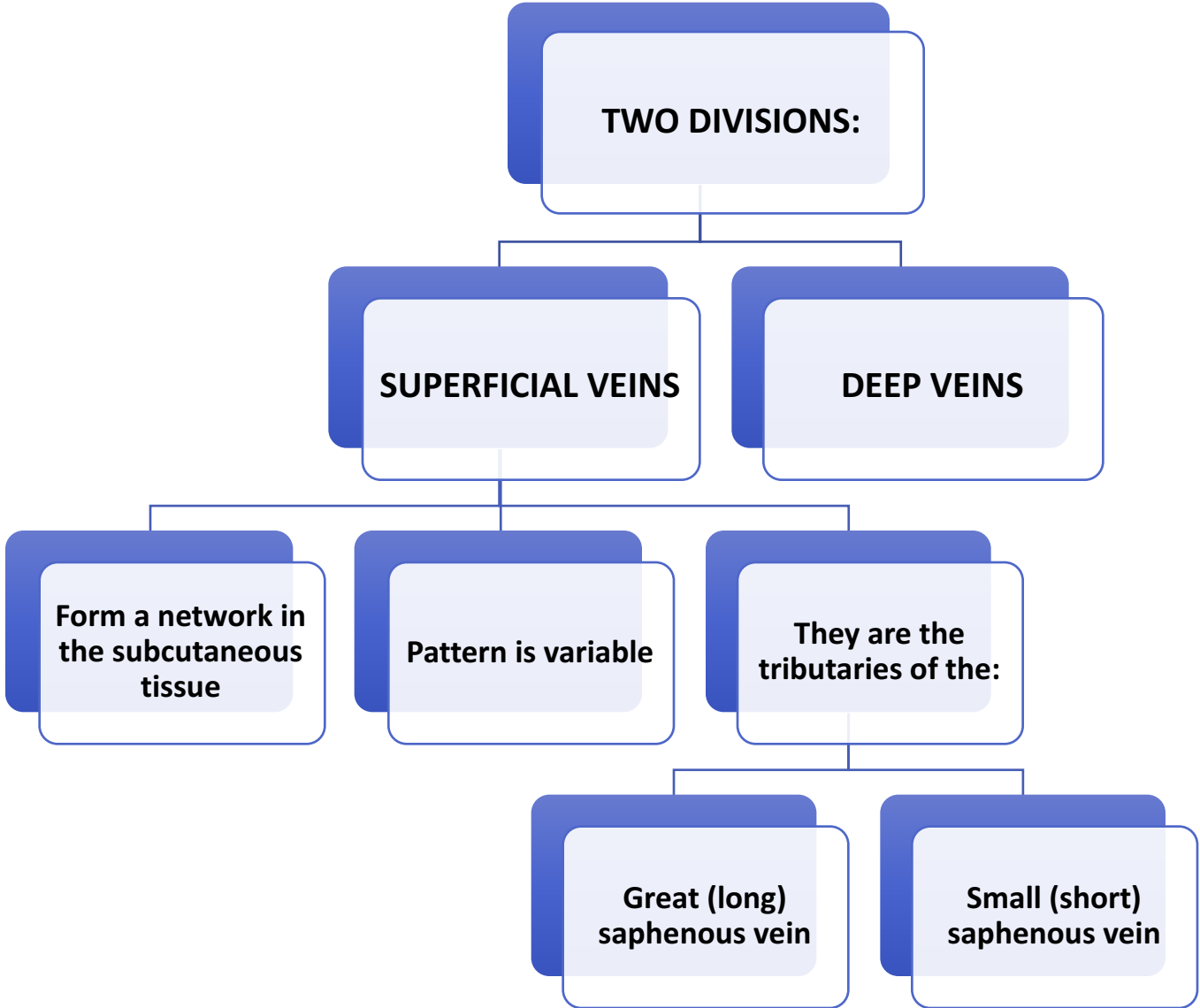
1. Median sacral vein
2. Two common iliac veins
3. Four paired lumbar veins
4. Right gonadal vein (the left vein drains into the left renal vein*)
5. Paired renal veins
6. Right suprarenal vein (the left vein drains into the left renal vein*)
7. Hepatic veins
8. Paired inferior phrenic vein

*Note:

The left gonadal/suprarenal veins drain into the IVC but INDIRECTLY. They first drain into the left renal vein which then drains into the IVC. That's why we didn't list them here as part of the tributaries.



Veins Of Lower Limbs



Veins Of Lower Limbs

Great Saphenous Vein

- The longest vein.
- **Beginning:**
from the medial end of the dorsal venous arch of the foot.

Ascending :

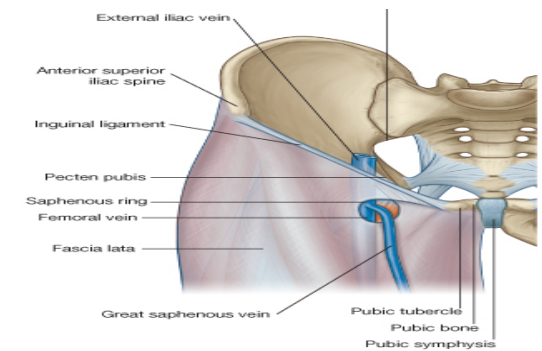
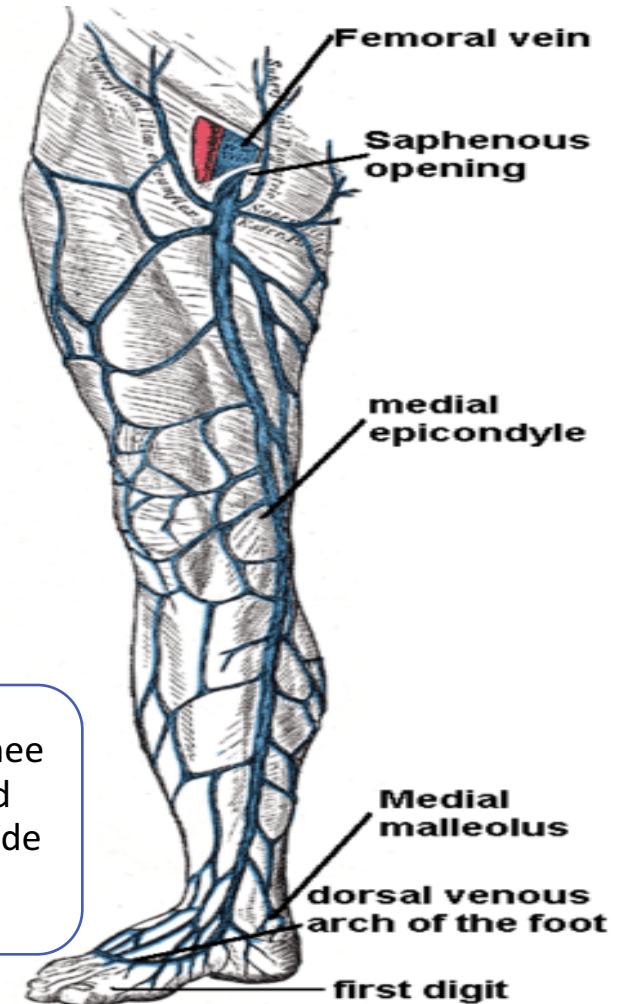
Passes upward in front of the medial malleolus (constant position) with the **saphenous nerve**.

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.

- **Termination :**
Hooks through the lower part of the saphenous opening in the deep fascia to join the **femoral vein** about 1.5 inch (4 cm) below and lateral to the pubic tubercle.



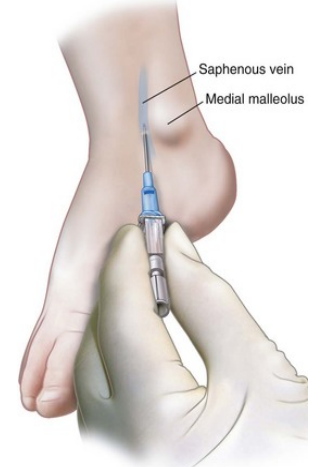
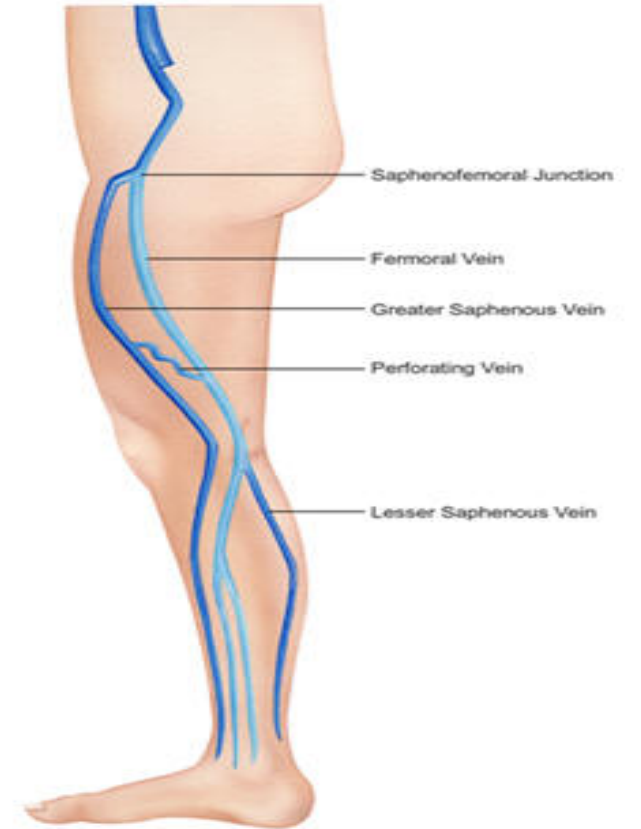
Veins Of Lower Limbs

Great Saphenous Vein

- 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 (التطعيم) and saphenous vein cutdown may be necessary for inserting the needle or canula (take care of the saphenous nerve)

Only on the girls' slides



Veins Of Lower Limbs

Small Saphenous Vein

- **Beginning:**
 - from the lateral end of the dorsal venous arch of the foot.
- Has numerous valves along its course.
- Anastomosis freely with great saphenous vein.

Ascending :

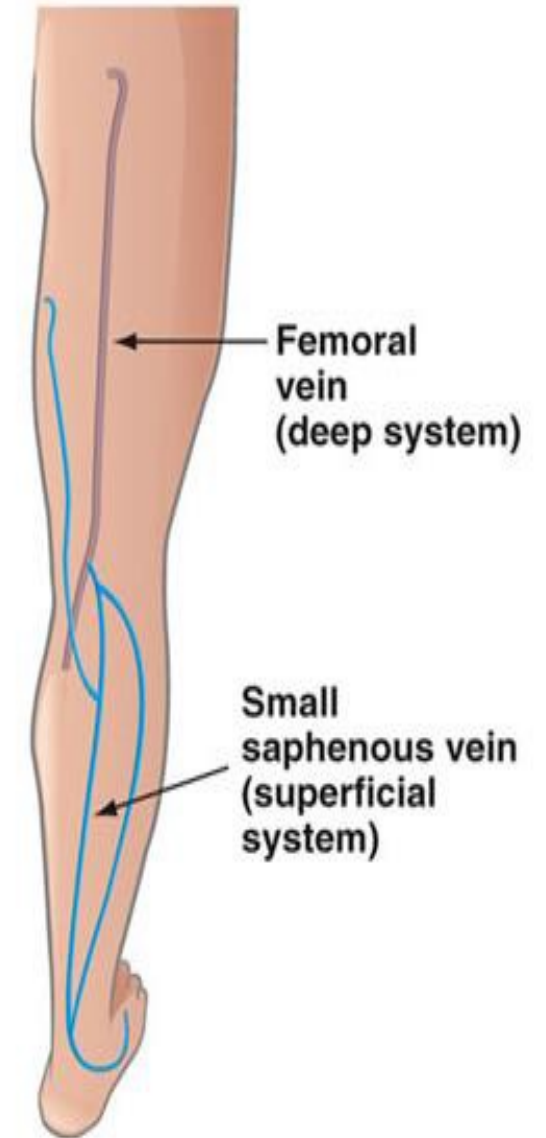
Ascends behind the lateral malleolus in company with the **sural nerve**.

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**

- **Termination:**
 - Drains into the **popliteal vein** .

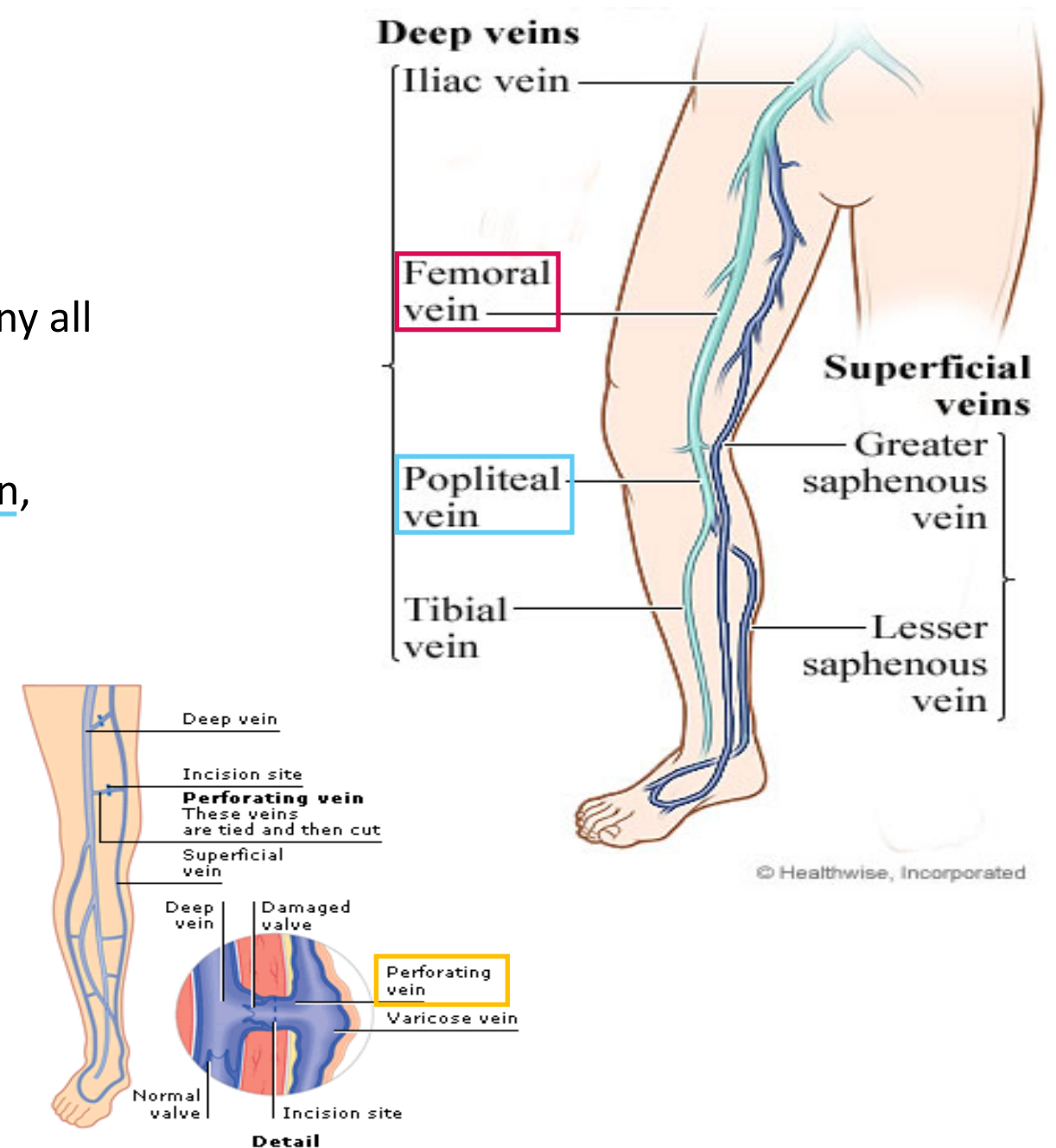
Doctor's note: the small saphenous vein join the venae comitantes and forms the popliteal vein.



Veins Of Lower Limbs

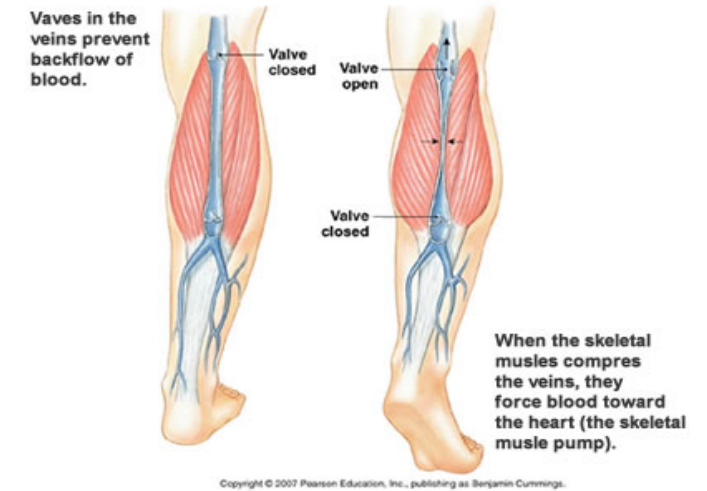
Deep Veins

- 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 (For Your Information)

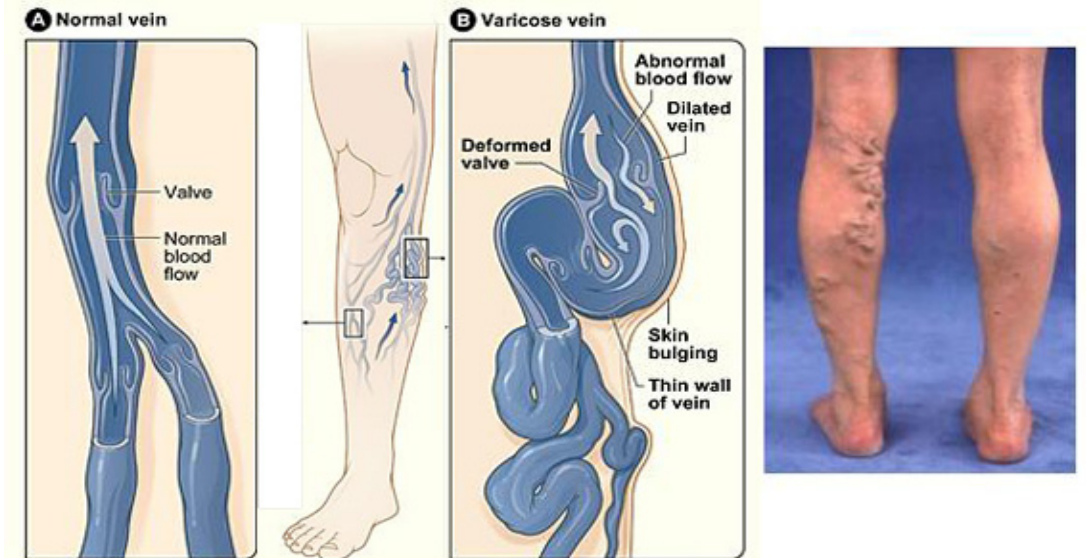
- Much of the saphenous blood passes from superficial to deep veins through the perforating veins
- The blood is pumped upwards in the deep veins by the contraction of the calf muscles (calf pump).
- This action of calf pump is assisted by the tight sleeve of deep fascia surrounding these muscles.



Varicose Veins



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



Factors Aiming Blood Return

- **Muscle Contraction.**

Rhythmical contraction of limb muscles as occurs during normal locomotory activity (walking, running, swimming) promotes venous return by the muscle pump mechanism.

- **Respiratory Pump**

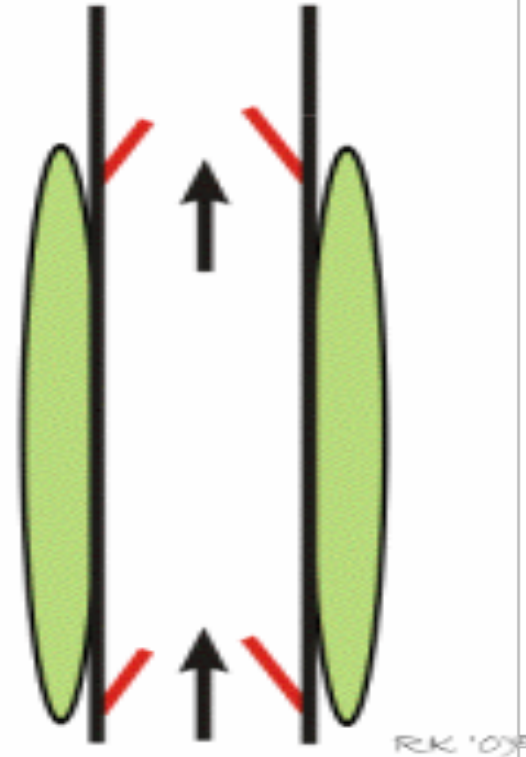
During respiratory inspiration, the venous return increases because of a decrease in right atrial pressure.

- **Decreased Venous Compliance**

Sympathetic activation of veins decreases venous compliance, increases central venous pressure and promotes venous return.

- **Gravity**

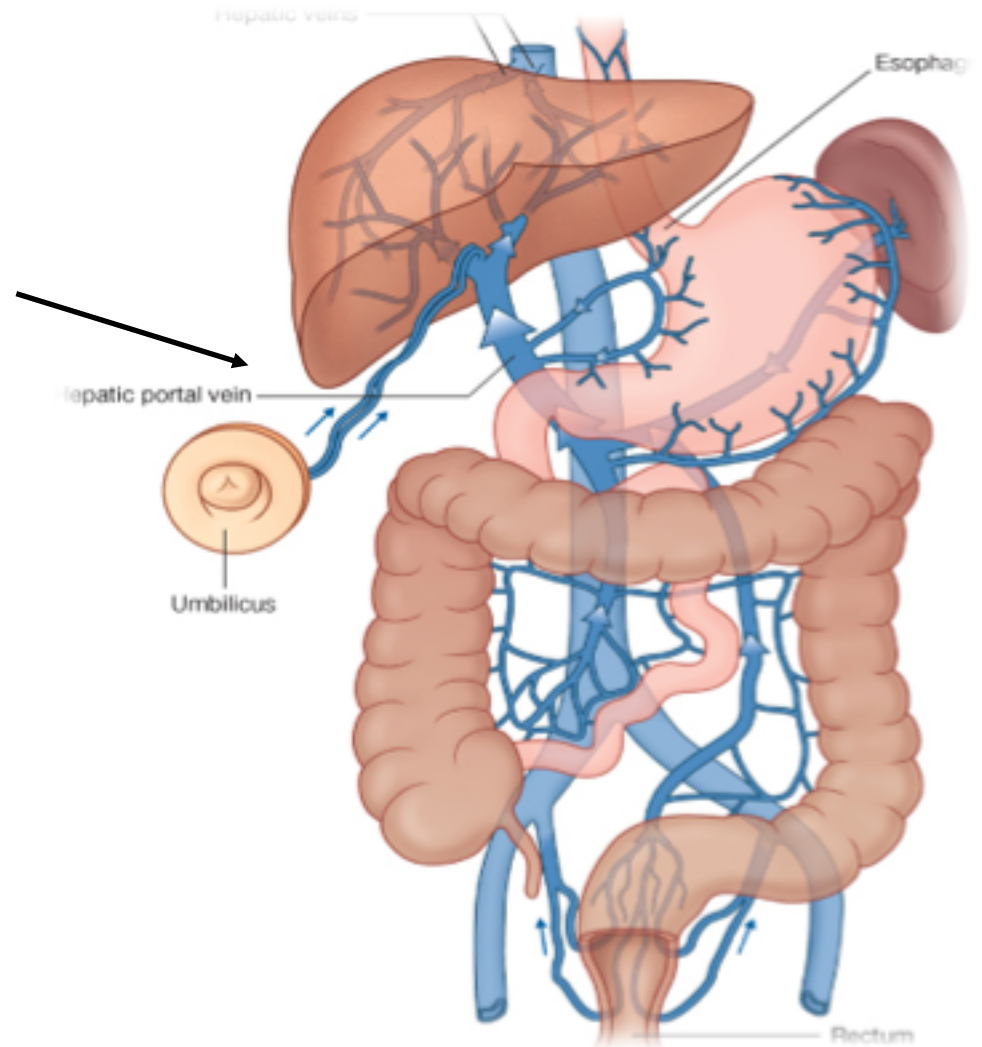
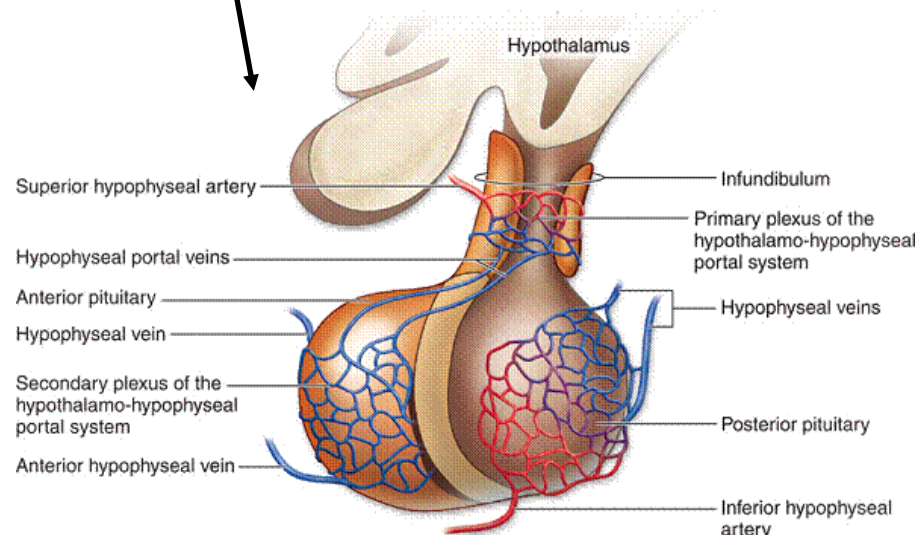
The effects of gravity on venous return seem paradoxical because when a person stands up hydrostatic forces cause the right atrial pressure to decrease and the venous pressure in the dependent limbs to increase



Portal Circulation



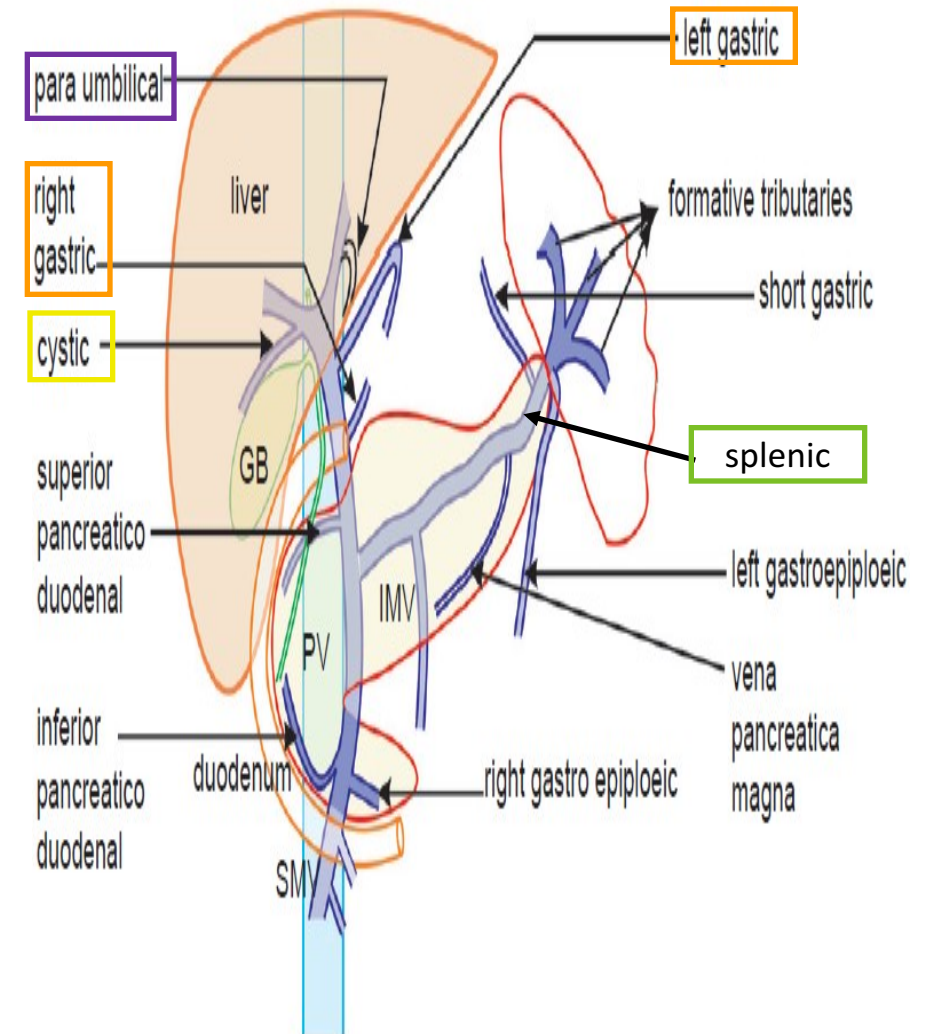
- A portal venous system is a series of veins or venules that directly connect two capillary beds.
- Examples of such systems include the **hepatic portal vein** and **hypophyseal portal system**.



Portal Circulation

Hepatic Portal Vein

- **Drains blood** from the gastrointestinal tract and spleen **to the liver**.
- **It is formed by** the union of the **superior mesenteric** and **splenic veins** **behind the neck of pancreas**.
- 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** from the gall bladder joins its right branch.
 - **Para-umbilical veins** that drain veins from anterior abdominal wall to the hepatic portal vein.

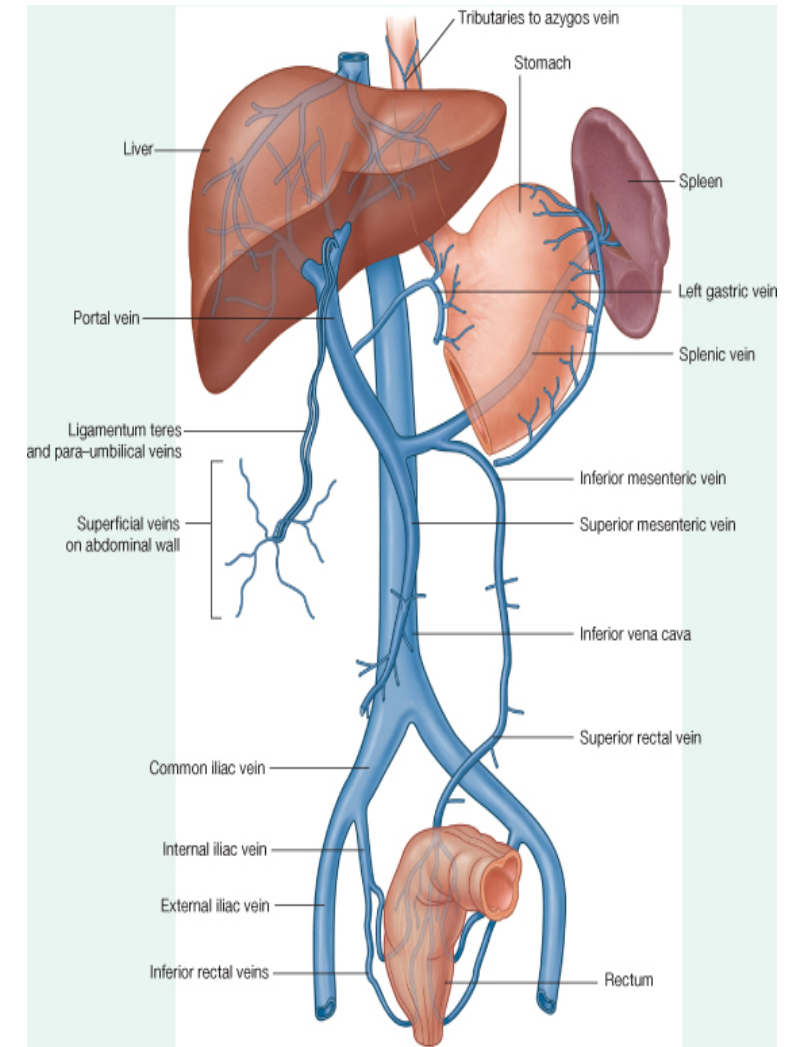
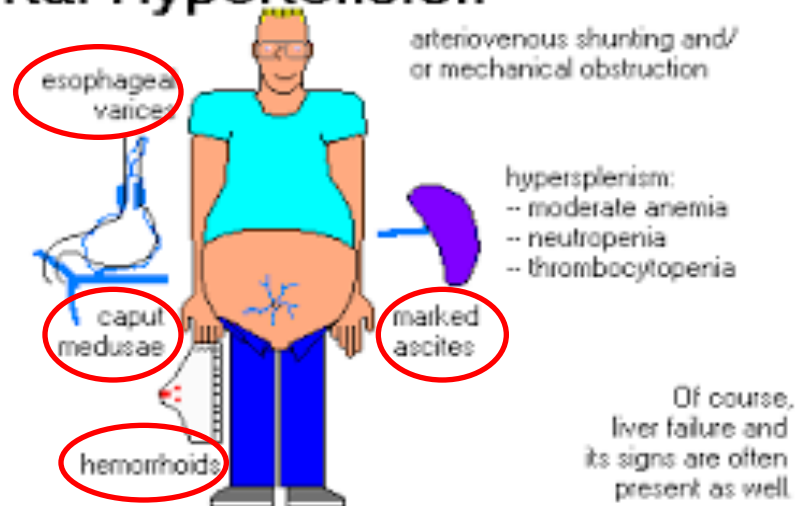


Portal Circulation

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**.

Portal Hypertension

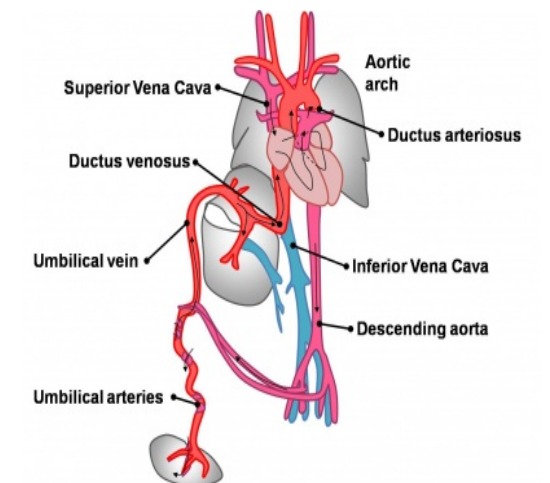
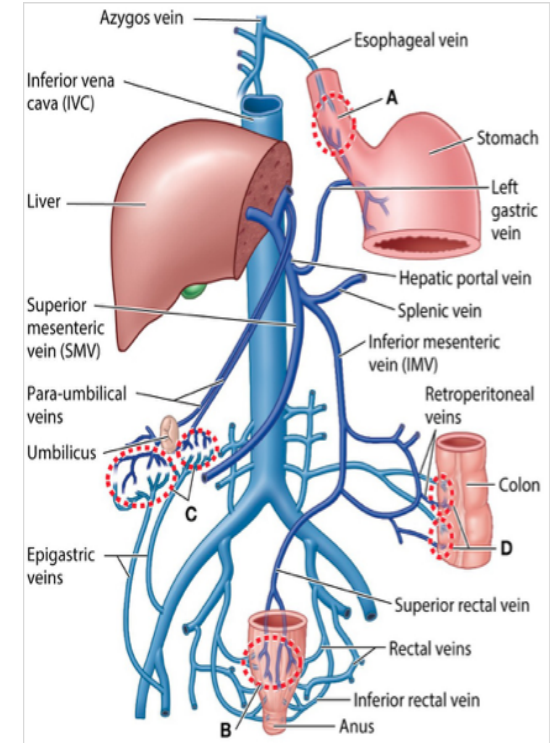


Portal Circulation

Sites Of Portocaval Anastomosis



Site	Portocaval Anastomosis		Associated condition
	Portal Vein	Systemic Vein	
Lower end of esophagus	Left gastric vein	Esophageal branch of azygos vein	<i>Esophageal Varices</i>
Lower part of rectum (or upper part of anal canal)	Superior rectal vein	Middle and inferior rectal vein	<i>Hemorrhoids</i>
Para umbilical regoin	Para umbilical veins	Superficial epigastric vein	<i>Caput Medusae</i>
Retroperitoneal	Colic veins	Veins of the posterior abdominal wall (retroperitoneal veins)	--
Patent ductus venosus (intrahepatic)	Umbilical vein + portal vein	Inferior Vena Cava	--
Bare area of liver	There is some anastomosis between portal venous channels in the liver and azygos system of veins above the diaphragm.		



MCQs

Which of the following is the thickest layer in the artery ?

- A. Tunica Media.
- B. Tunica Intima.
- C. Tunica Adventitia.

Answer: A

Which of the following veins is the only tributary of the subclavian vein?

- A. External jugular vein
- B. Internal jugular vein
- C. Anterior jugular vein
- D. Occipital vein

Answer: A

which of the following is a tributary for the internal jugular vein?

- A. anterior jugular vein
- B. Transverse cervical vein
- C. facial vein
- D. Suprascapular vein

Answer: C

Which one of the following nerves accompany the great saphenous vein in the medial side of the leg ?

- A. Sural nerve
- B. Sciatic nerve
- C. Saphenous nerve
- D. Tibial nerve

Answer: C

Which one of the following veins can be used in coronary artery bypass ?

- a. Small saphenous vein
- b. Hepatic veins
- c. Renal veins
- d. Great saphenous vein

Answer: D

The anastomotic channels of portocaval become dilated (varicosed) in case of.. ?

- A. portal hypertension
- B. portal hypotension
- C. none of A&B
- D. both of A&B

Answer : A



Leaders:

Nawaf AlKhudairy
Jawaher Abanumy

Members:

Yazeed Alsuhaibani
Abdulmalek Alhadlaq
Hamad Alkhudairy
Mohammed Habib
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