

# Lecture 4

# MAJOR VEINS OF THE BODY



## OBJECTIVES

- Define the word 'veins' and understand the general principles of the venous system.
- Describe the superior & inferior vena cava and list their tributaries.
- List the major veins and their tributaries in the body.
- Describe the Portal Vein.
- Describe the Portocaval Anastomosis.

### Color Index:

- Main text
- Boys' Slides
- Girls' Slides
- Important
- Dr's Notes
- Extra

 Editing File

# Veins

## Definition

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

All veins carry deoxygenated blood, with the exception of the **pulmonary veins** (which carry oxygenated blood from the lungs to the heart) and **umbilical vein** (during fetal development).

## There are two types of veins:

**Superficial veins:**  
Close to the surface of the body with **NO corresponding arteries**.

**Deep veins:**  
Found deeper in the body with **corresponding arteries**.

## 1- Veins of the systemic circulation:

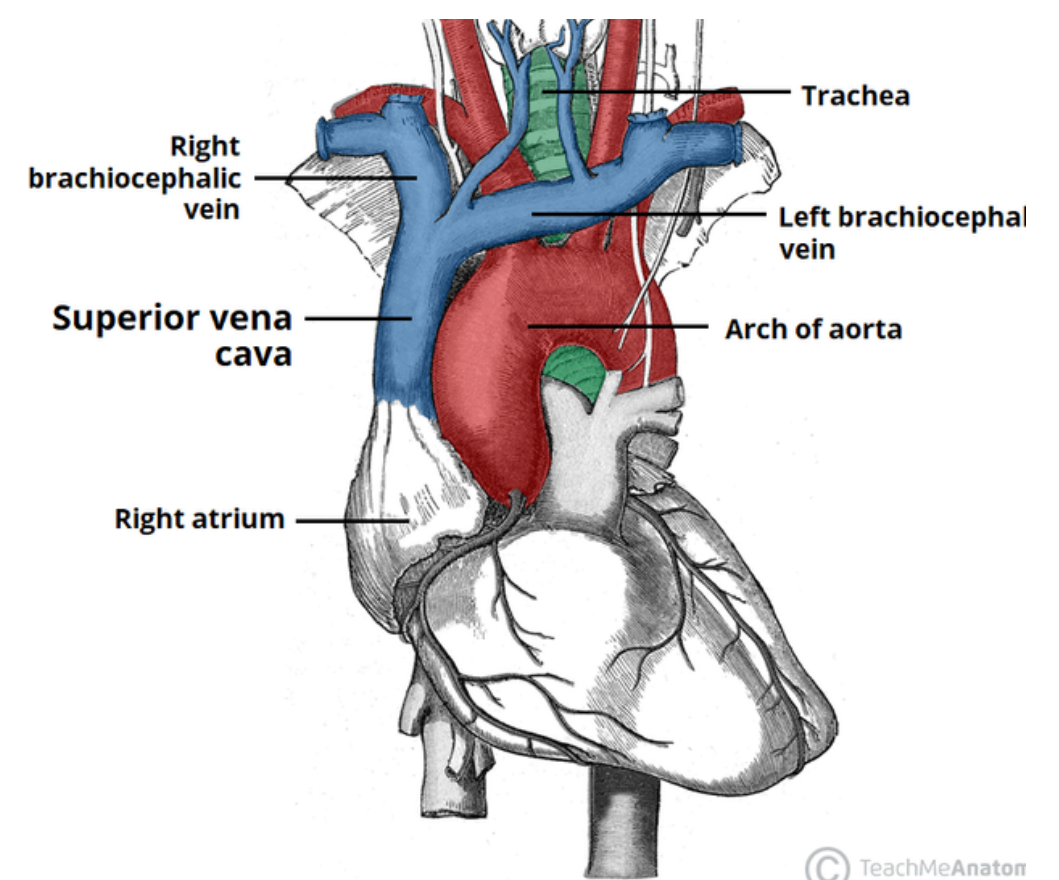
They are veins draining into the **right atrium** of the heart, and are arranged into three groups:

1. Veins draining the heart.
2. Veins draining the upper limbs, head & neck, and thorax, which end into the **SVC**.
3. Veins draining the lower limbs, abdomen and pelvis, which end into the **IVC**.

Ex; Superior and Inferior vena cava with their tributaries.

## 2- Veins of the portal circulation:

Ex; Portal vein.



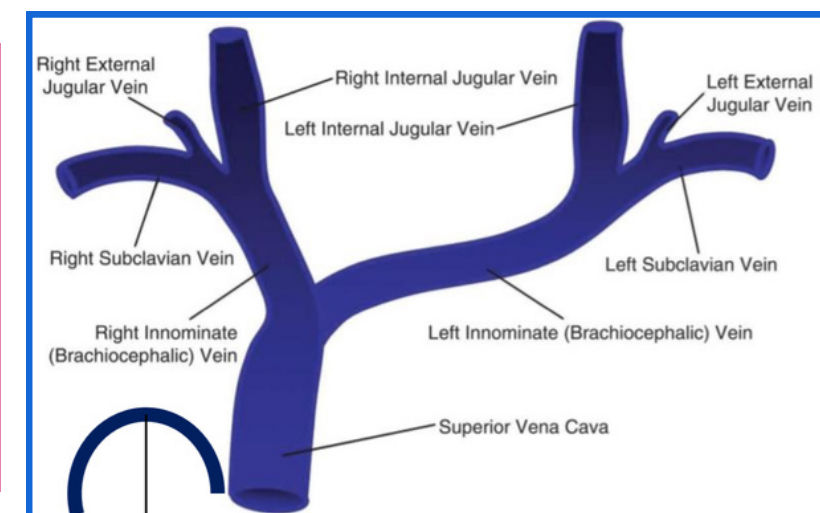
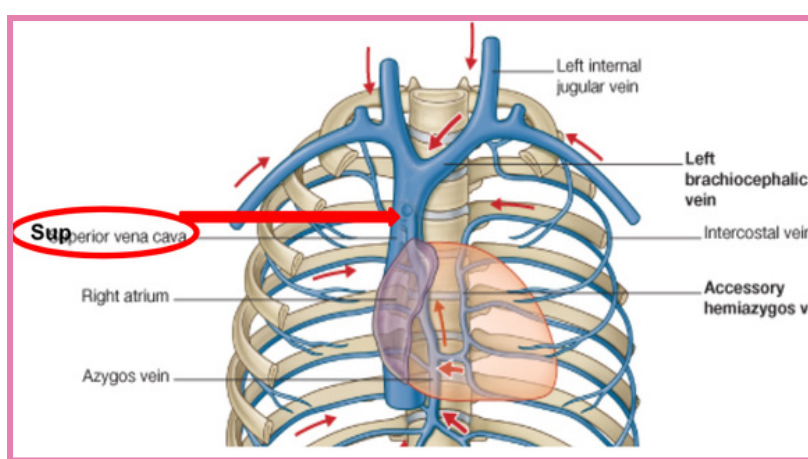
## Veins General Principals



- ◆ Veins have **thinner** walls, **wider** lumen and **less** muscular tissue than arteries.
- ◆ Veins have **valves** that prevent backflow of blood.
- ◆ Veins carry blood under **low** or **negative** pressure.

# Superior Vena Cava

- It is formed by the union of the **right** and **left brachiocephalic veins**, behind the lower border of the 1st right costal cartilage.
- Drains venous blood from:
  - Head & neck.
  - Thoracic wall.
  - Upper limbs

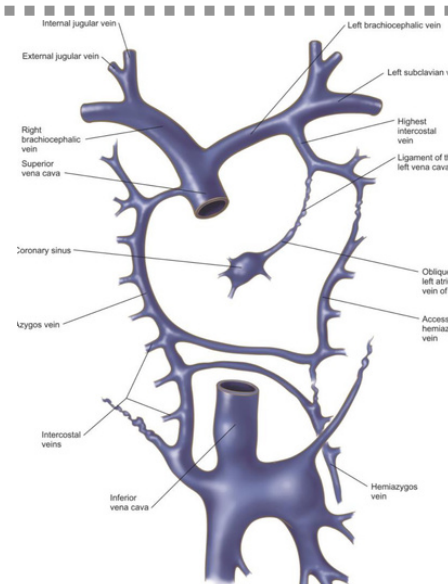


- It passes downward and enter the **right atrium**, at the level of the right 3rd costal cartilage
- Receives **azygos vein** on its posterior aspect just before it enters the heart, at the level of right 2nd costal cartilage (T4). (the only tributary + minor veins of mediastinal, esophageal & pericardial.)
- Brachiocephalic veins are formed by the union of **internal jugular** and **subclavian veins**.

## Azygos vein



It connects inferior vena cava with superior vena cava and can provide an alternative path for blood to the right atrium when either of the venae cavae is blocked.  
N.B.: Azygos = single/unpaired



## Veins of Head & Neck

### Deep veins

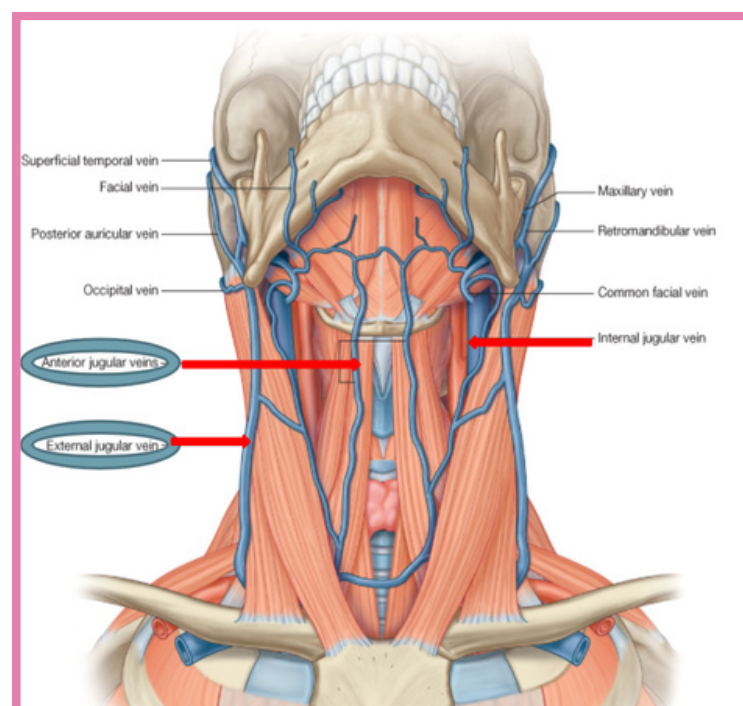
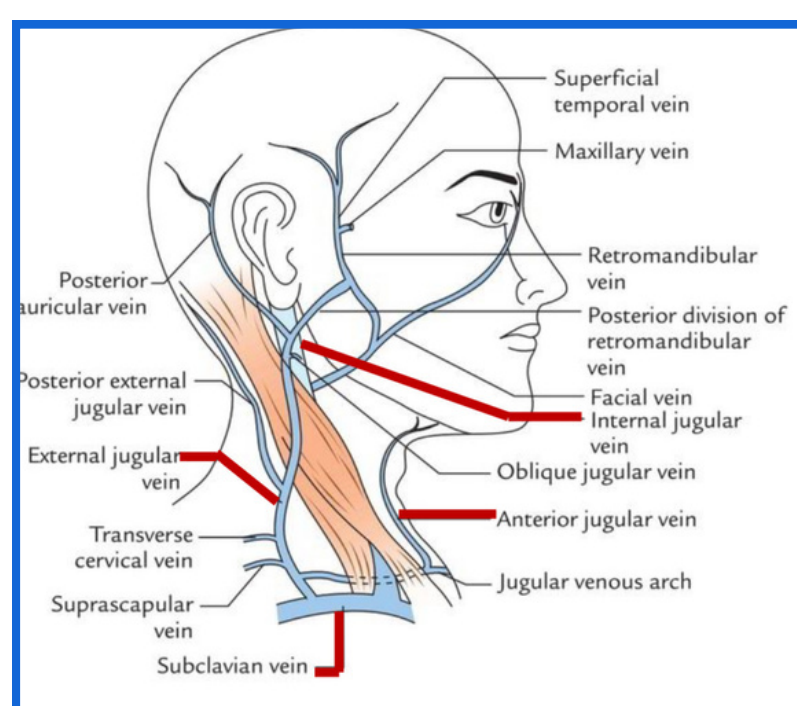
internal jugular vein

subclavian vein

### Superficial veins

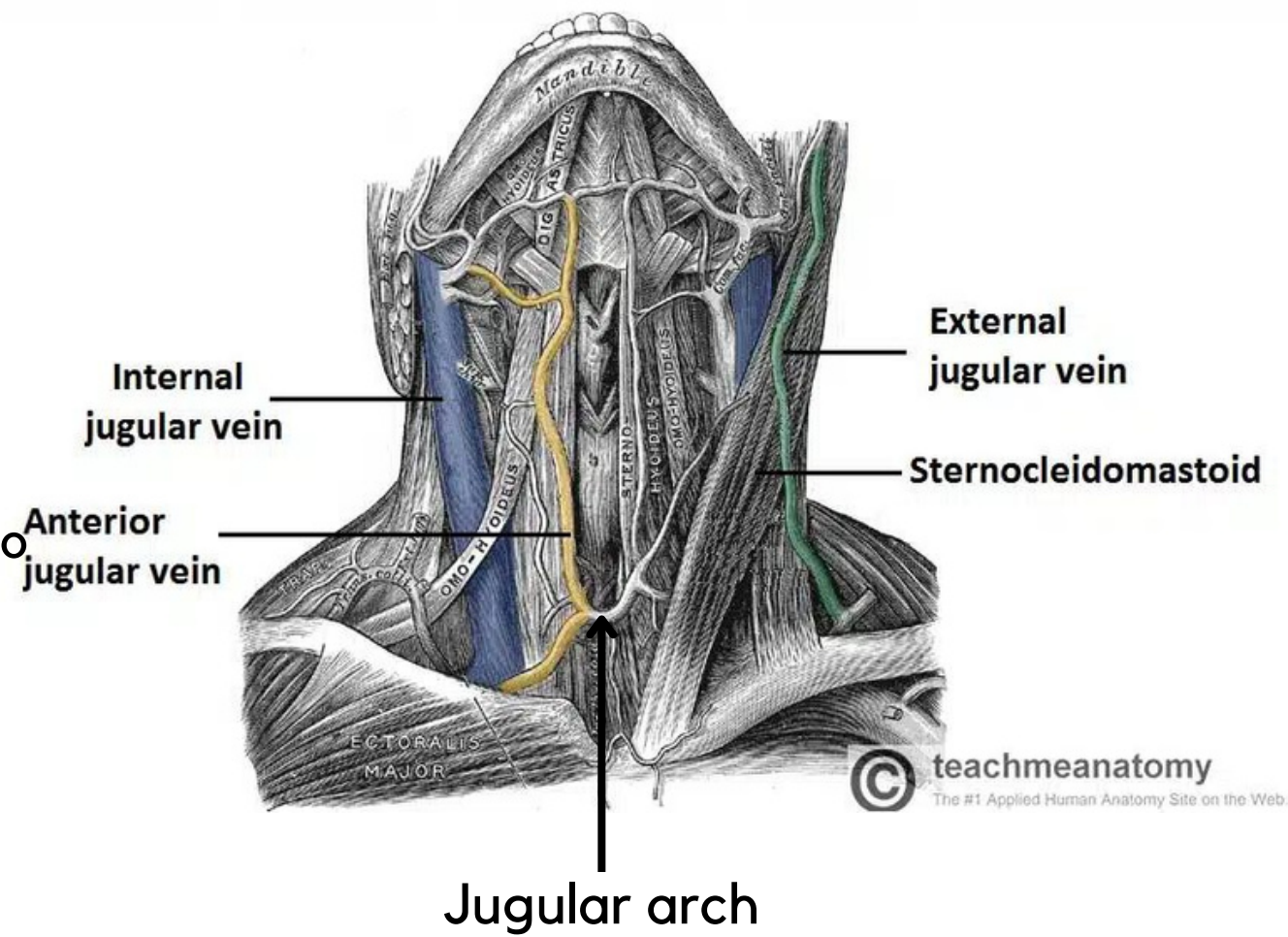
External jugular vein

Anterior jugular vein



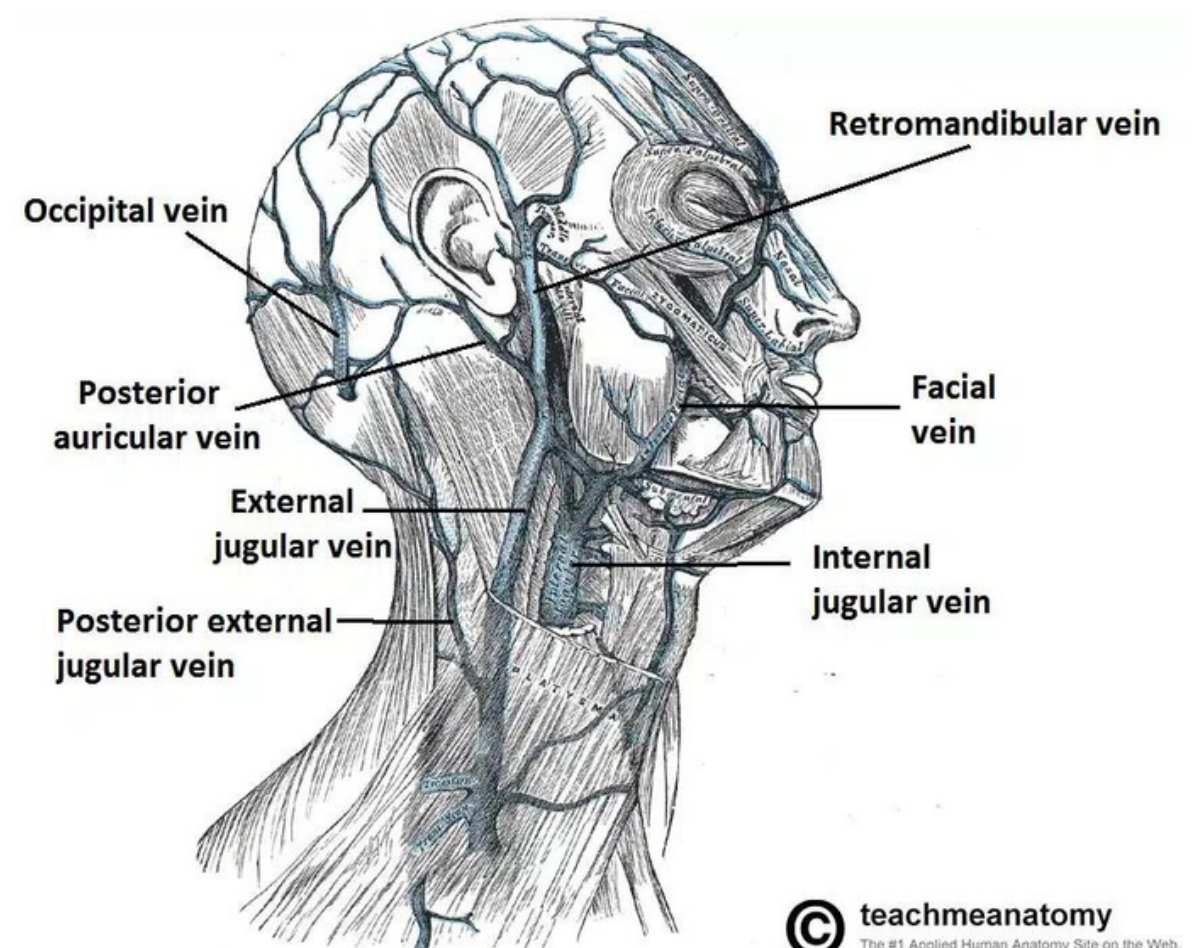
# Anterior Jugular Veins

- It begins in the upper part of the neck (**below the chin**), by the union of the submental veins.
- It descends close to the midline of the neck, medial to the sternomastoid muscle.
- At the lower part of the neck, it passes laterally deep to the sternomastoid to end into **"or 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. **It drains the superficial structure** in the anterior aspect of the neck.



# External Jugular Veins

- It is formed by the union of **posterior division of retromandibular vein and the posterior auricular vein**, behind the angle of mandible.
- It descends **superficial** to the sternomastoid muscle.
- **It passes down the neck and it is the only tributary of the subclavian vein. "ends in the subclavian vein."**
- It drains blood from the **"superficial structures of the head and neck"**:
  - > **Outside of the skull.**
  - > **Deep parts of the face.**



# Internal Jugular Veins IMPORTANT!

- ◆ It is the largest vein in the neck.
- ◆ It drains blood from the brain, face, head & neck.

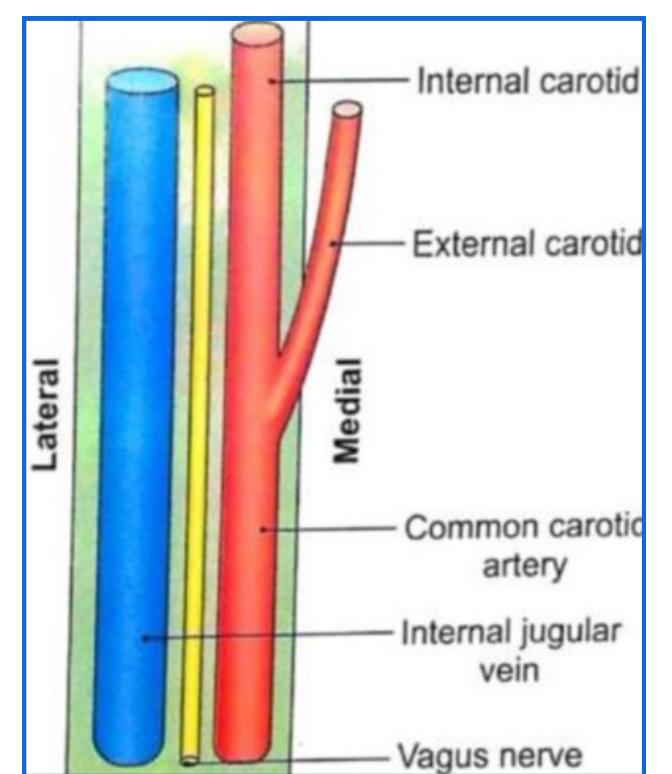
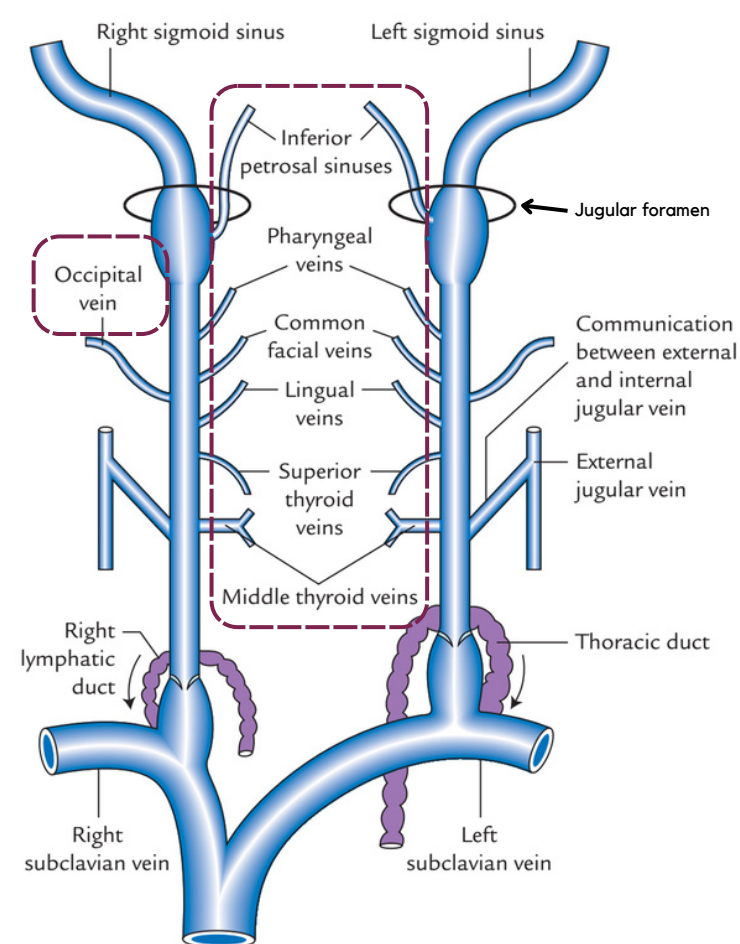
It is the continuation of the sigmoid sinus through the jugular foramen.

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, behind the sternoclavicular joint.

## It has 7 tributaries:

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

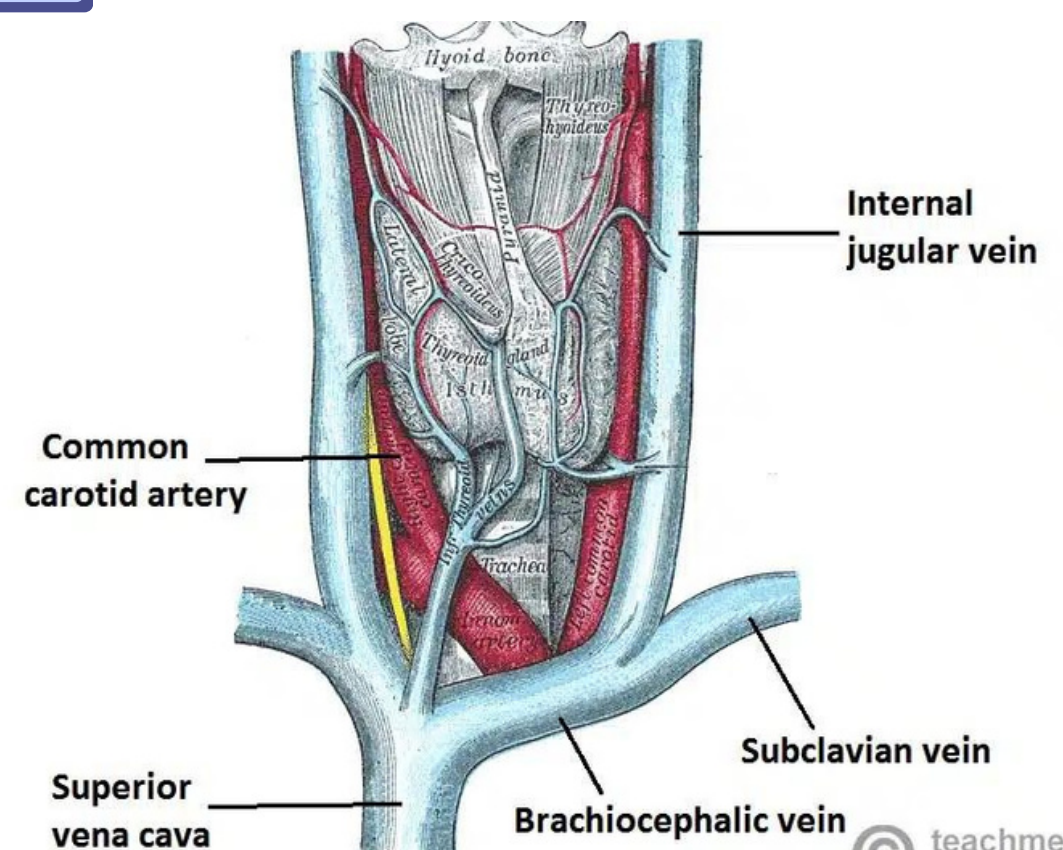


Carotid Sheath

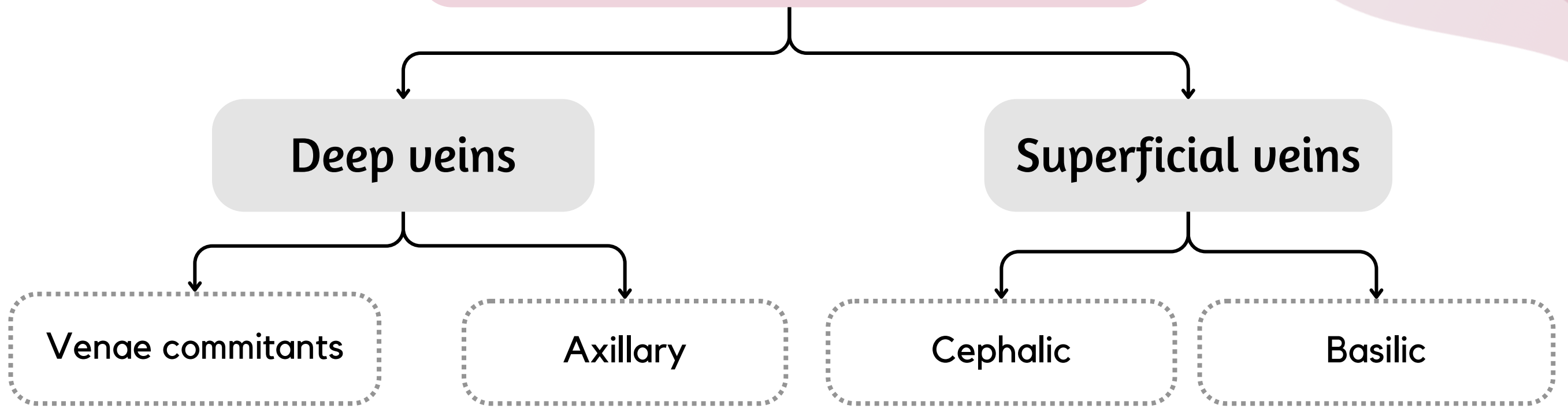
# Subclavian Veins



- ◆ It is the continuation of the axillary vein, at the outer border of the first rib.
- ◆ It joins the internal jugular vein, behind the sternoclavicular joint, to form the brachiocephalic vein.
- ◆ It has only one tributary: **External jugular vein.**



## Veins of Upper Limb



# Superficial Veins of the Upper Limb

## 1

### Cephalic vein

IMPORTANT!

- ✦ It arises from the lateral end of the dorsal venous arch of hand.
- ✦ It ascends (in the superficial fascia) on the lateral side of the forearm and arm (biceps).
- ✦ It runs in the deltopectoral groove.
- ✦ It pierces the clavipectoral fascia to end (drains) into the axillary vein.

## 2

### Basilic vein

Basilic vein is medial /close to the Body

Mnemonic:

To know where the Basilic vein located, remember BM.



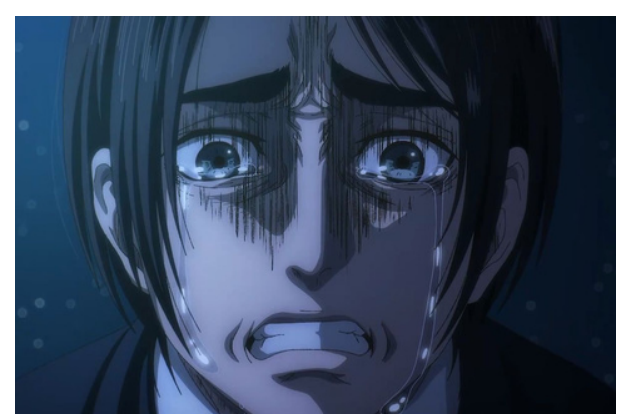
- ✦ It arises from the medial end of the dorsal venous arch of hand.
- ✦ It ascends (in the superficial fascia) on the medial side of the forearm and arm (biceps).
- ✦ In the middle of the arm, it pierces the deep fascia (At the lower border of teres major), joins the venae comitantes of the brachial artery and continues as the axillary vein.

## 3

### Median cubital vein

- ✦ It links the cephalic vein and basilic vein in the cubital fossa.
- ✦ It is a frequent site for venipuncture.

Pictures in the next page



When the blue and pink text is getting a way too much

# Deep Veins of the Upper Limb

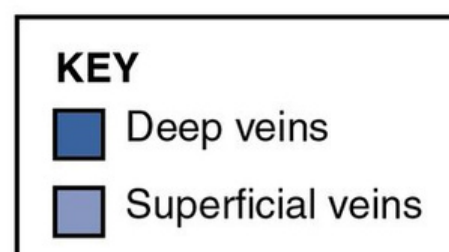
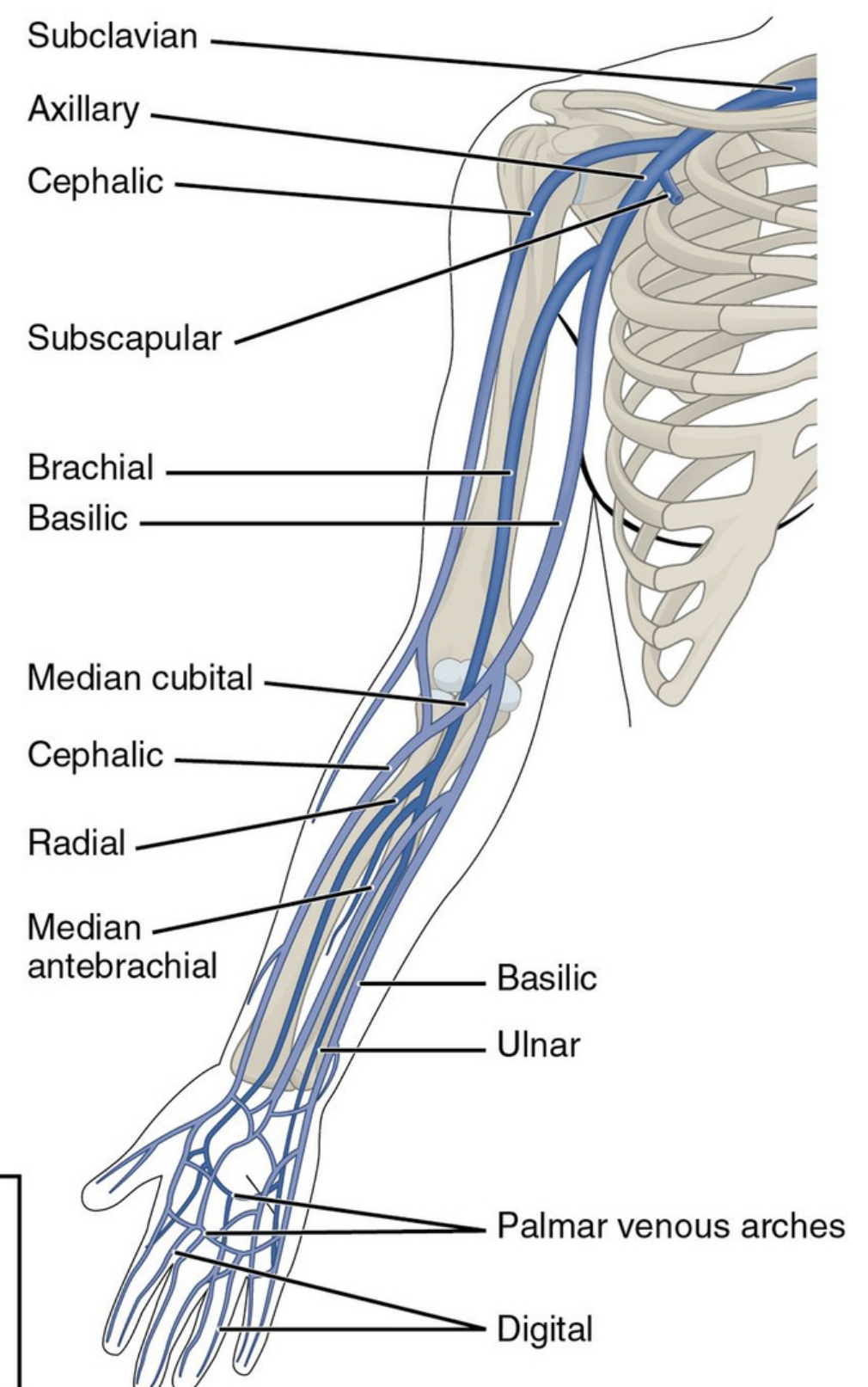
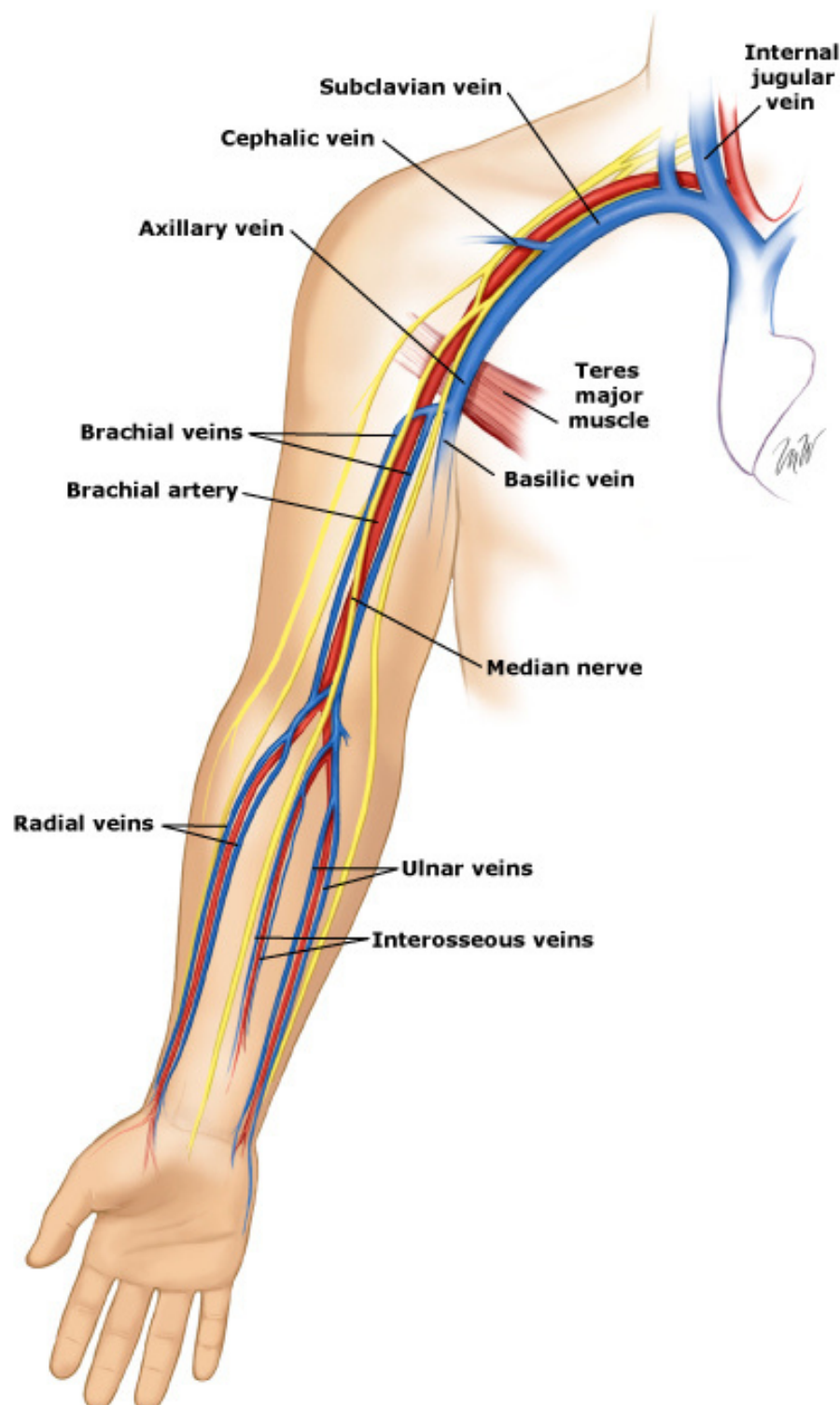
## 1 Venae comitantes

- ◆ They are generally arranged in pairs, and are situated one on either side of the corresponding artery (**accompany all the large arteries**).

## 2 Axillary vein

- ◆ Venae comitantes of the radial artery join those of the ulnar artery to form the venae comitantes of the brachial artery.
- ◆ Venae comitantes of the brachial artery join the basilic vein which continues as the axillary vein.
- ◆ At the outer border of the first rib, the axillary vein continues as the subclavian vein (**it drains finally into the subclavian vein**).

شرح بالعربي:  
 (١) الأوردة المصاحبة للرايالي الارترتي والالنفار ارترتي يتحدون مع بعض ويكونون الأوردة المصاحبة للبراكيال ارترتي.  
 (٢) الأوردة المصاحبة للبراكيال ارترتي تتحد مع البيزيلك فين عشان يكونون بالنهاية الاكزلي فين.  
 (٣) رح يعبر الاكزلي فين إلين يتعدى الحد الخارجي للضلع الأول ويكمل ك سبكلايفيان فين (تكرار من المسكلو)

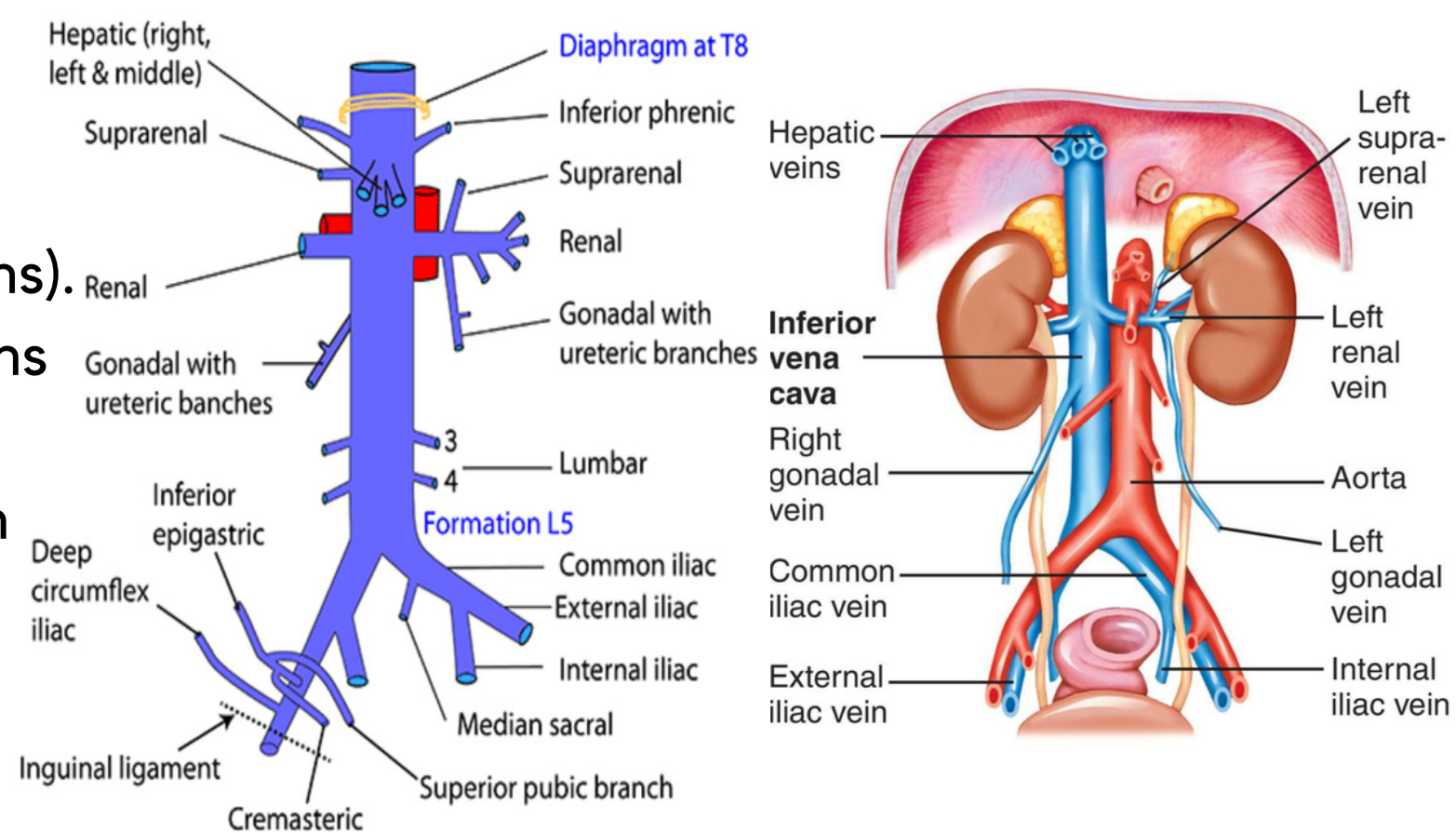


# Inferior Vena Cava IMPORTANT!

- ◆ Drains most of the blood from the body below the diaphragm to the right atrium (from the abdomen, pelvis, & lower limbs).
- ◆ Formed by the union of the **right and left common iliac veins** behind the **right common iliac artery** at **the level of the 5th lumbar vertebra (L5)**.
- ◆ Ascends on the right side of **abdominal** aorta.
- ◆ Enters the thorax through the **inferior vena caval opening** and pierces the **central tendon** of diaphragm **at the level of the 8th thoracic vertebra (T8)**.
- ◆ It ends by opening into the right atrium, at the level of the right 6th costal cartilage

## Tributaries of Inferior Vena Cava:

1. Right & left common iliac veins.
2. Median sacral vein
3. Right & left lumbar veins (4 paired lumbar veins).
4. Right gonadal vein (the left gonadal vein drains into the left renal veins)
5. Right suprarenal vein (The left suprarenal vein drains into the left renal veins)
6. Right & left renal veins.
7. Right & left inferior phrenic veins.
8. Right & left hepatic veins.



# Tributaries of Common Iliac



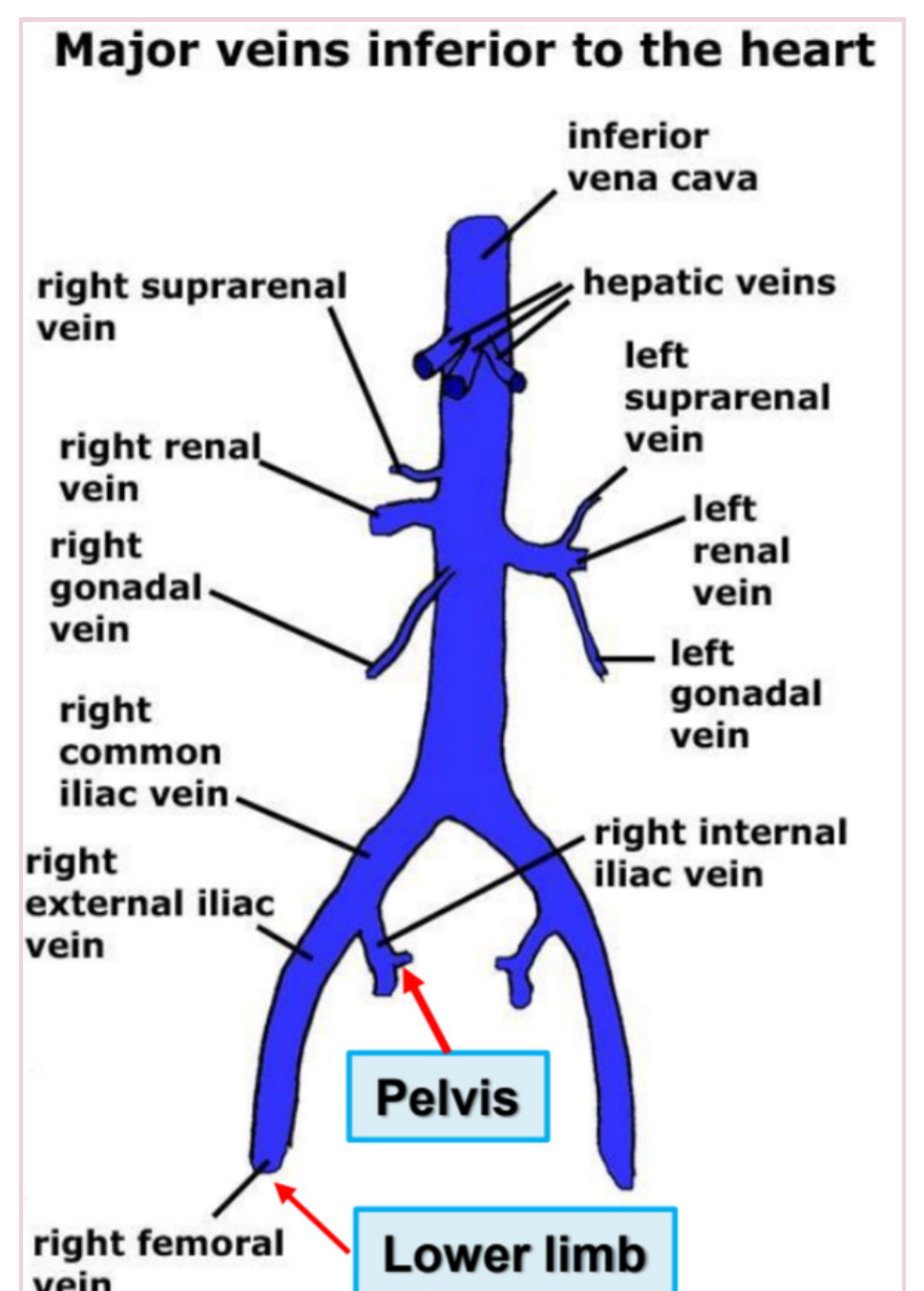
External iliac vein

Internal iliac vein

Continuation of **femoral vein** of the lower limb

fEmoral = EExternal :)

Drains the pelvis





# Veins of the Lower Limb

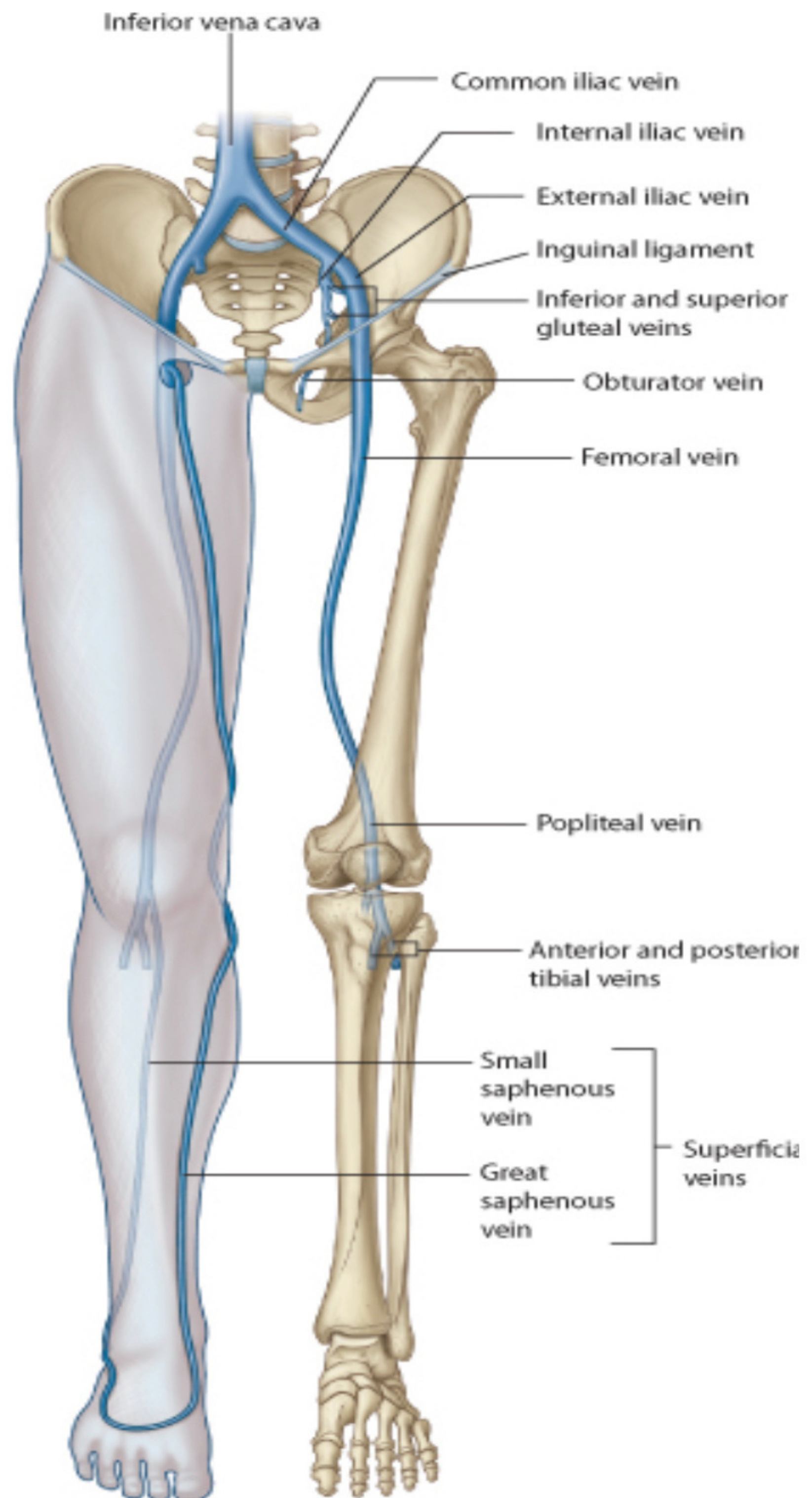
## Superficial veins

lying in the subcutaneous tissue

- 1- Great (long) saphenous vein
- 2- Small (short) saphenous vein

## Deep veins

- 1- Venae comitantes of the anterior, posterior tibial arteries.
- 2- Popliteal vein.
- 3- Femoral vein



# Great Saphenous Vein IMPORTANT!

◆ It is the **longest** vein in the body.

Boys' Dr: frequently asked in the exam

◆ It is connected to the small saphenous vein by one or two branches that pass behind the knee and it is connected to the deep veins by numerous perforating veins. , The perforating veins have valves which allow blood flow from superficial to deep veins.

## Beginning

From the **medial end of the dorsal venous arch of the foot.**

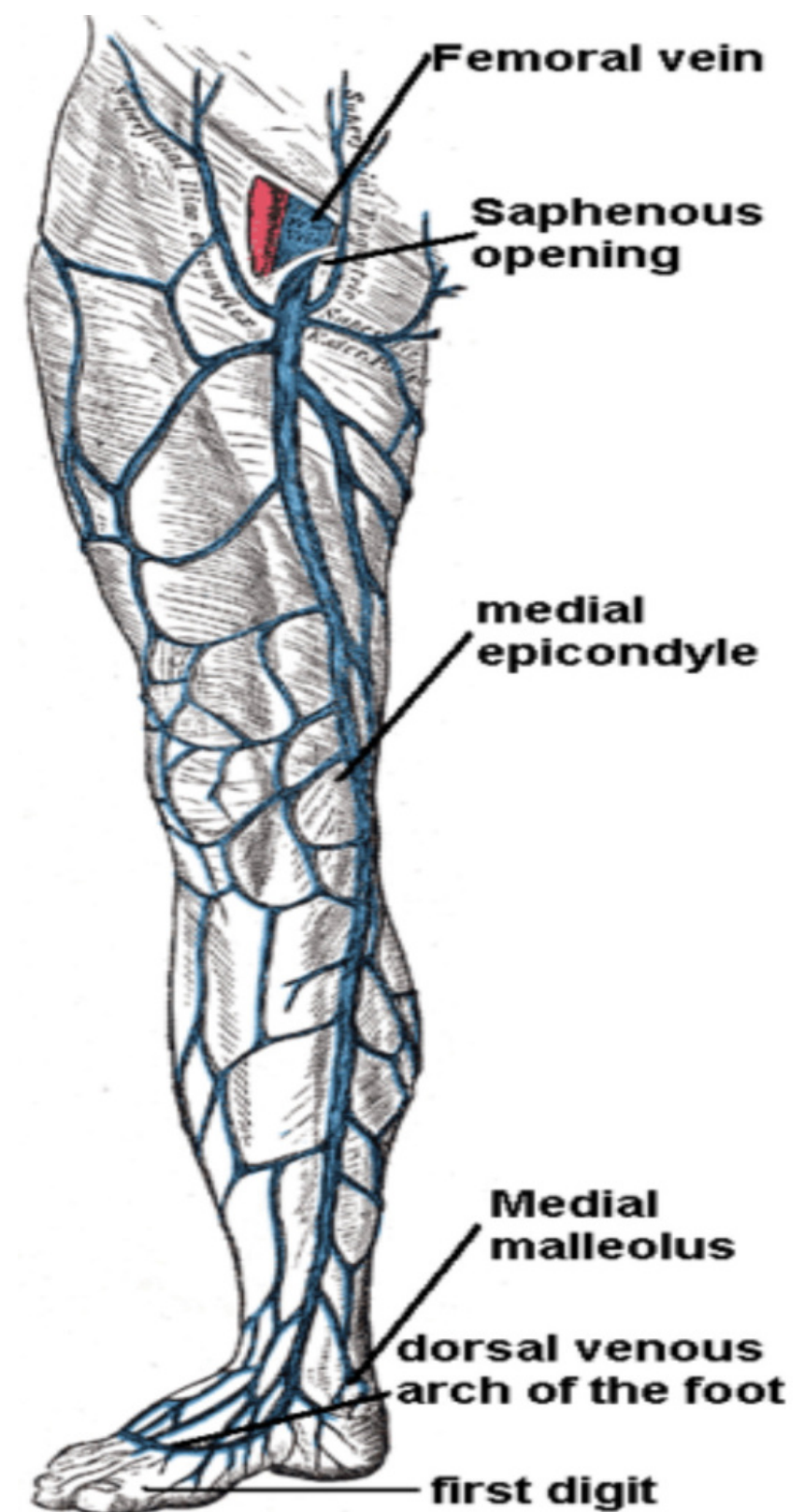
## Course

It ascends (accompanied with saphenous nerve) in the **superficial fascia** :

1. **passes upward** In front of medial malleolus of tibia.
2. **On medial surface of tibia / over the medial side of the leg.**
3. **On medial side of knee joint / Ascends obliquely upwards, passing behind the knee then curves forward around the medial side of the thigh.**

## Termination

In front of thigh, **Hooks through the lower part of / passes through the saphenous opening in the deep fascia** (1.5 inches below & lateral to pubic tubercle) to **end in the femoral vein.**

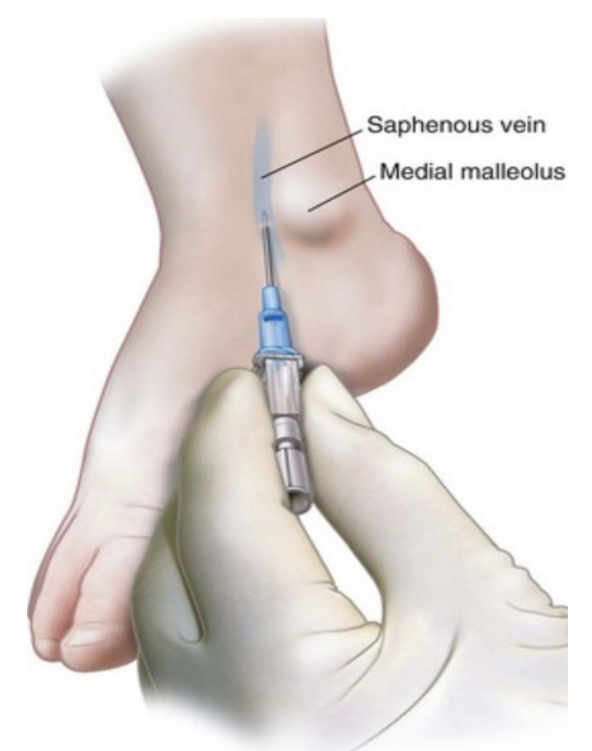


## Clinical Applications of the Great Saphenous Vein

### Venous Cutdown

The great saphenous vein is used in **saphenous venous cutdown** (emergency procedure in which the vein is exposed surgically and then a cannula or needle is inserted into the vein under direct vision), and in **intravenous injection of fluids due to other venous collapse.** When using **great saphenous vein, we should take care of the saphenous nerve.**

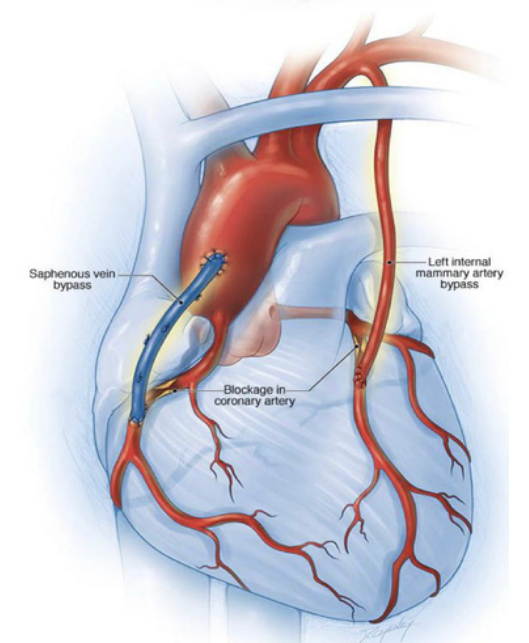
في حال كان الشخص مغمى عليه او dehydrated هذا الوريد راح يكون اوضح وريد يقدرن يدخلون فيه المغذي



### Coronary Bypass

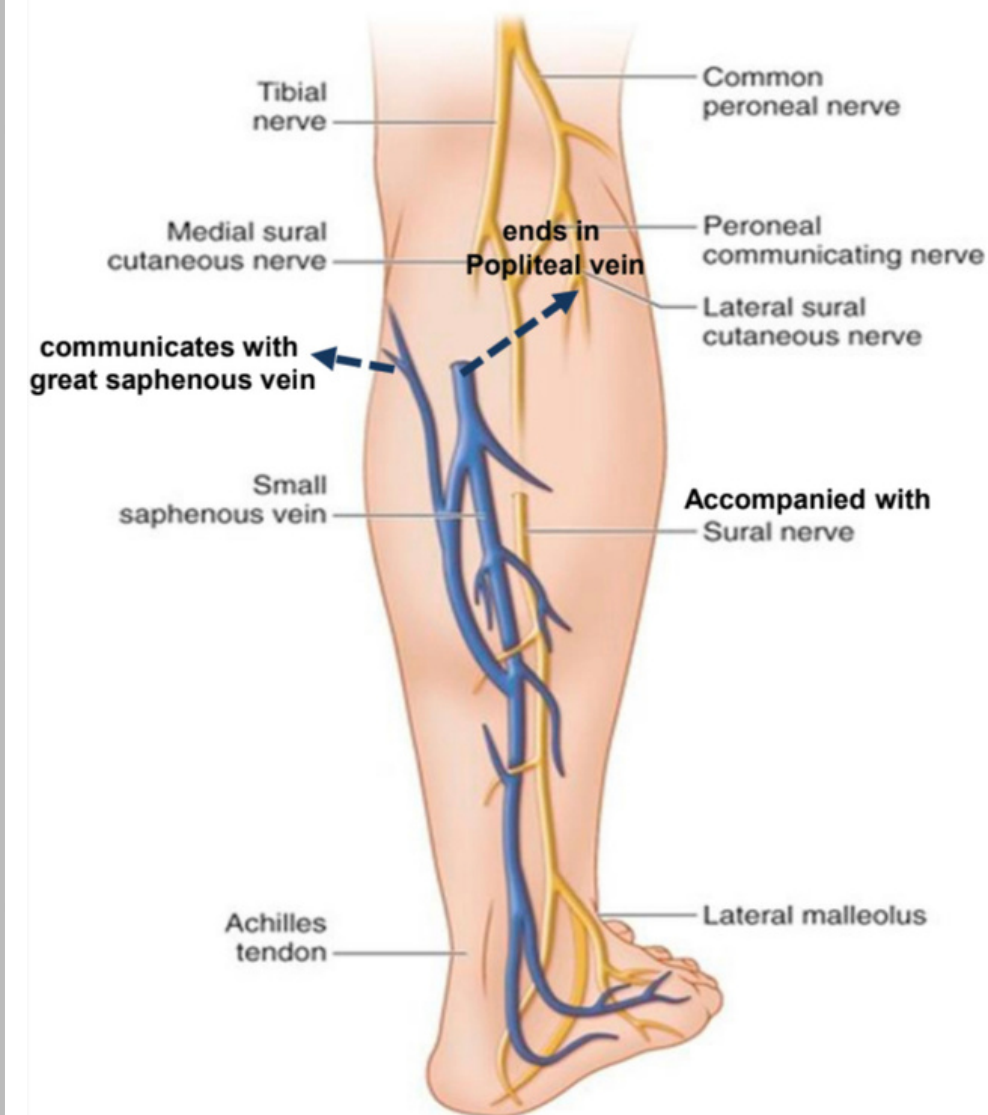
It is also used in **venous grafting** and **coronary bypass surgery** (bypass the blocked portion of the coronary artery with a piece of a healthy blood vessel from elsewhere in the body to restore blood flow into the heart).

في حال كانت فيه مشكلة ف coronary artery مثل انه مسدود ممكن يقصون ال vein saphenous great ويفتحون مجرى ثاني للدم بدال coronary artery



# Small Saphenous Vein

<b>Beginning</b>	Arise from the lateral end of the dorsal venous arch of the foot
<b>Course</b>	<ul style="list-style-type: none"> <li>Runs along the lateral border of the foot tendo calcaneus, ascend below then behind the lateral malleolus, to the posterolateral aspect -runs up to the back- of the leg (accompanied with the sural nerve) to reach the popliteal fossa.</li> <li>Has numerous valves along its course.</li> </ul>
<b>Termination</b>	Pierce the deep fascia in the lower part of the popliteal fossa to end in the popliteal vein (drains into it).
<b>Tributaries</b>	Veins from the back of the leg & from the foot + communicating vein / Anastomosis freely with long (great) saphenous vein



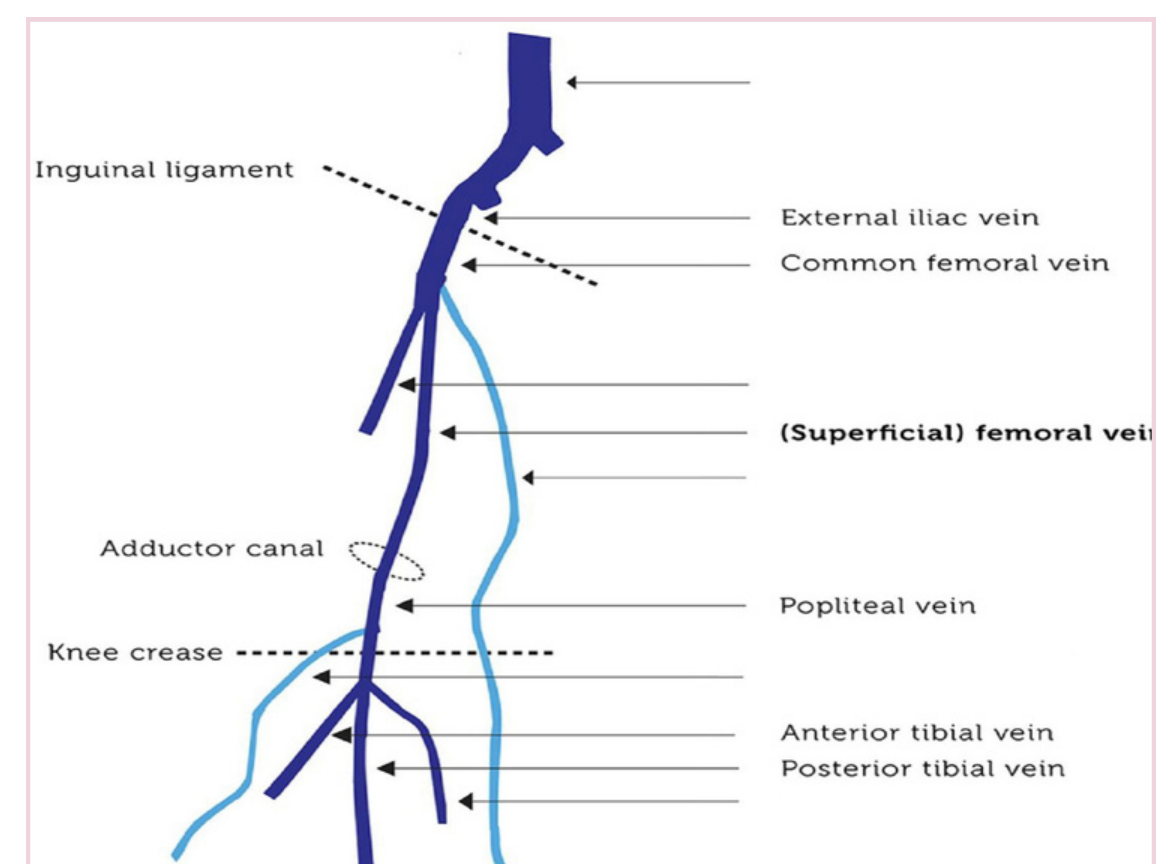
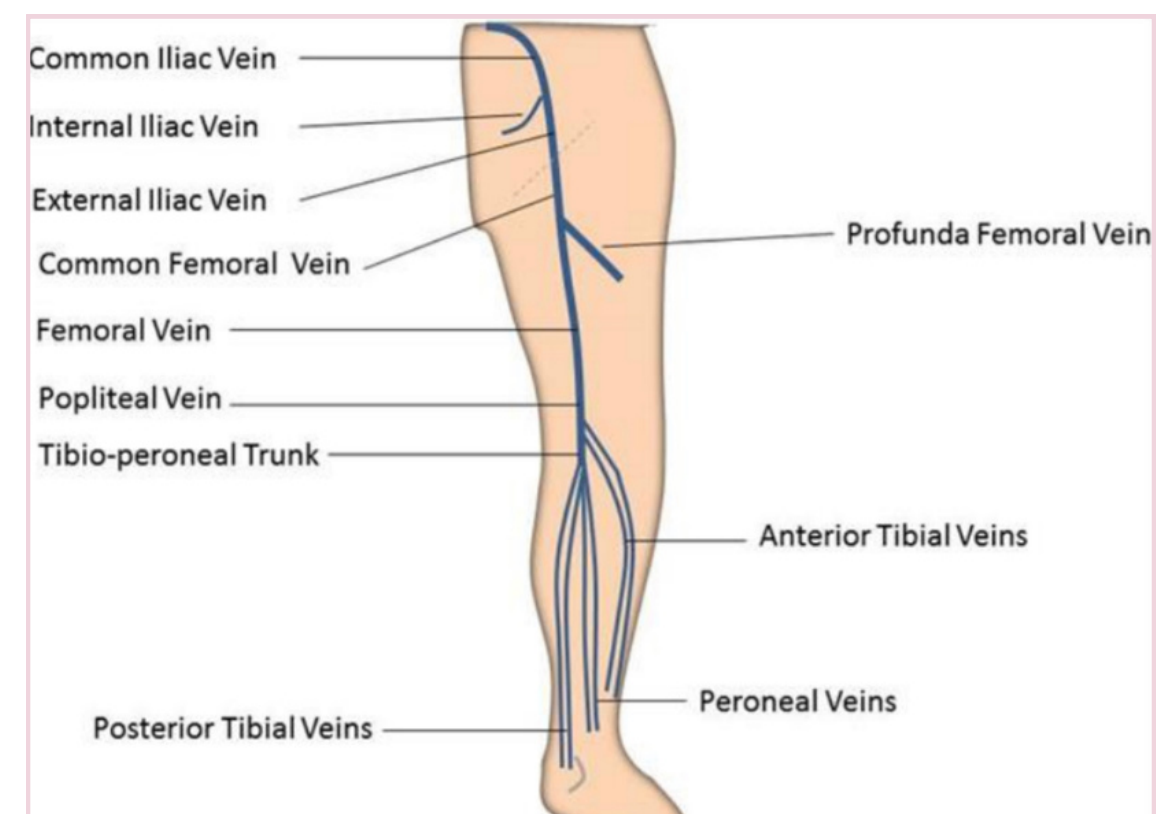
# Deep Veins of the Lower Limb

**1** Comprise the venae comitantes, which accompany all the large arteries, usually in pairs.

**2** The venae comitantes of the anterior tibial artery join the venae comitantes of the posterior tibial artery to form the popliteal vein.

**3** Venae comitantes unite to form the popliteal vein that passes through the adductor hiatus and continues as the femoral vein.

**4** The femoral vein ascends behind the inguinal ligament and continues as the external iliac vein.



# Mechanism of venous return from lower limb

1

Deep veins **receive blood** from superficial veins through **perforating veins**.  
Much of the saphenous blood passes from superficial to the deep veins through the perforating veins

2

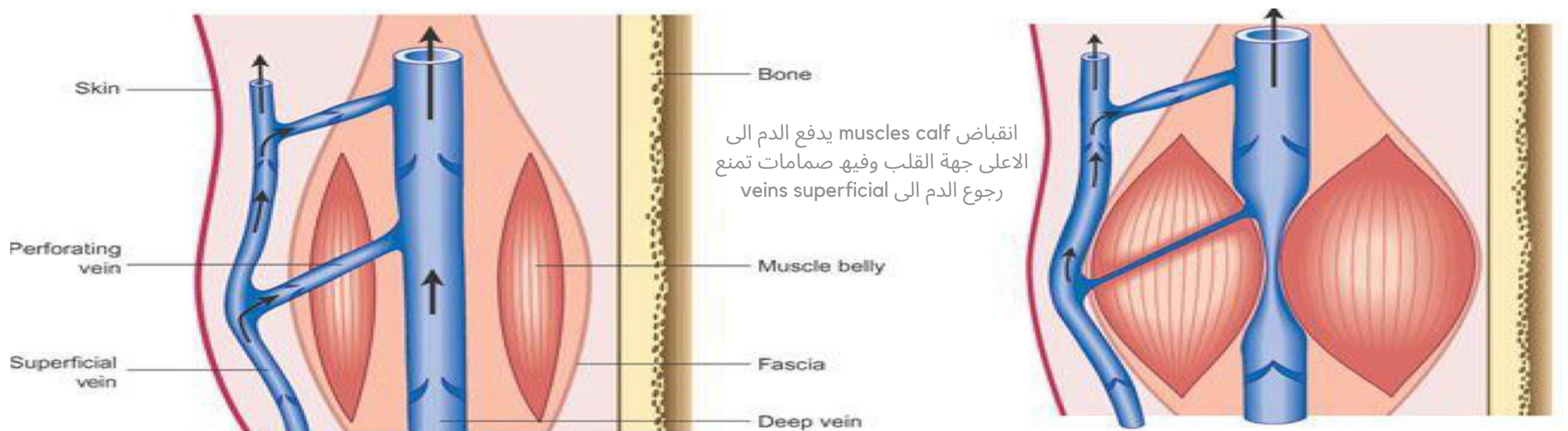
The blood is **pumped upward** in the deep veins toward the **heart** by the **contraction of the calf muscles (calf pump)**.

3

This action of calf pump is assisted by the tight sleeve of deep fascia surrounding these muscles

4

Perforating veins possess **valves that prevent the backflow of the blood into the superficial veins**.



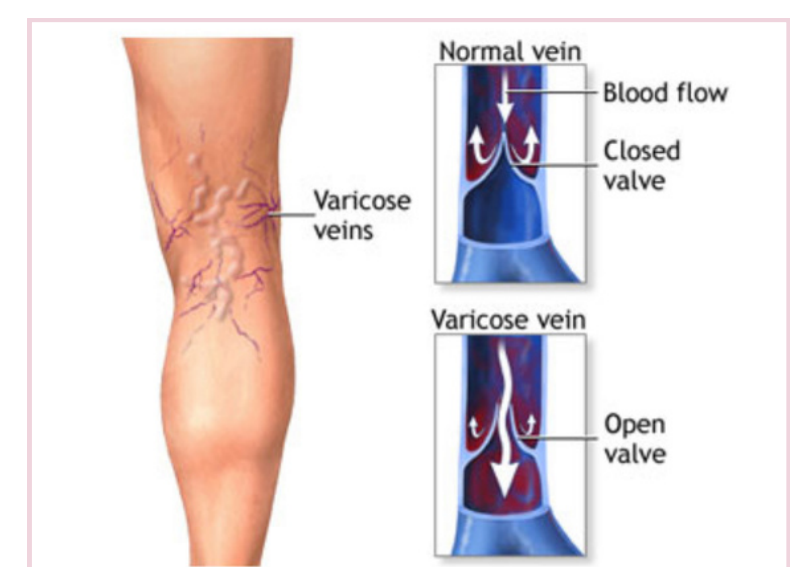
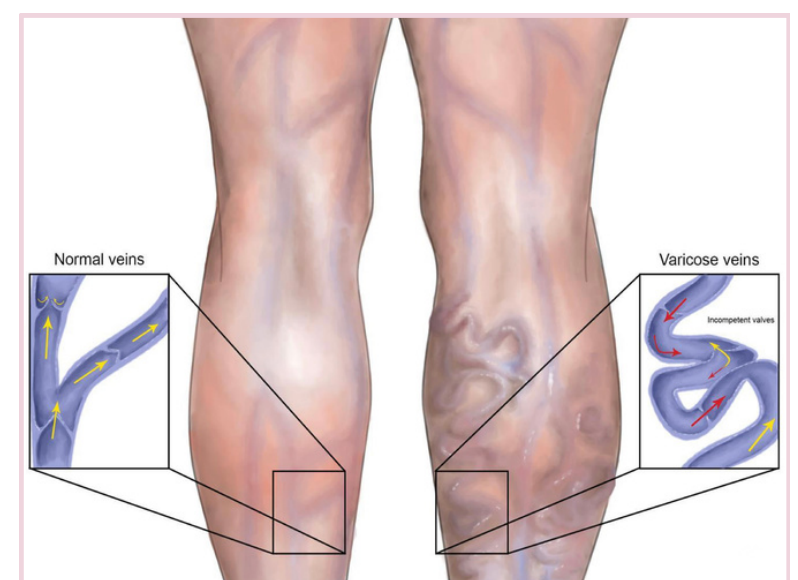
# Varicose Veins of the Lower Limb

**Definition:** Dilated, tortuous and palpable superficial veins of the lower limb. What's the cause of varicose veins?

The main cause of varicose veins is **incompetence of the valves** in the **perforating veins**.

If valves become **weakened or damaged**, the direction of blood flow is **reversed** and the veins become **varicose**.

**Superficial veins** become **enlarged, twisted** and **engorged with blood** and **most common in posterior medial parts of lower limbs particularly in old people**.



# Portal System

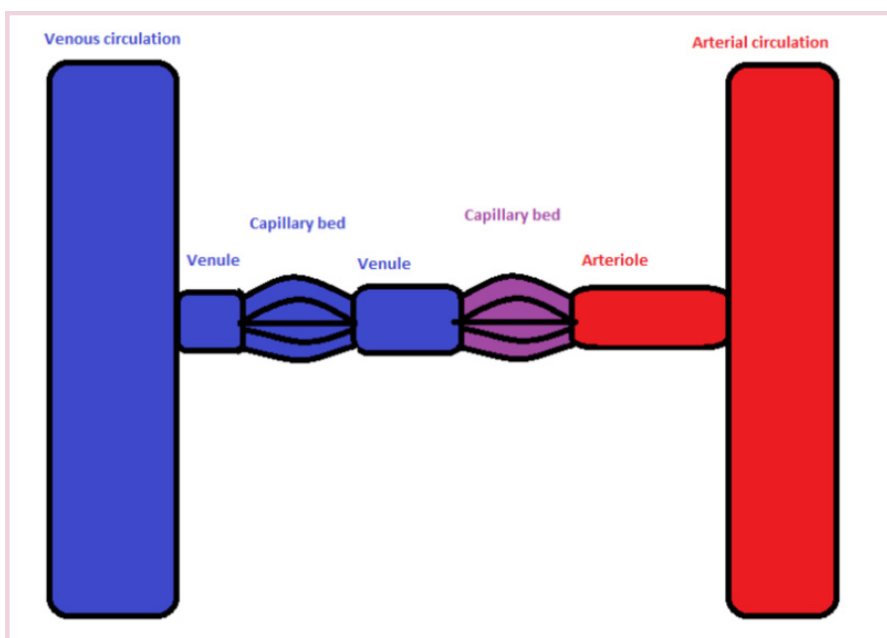
## Definition

A vascular arrangement in which blood collected from one set of capillaries of one organ is transported to another set of capillaries of another organ by a **connecting vein or veins**.

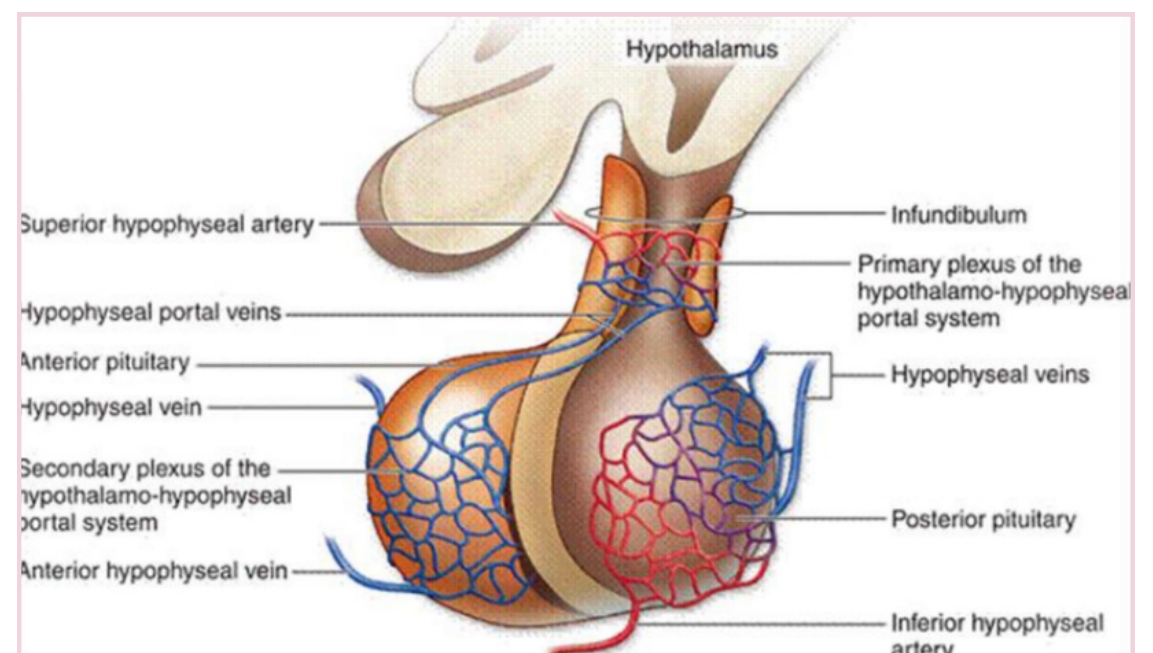
A series of veins or venules that directly connect two capillary beds (of arteriole & venule).

## It includes :

### Hepatic portal system



### Hypophyseal portal system



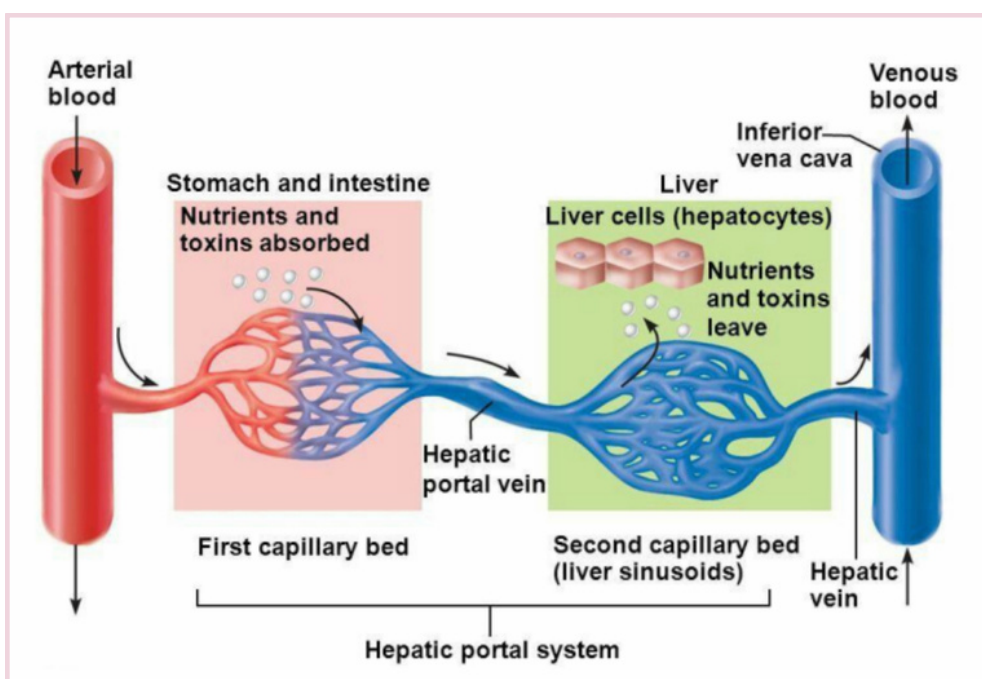
# Hepatic Portal Vein



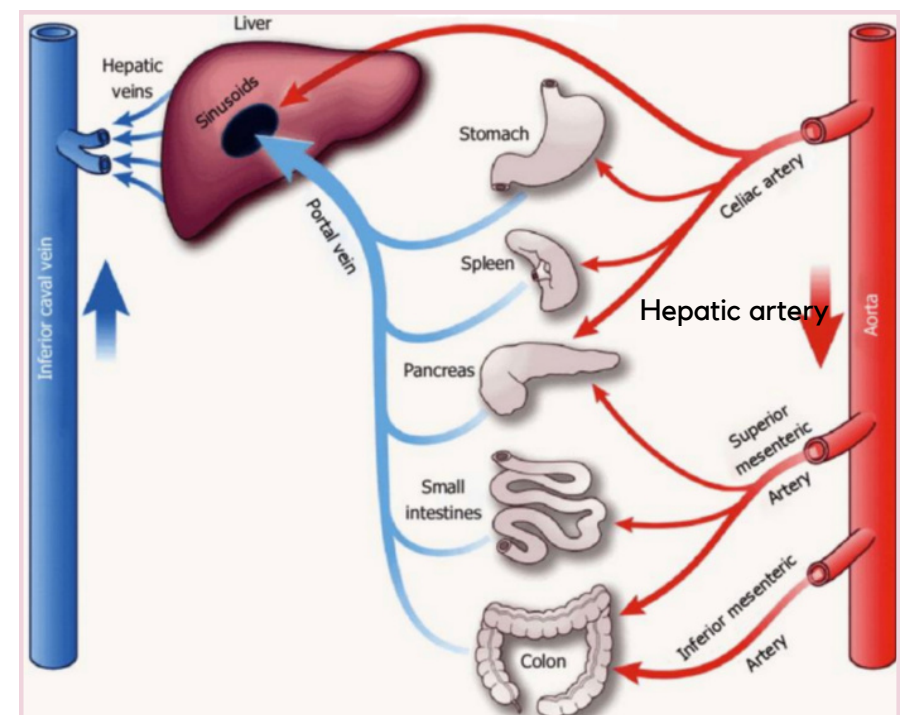
**Hepatic artery** which delivers **oxygenated** blood from the general circulation.

The liver receives a blood supply from two sources:

**Hepatic portal vein** delivering **deoxygenated** blood from the gastrointestinal tract containing **nutrients**.

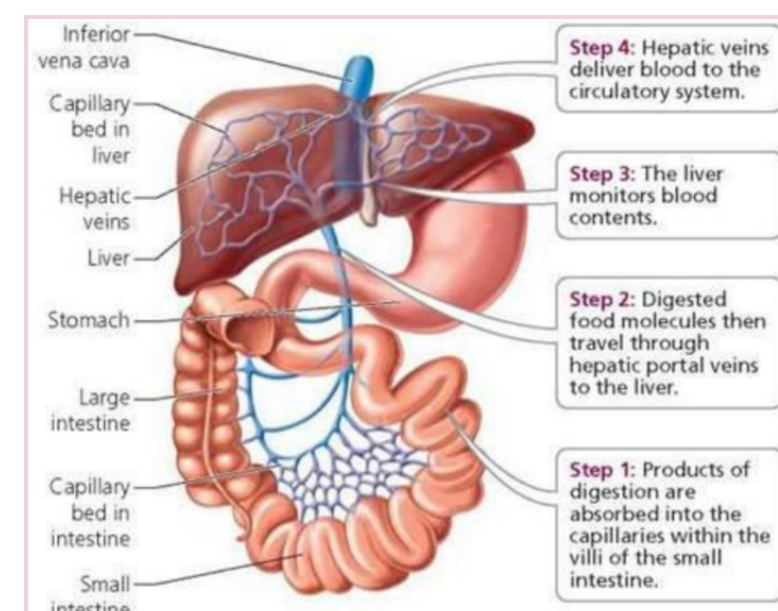
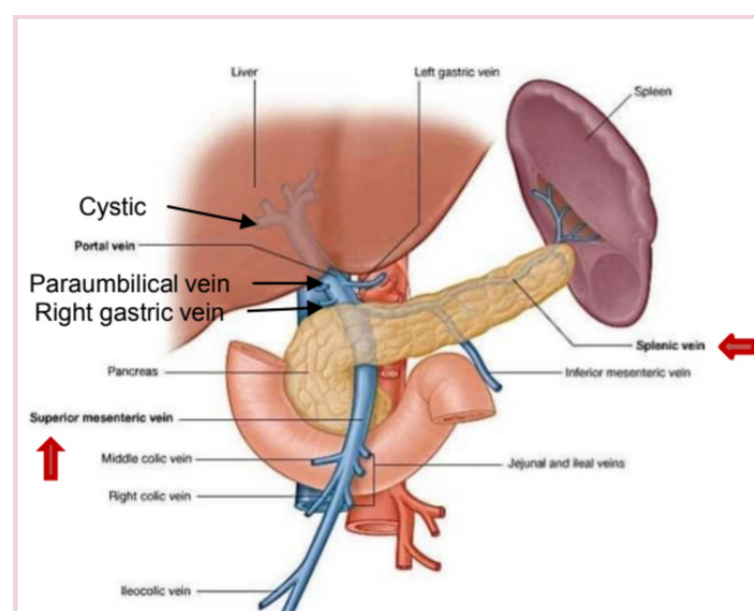
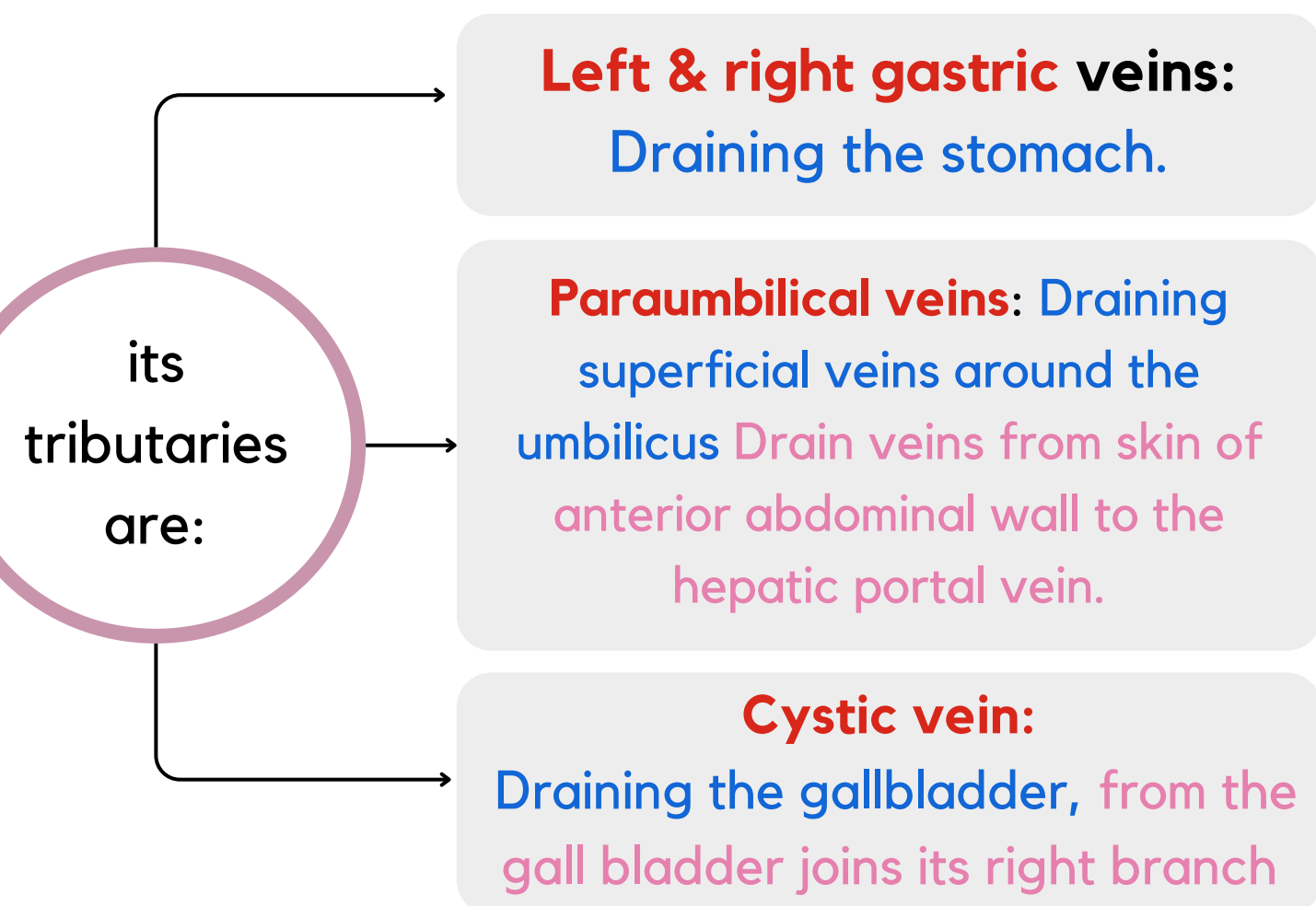


الكبد يقيها دم مؤكسج عن طريق artery hepatic ويغذيها، ويجيها دم غير مؤكسج من GIT وغيرها وهذا الدم يحتوي ع سموم ومواد غذائية وغيرها فنحتاج اننا ندخله الكبد علشان يتم تصفيته وتنظيفه من السموم علشان لم يرجع يدخل ف IVC يكون دم ( غير مؤكسج ) لكن صافي ومافيه سموم او مواد ممكن تضر باقي الجسم



# Hepatic Portal Vein

- 1 The hepatic portal vein is not a true vein because it does not drain into the heart.
- 2 It is formed by the union of **superior mesenteric** and **splenic veins**, behind the neck of pancreas.
- 3 Immediately before reaching the liver, the portal vein ends by dividing into **right & left terminal branches** that enter the liver.



# PortoCaval (PORTO-SYSTEMIC) Anastomosis

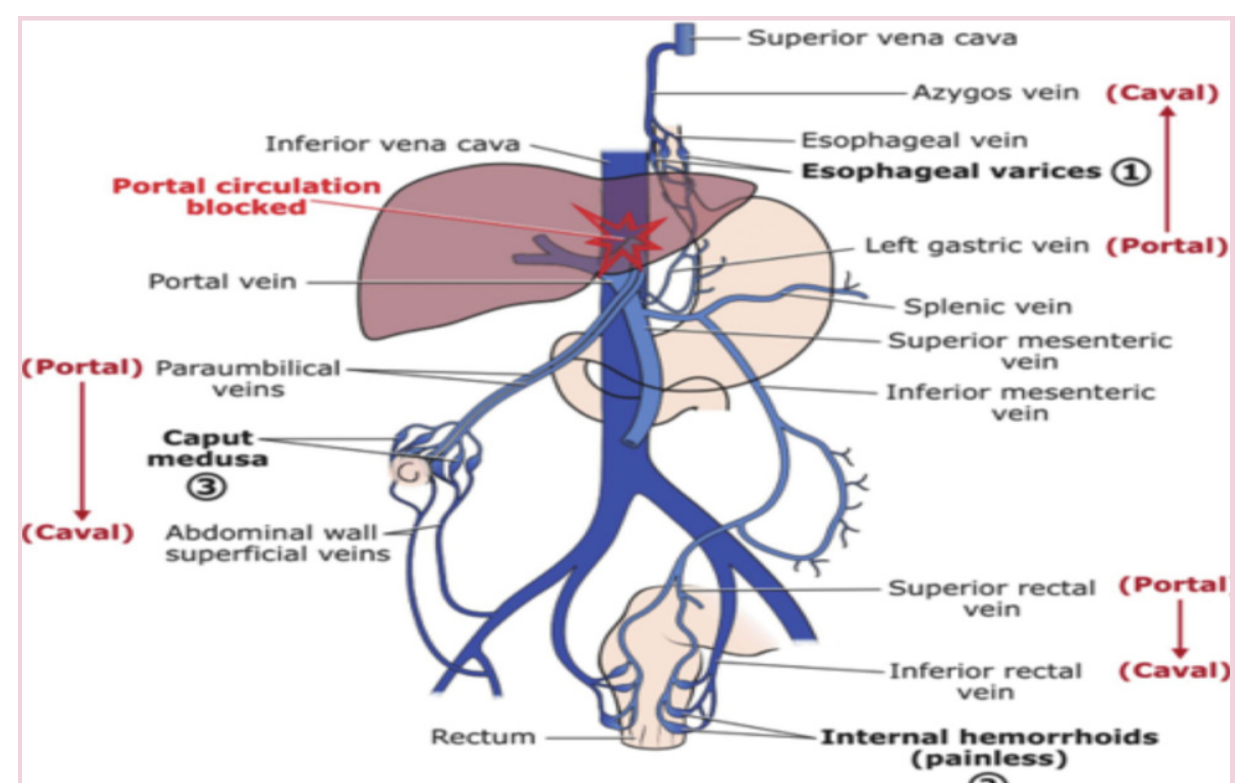
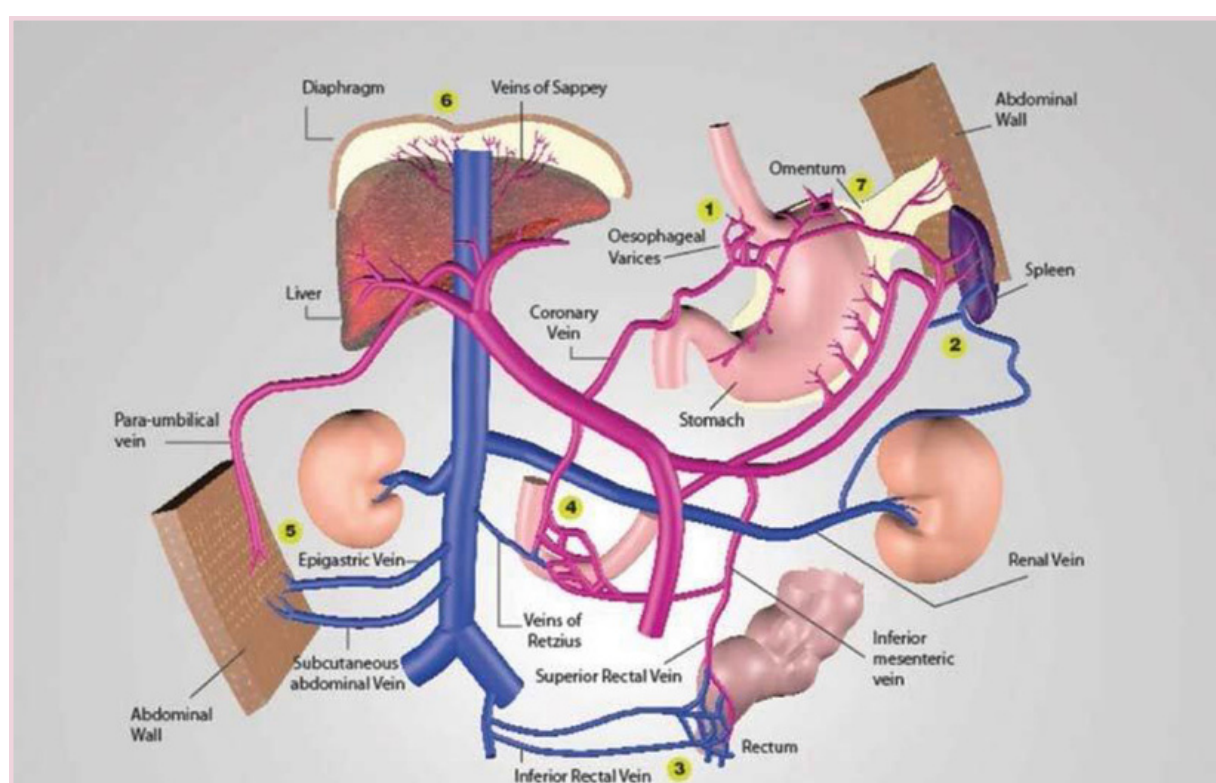
**1** It is a specific type of **anastomosis** that occurs between the veins of portal circulation and those of systemic circulation (IVC)  
The anastomotic channels become **dilated (varicosed)** in case of **portal hypertension**.

**2** The importance of **portocaval anastomosis** is to **provide alternative routes of circulation** when there is a **blockage in the liver or portal vein**.

مفيدة من ناحية ان لو صار فيه انسداد في vein portal يكون فيه مجرى اخر للدم

**3** Even though this is useful, **bypassing the liver may be dangerous**, since it is the main organ in charge for **detoxification and breaking down of substances** found in the **gastrointestinal tract**, such as **medications**.

مفيدة لكنها خطيرة من ناحية ان الجسم راح يفقد خاصية تنقية الدم من السموم وغيرها

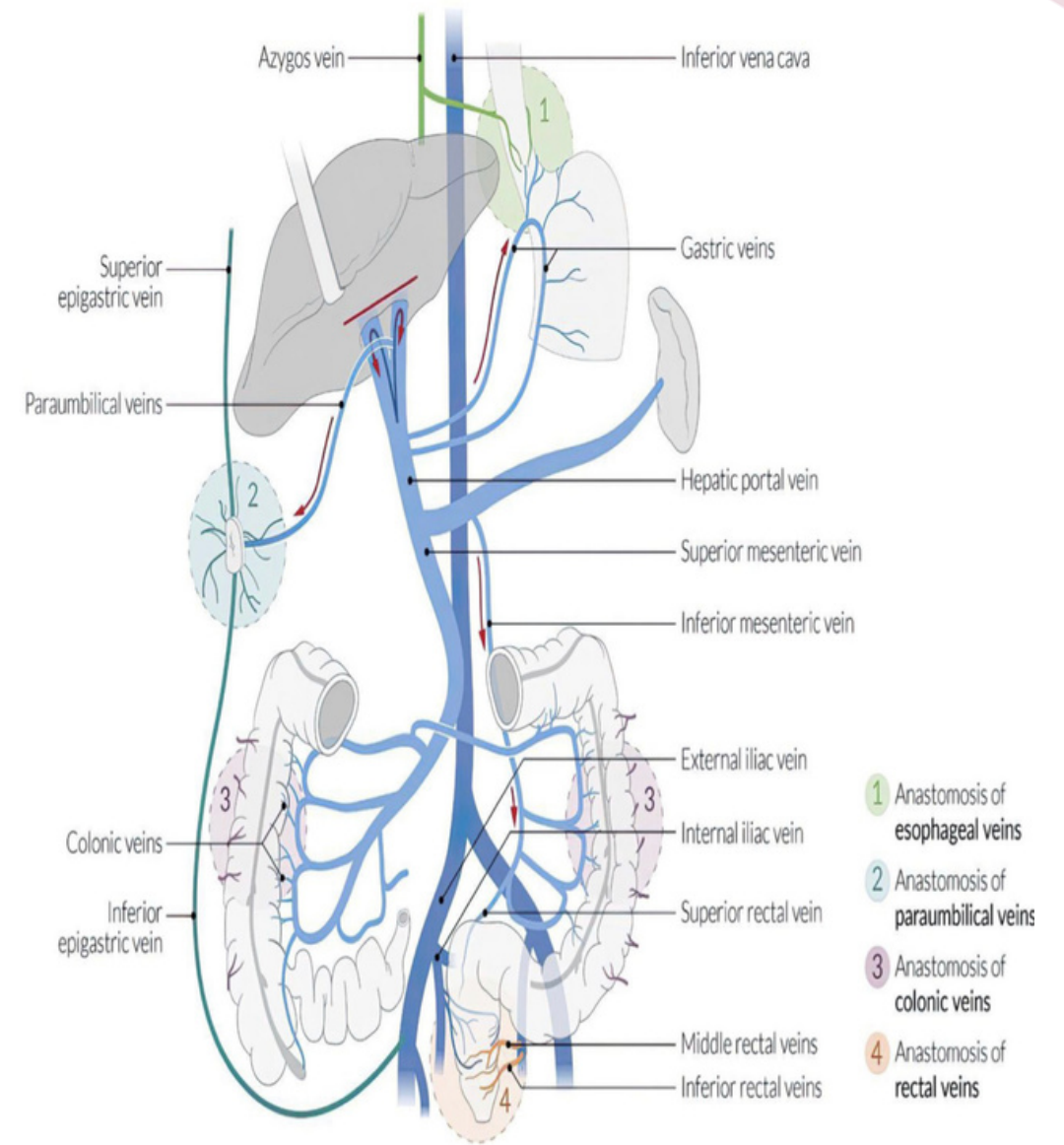


# Sites of PortoCaval Anastomosis



## Sites of PortoCaval Anastomosis:

- ◆ Lower part (end) of esophagus: (Esophageal tributaries of left gastric vein with esophageal tributaries of azygos vein.) / (esophageal varices)
- ◆ Lower part of rectum or upper part of anal canal:(Superior rectal vein with middle and inferior rectal veins) / (Hemorrhoids or piles)
- ◆ Paraumbilical region: (Paraumbilical veins with superficial veins of the anterior abdominal wall (superficial epigastric vein) ) / (Caput Medusae)
- ◆ Retroperitoneal region (post.abd.wall) :(Veins of the colon with veins of the posterior abdominal wall), without any clinical sign.
- ◆ Bare area (posterior surface) of liver: Left branch of portal vein with inferior phrenic veins.
- ◆ Patent ductus venosus (intrahepatic portosystemic shunt) during fetal development : Portosystemic shunts may be congenital or may be acquired with diseases that cause portal hypertension
- ◆ Umbilical vein & portal vein shunt blood via patent ductus venosus into IVC. (Hepatomegaly, ascitis and signs of portal hypertension).

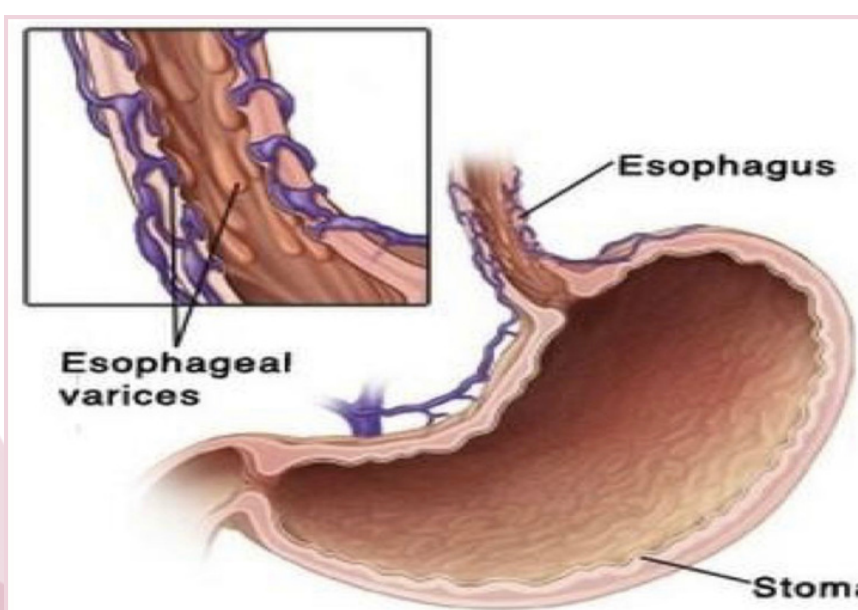


## Effect of Portal Hypertension on PortoCaval Anastomosis



In cases of **portal hypertension** (e.g. liver cirrhosis), the **pressure increases in sites of portocaval anastomosis** and **veins become congested and dilated**. Obstructed portal blood flow may lead into:

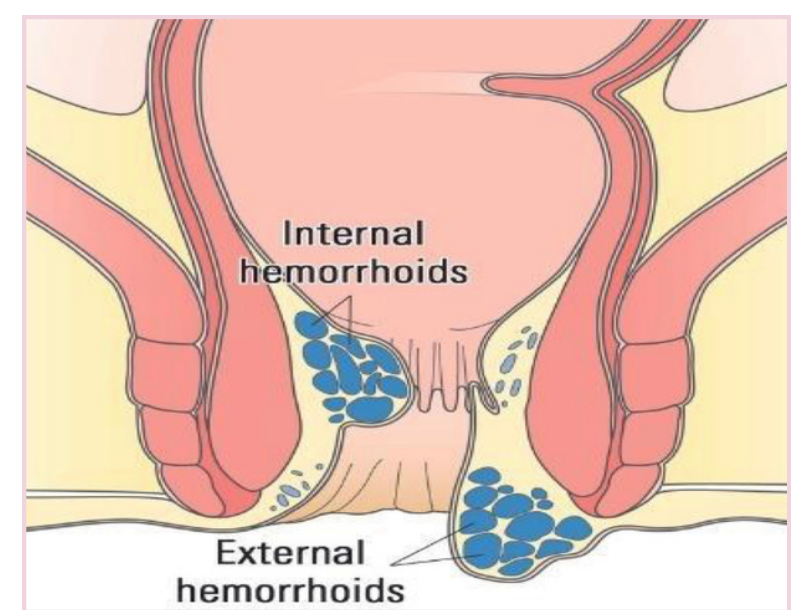
**Esophageal varices:**  
Enlarged veins around the lower end of esophagus which might **rupture** and cause **hematemesis** (vomiting of blood).



**Caput medusae:**  
Swollen veins around the abdomen.



**Hemorrhoids:**  
Swollen and enlarged veins inside the anal canal (internal) and outside and around the anus (external). They are painful (external) and may bleed (internal).



# MCQs

1

which vein connects inferior vena cava with superior vena cava ?

A- Internal jugular vein	B- Subclavian	C- Anterior Jugular Veins	D- Azygos Vein
--------------------------	---------------	---------------------------	----------------

2

the inferior vena cava is formed behind .... and at the level of .... ?

A- Right common iliac artery , level of L3	B- Left common iliac artery , level of L3	C-Left common iliac artery , level of L5	D- Right common iliac artery , level of L5
--	---	--	--

3

the great saphenous vein it is accompanied with .... and ..... malleolus ?

A- sural nerve , in front of lateral malleolus	B- sural nerve , behind of medial malleolus	C- saphenous nerve , in front of medial malleolus	D- saphenous nerve , behind of lateral malleolus
--	---	---	--

4

which vein is used in venous cutdown ?

A- great saphenous vein	B- small saphenous vein	C- femoral vein	D- anterior tibial vein
-------------------------	-------------------------	-----------------	-------------------------

5

Hepatic portal vein is formed by union of ..... behind the neck of pancreas ?

A- superior mesenteric and right renal veins	B- superior mesenteric and splenic veins	C- left gastric and splenic veins	B-Inferior mesenteric and splenic veins
--	--	-----------------------------------	---



1)D 2)D 3)C 4)A 5)B





Finally done...

# SAQs


1

Internal Jugular Veins It descends in the neck along with the ..... arteries and ..... nerve within ..... ?

 internal and common carotid arteries , vagus nerve, within the carotid sheath.

2

Enumerate the tributaries of Internal Jugular Vein?

 1- Superior & middle thyroid 2- Lingual 3- Facial 4- Pharyngeal 5- Occipital veins 6- Dural venous sinuses (inferior petrosal sinus)

3

Enumerate the tributaries of of Inferior Vena Cava ? :

 [slide 8](#)

4

what is the sites of PortoCaval Anastomosis

 [slide 15](#)

More questions? [Click here!](#)



# TEAM LEADERS

**Nisreen Alotaibi**

**Ziyad Alenazi**

# TEAM MEMBERS

- **Aleen Almutairi**
- **Shaden Alotaibi**
- **Lama Alrasheed**
- **Loyal Alkhalifah**
- **Jenan Alsayari**
- **Nouf Alotaibi**
- **Aljory Alqahtani**
- **Lubna Alamri**
- **Ward Alanazi**
- **Elaf Alshamlan**

- **Omar Albaqami**
- **Fawaz Almadi**
- **Faris Alturaiki**
- **Nasser Alabdulsalam**
- **Abdullah Alzoom**
- **Waleed Alanazi**
- **Sulaiman Abdulkarim**
- **Odai AlJarawneh**
- **Rakan Alarifi**
- **Ali Al-Abdulazem**
- **Omar Alattas**