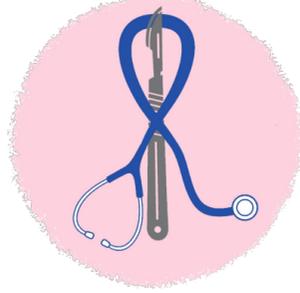




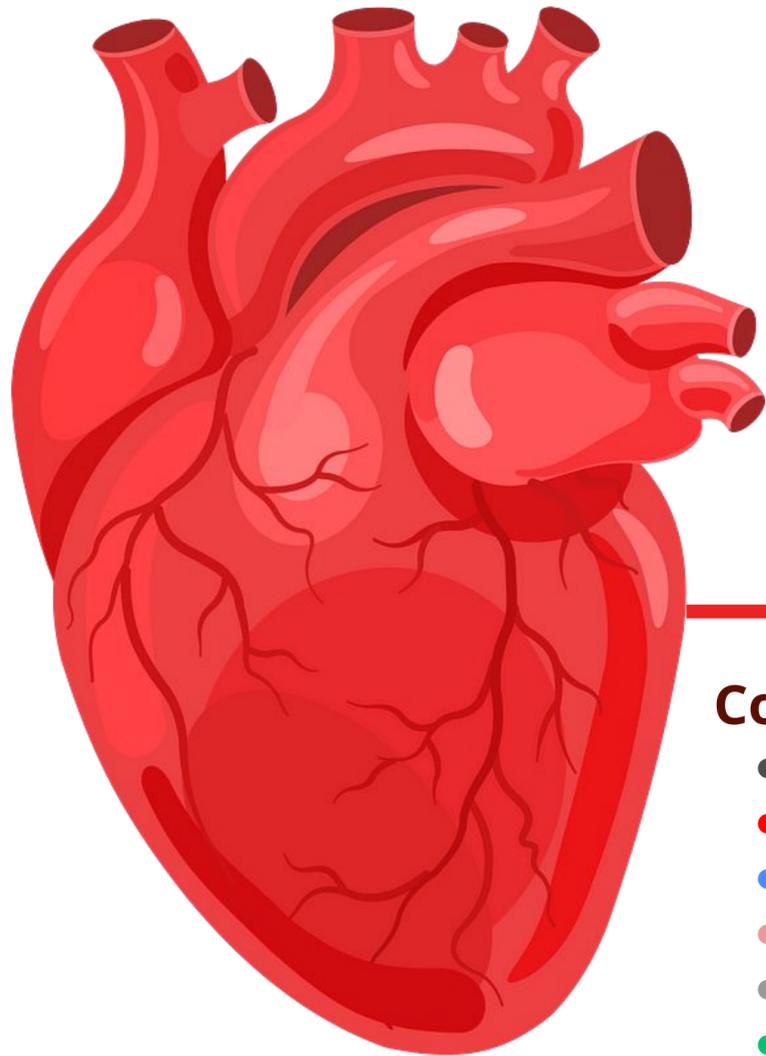
MED441
KING SAUD UNIVERSITY



Revised & Reviewed
by:
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Faye Wael Sendi



Major veins of the body



Color index:

- Main text
- **Important**
- **In male's slides only**
- **In female's slides only**
- Extra information, explanation
- **Doctors notes**



Editing file CVS

Objectives

01.

Define the veins, and understand the general principle of the venous system.

02.

Describe the superior & inferior Vena Cava and their tributaries.

03.

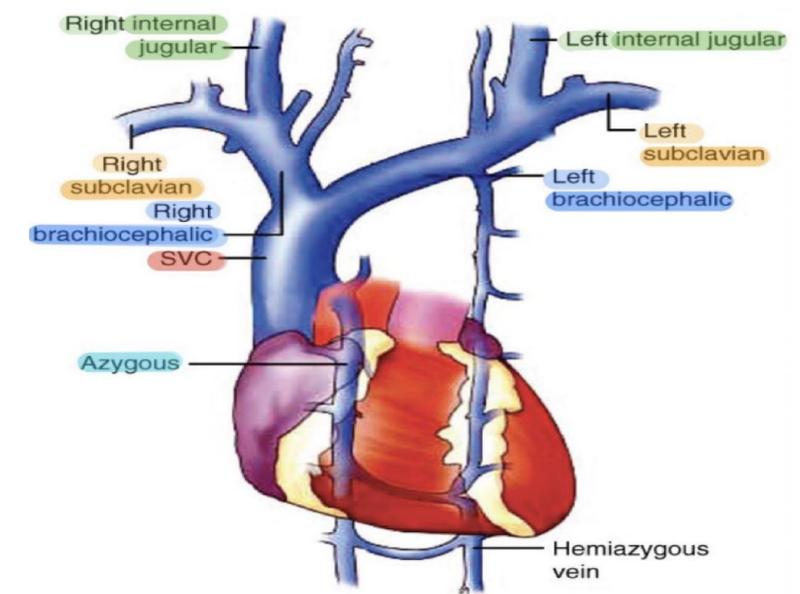
List major veins and their tributaries in the body.

04.

Describe the Portal Vein and the Portocaval Anastomosis.

Veins

- Veins are blood vessels that bring blood back to the heart.
- All veins carry **deoxygenated** blood with the **exception** of the **pulmonary veins** (open in the left atrium) and **umbilical vein** (during fetal development).



Location:

- **Superficial** veins: close to the surface of the body. **NO** corresponding arteries. (The major superficial veins of the upper limb are cephalic and basilic vein)
- **Deep** veins: found deeper in the body **WITH** corresponding arteries.

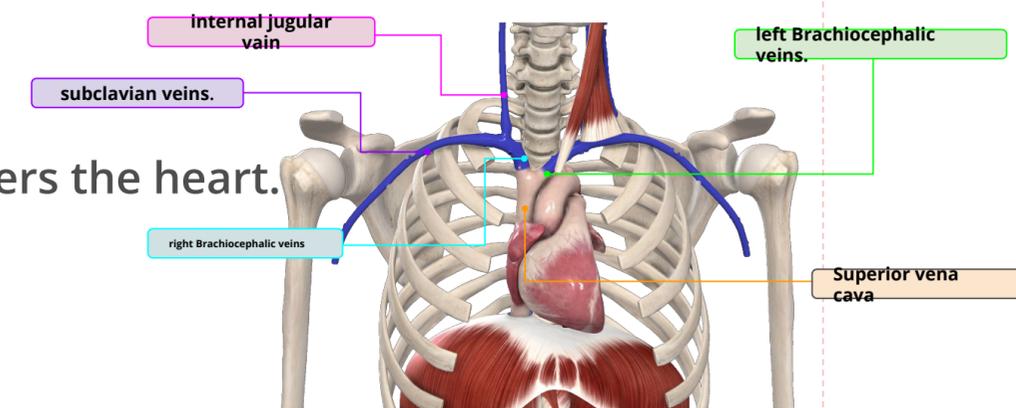
Veins can be classified in 2 ways based on :

- **Circulation:**
Veins of the systemic circulation: **Superior** and **Inferior** vena cava with their tributaries.

Veins of the portal circulation: **Portal vein**. Take the blood from **GIT** organs to **liver** to be filtered and then going to the heart

Superior vena cava

- The superior vena cava is above the heart
- Formed by the **union of the right and left Brachiocephalic veins**.
→ **Brachiocephalic veins** are formed by the **union of internal jugular and subclavian veins**.
- It Passes downward and enter the right atrium.
- Receives azygos vein on the posterior aspect just before it enters the heart.
Drains venous blood from :
 1. Head & neck : it divided to superficial and deep
 2. Thoracic wall
 3. Upper limbs: it divided to superficial and deep



Head and Neck

Superficial veins

Deep vein

External jugular vein

Anterior Jugular Vein

Internal Jugular Vein

Lies **superficial** to the **sternomastoid muscle** and it passes down the neck and it is the only tributary of the subclavian.

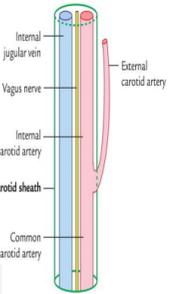
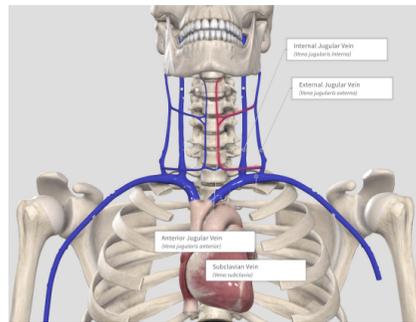
- It descends close to the median line of the neck, **medial** to the **sternomastoid**.

- At the lower part of the neck, it passes laterally **beneath** sternomastoid 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**.

- It descends in the neck along with the internal and common carotid arteries and vagus nerve, within the **carotid sheath**.

- Joins the subclavian vein form the **brachiocephalic vein**.



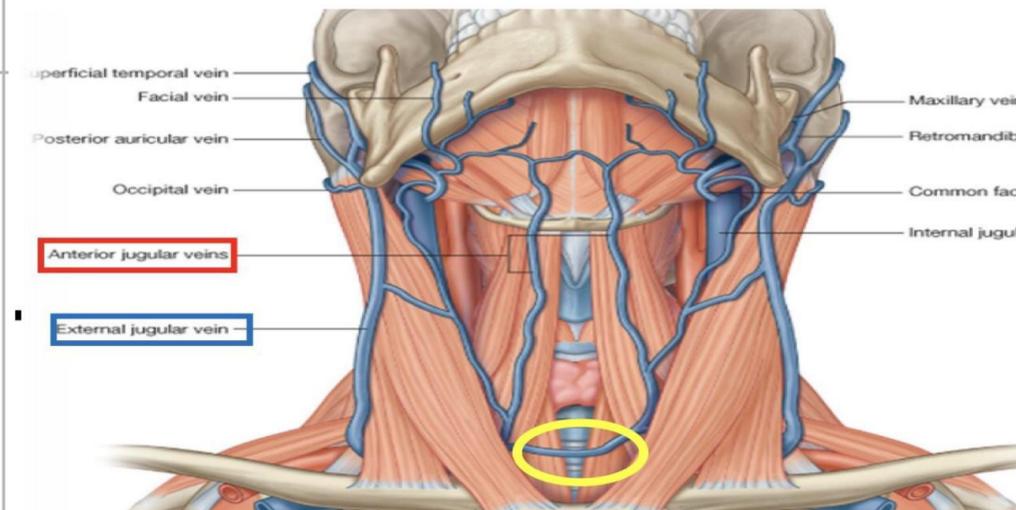
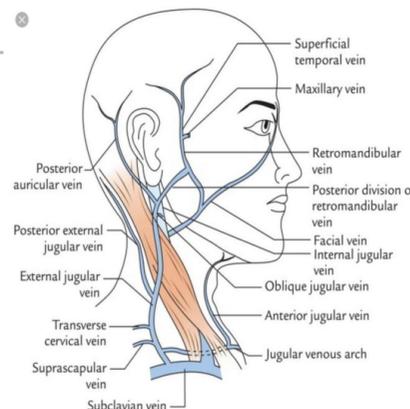
Begins just behind the angle of mandible by union of **posterior auricular vein** with the posterior division of **retromandibular vein**.

It begins in the upper part of the neck by the union of the **submental veins** (vein that is situated below the chin)

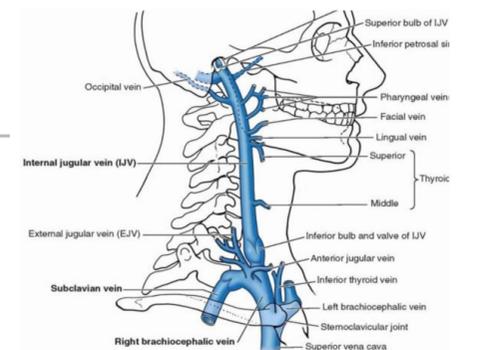
Tributaries:

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

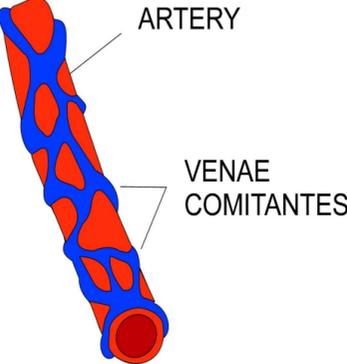
It drains blood from:
1- Outside of the skull.
2-Deep parts of the face.

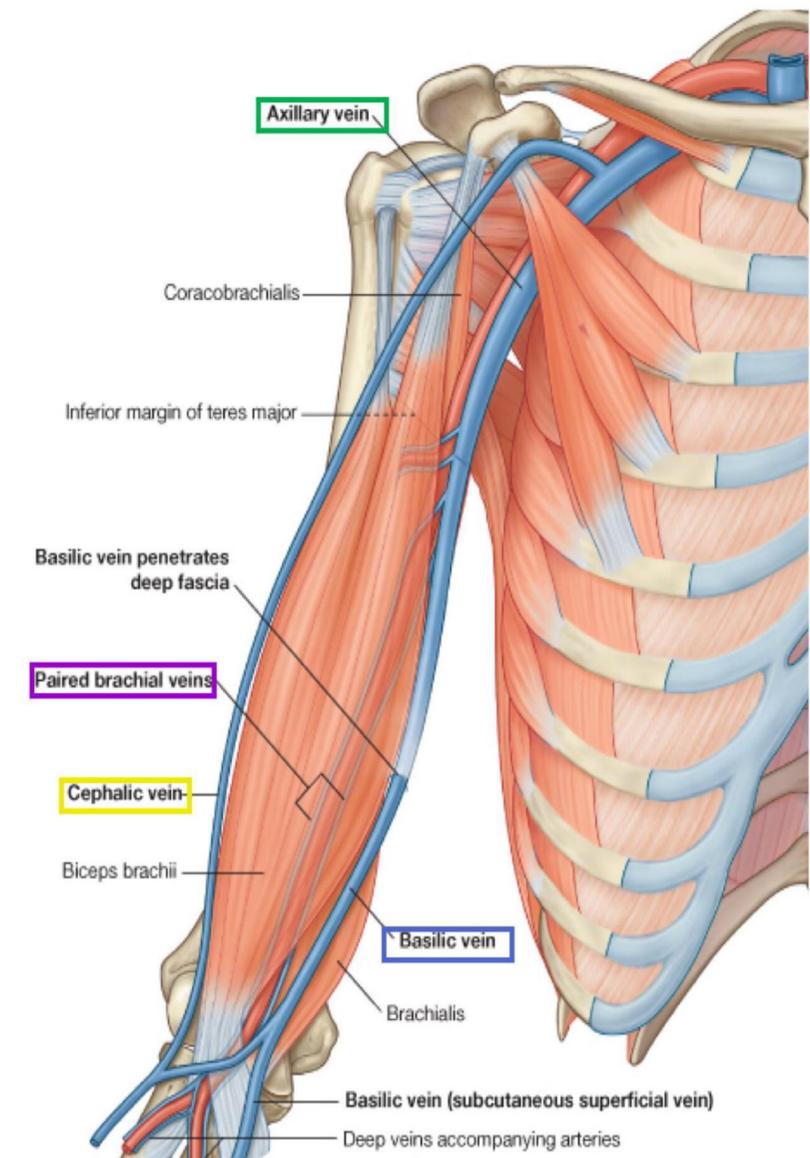


-Drains blood from:
1- The brain.
2- Face.
3- Head & Neck.



Veins Of Upper Limbs

Superficial veins		Deep vein	
Cephalic Vein	Basilic Vein	Venae comitantes	<u>Axillary vein</u>
<p>-Ascends in the superficial fascia on the lateral side of the biceps.</p> <p>-It ascends the antero-lateral aspect of the upper limb, passing anteriorly at the elbow.</p> <p>-It drains into the axillary vein.</p> <p>-Arises from the dorsal venous network of the hand.</p> <p>- At the shoulder , the cephalic vein travels between the deltoid and pectoralis major muscles to enters the axils region via the clavicpectoral triangle.</p> <p>-within the axilla, the cephalic vein terminates by joining the axillary vein.</p>	<p>-Ascends in the superficial fascia on the medial side of the biceps.</p> <p><u>-Halfway up the arm,</u> it pierces the <u>deep fascia</u>.</p> <p><u>-At the lower border</u> of the teres major it joins the venae comitantes of the brachial artery to form the Axillary vein.</p>	<p>Which accompany all the large arteries and are usually in pairs.</p>  <p>*The brachial veins the largest in size and situated on either side of brachial .</p> <p>*Ulnar and radial veins are venae comitantes of ulnar and radial arteries.</p>	<p>Formed by the union of basilic vein and the venae comitantes (brachial veins) of the brachial artery.</p> <p>Finally drain into the subclavian vein.</p>



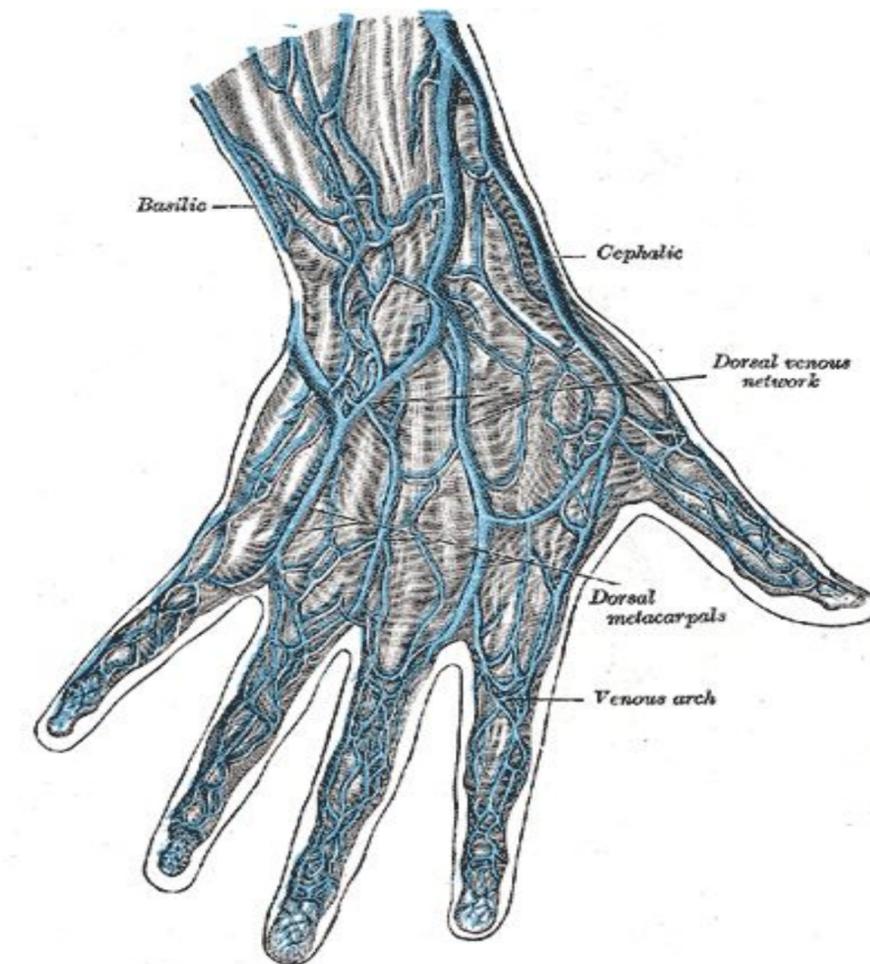
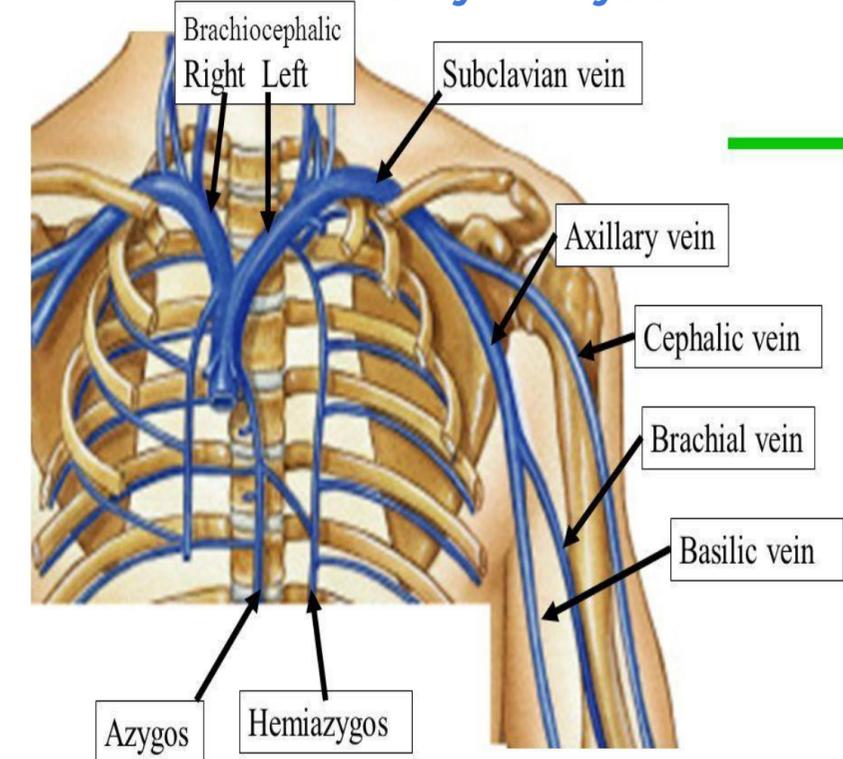
Hand veins

- The hand is drained by network of superficial and deep veins.
- In the palm, these veins form arches and they are associated with the superficial and deep palmar arterial arches.
- This network United to give rise to two extensive superficial veins, the cephalic and basilic veins.
- On the lateral side of the carpus, the dorsal venous network is prolonged proximally as the cephalic vein, while the basilic vein arises from the medial side.

Subclavian Veins

- Each subclavian vein is a continuation of the axillary vein and runs from the outer border of the first rib to the medial border of anterior scalene muscle.
- It then joins with internal jugular vein to form the brachiocephalic vein.
- The subclavian vein follows the subclavian artery.
- The right and left brachiocephalic veins form superior vena cava that enters right atrium.(Anterior to the middle scalene)

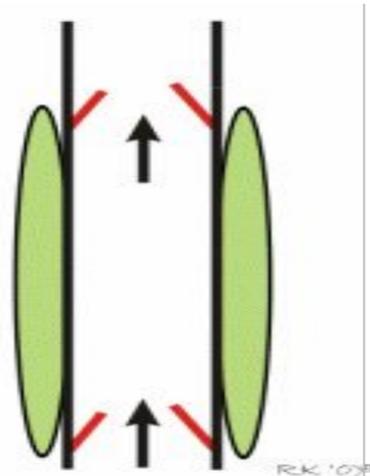
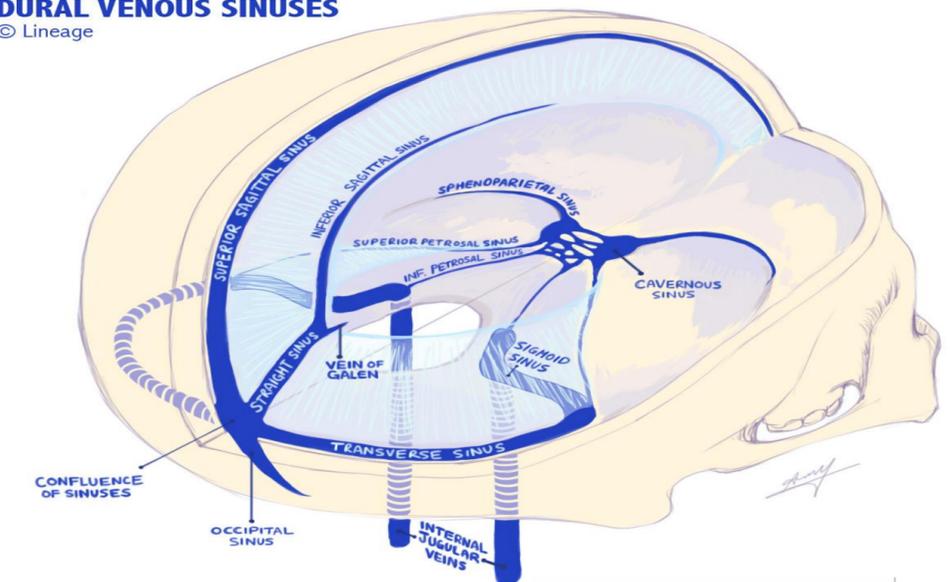
Only in boys slides



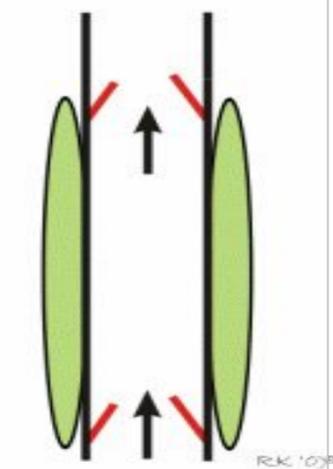
Veins of Head

- Dural Venous Sinuses:
- Superior Sagittal Sinus
- Inferior Sagittal Sinus
- Transverse Sinuses
- Confluence Of Sinuses
- Sigmoid Sinuses (continues as internal jugular vein)
- All sinuses drain into internal jugular vein

DURAL VENOUS SINUSES
© Lineage



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.
- *Sympathatic 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.

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 (**L5**).
- **Ascends on the right side of aorta.**
- Pierces the central tendon of diaphragm at the level (**T8**).

Tributaries of Inferior Vena Cava: (from above to below)

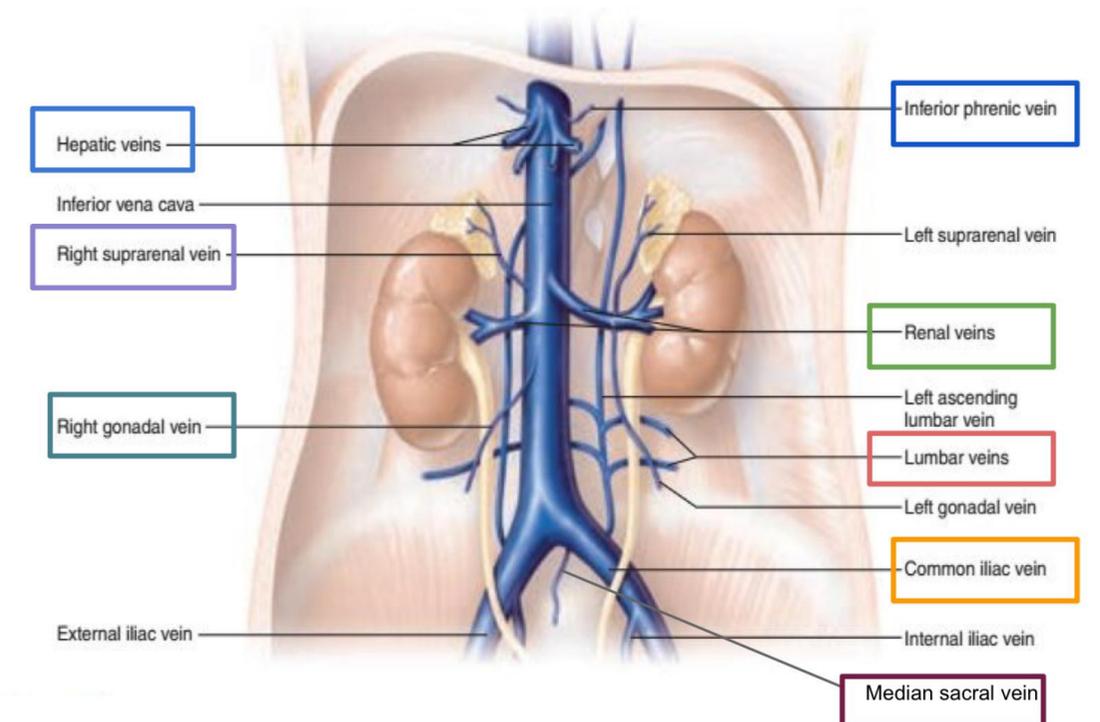
- Paired inferior phrenic veins.
- Hepatic veins
- Right suprarenal vein.
 - the **left vein** drains into the **left renal** vein
- Paired renal veins
- Right gonadal vein
 - the **left vein** drains into the **left renal** vein
- Four paired lumbar veins
- Two common iliac veins
- Median sacral vein

A useful **mnemonic** to remember the tributaries of the inferior vena cava is:

I Like To Rise So High

Iliac veins (common) and **I**nferior phrenic veins
Lumbar
Testicular or **o**varian (gonadal)
Renal
Suprarenal
Hepatic vein.

Think of the IVC wanting to rise high up to the heart

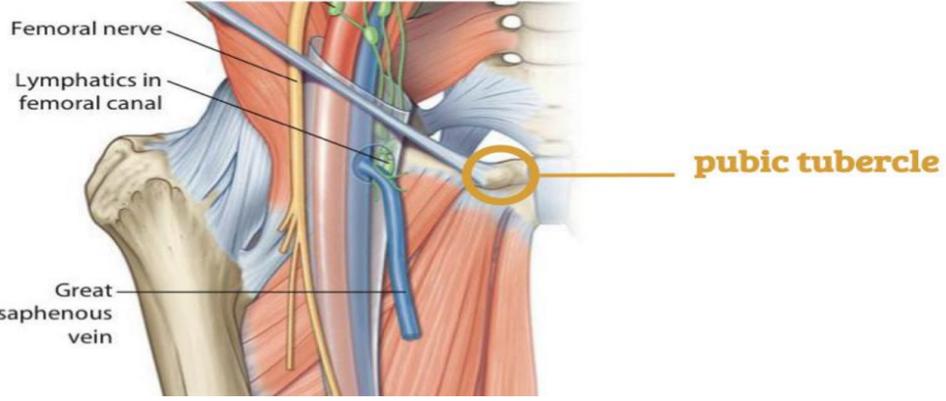


Veins Of Lower Limbs

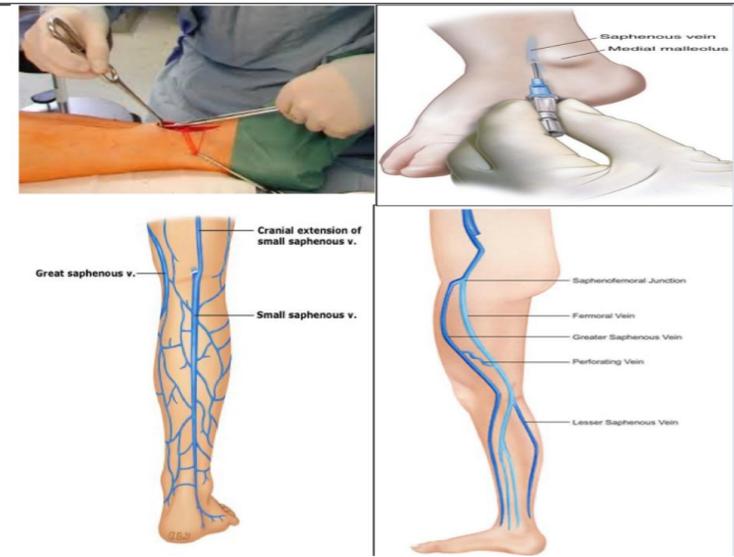
divided to: **Superficial and Deep**

Superficial Veins: Lying in the **subcutaneous tissue** .
 1. Pattern is variable
 2. They are the tributaries of the :
 • Great (long) saphenous vein
 • Small (short) saphenous vein

Great Saphenous Vein

Beginning	Course	Termination
<ul style="list-style-type: none"> Begins from the medial end of the dorsal venous arch of the foot. The longest vein 	<ul style="list-style-type: none"> -Passes upward in front of the medial malleolus with the saphenous nerve. -Then it ascends in accompany with the saphenous nerve <u>in the superficial fascia over the medial side of the leg.</u> -Ascends obliquely upwards, passing behind the knee and curves forward around the medial side of the thigh. 	<p>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.</p> 

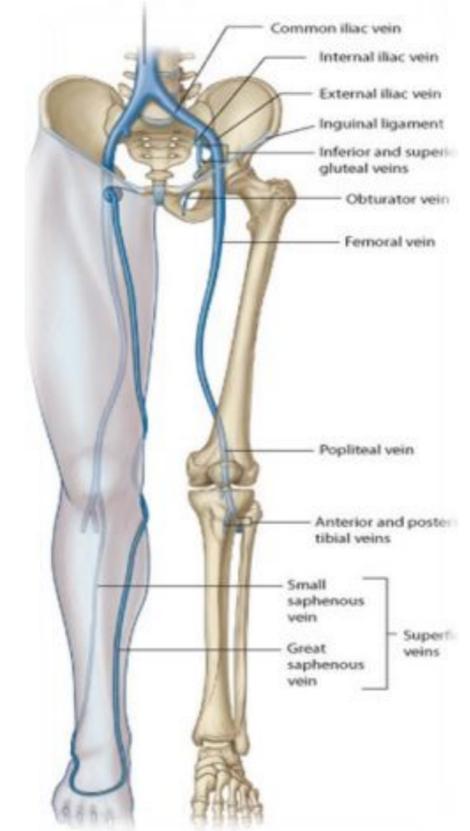
- It is connected to the **small saphenous vein** by one or two branches that pass behind the knee.
- It's connected to the **deep veins** by numerous perforating veins
- The perforating veins have valves which allow blood flow from superficial to deep veins.
- It is clinically significant in coronary bypass surgery and in intravenous delivery of fluids due to other venous collapse.
- **used in** venous grafting and saphenous vein cutdown may be necessary for inserting the needle or cannula (take care of the saphenous nerve)



Veins Of Lower Limbs cont:

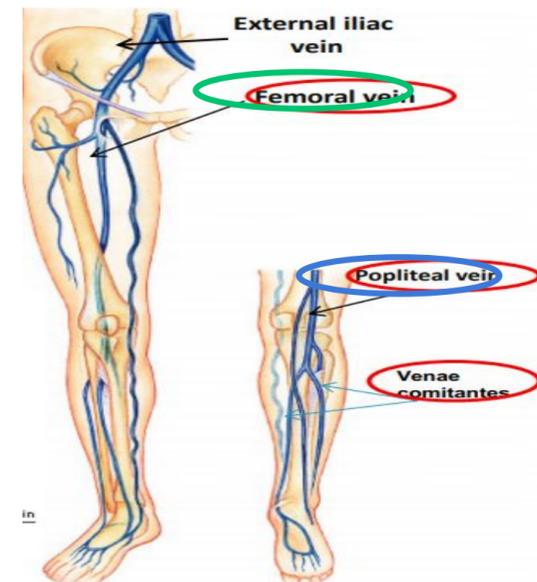
Small Saphenous Vein

beginning	course	Termination
<ul style="list-style-type: none"> From the lateral end of the dorsal venous arch of the foot. Has numerous <u>valves</u> along its course. Anastomoses freely with great saphenous vein 	<ul style="list-style-type: none"> Ascends behind the lateral malleolus in company with the sural nerve. Follows the lateral border of the tendocalcaneus and then runs up to the back of the leg. Pierces the deep fascia in the lower part of the popliteal fossa 	<p>Drains into the popliteal vein</p>



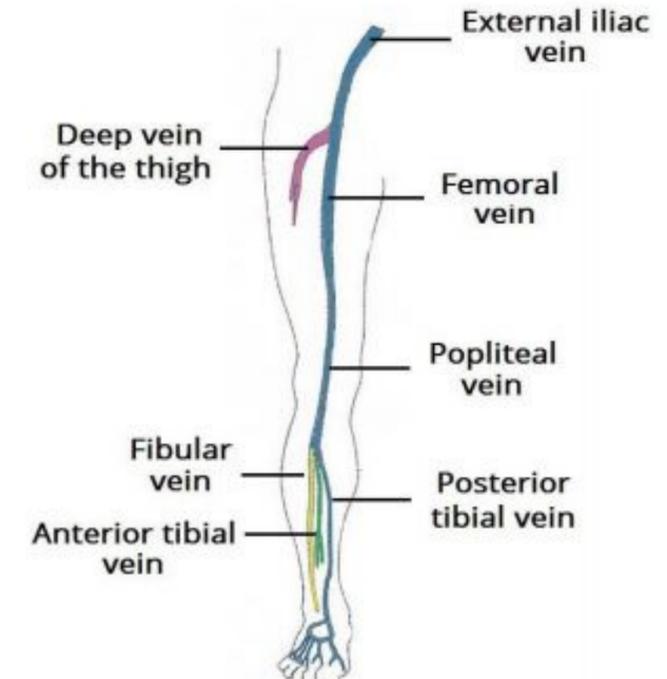
Deep veins: venae comitantes

Accompany all the large arteries, usually in pairs.	<p>Course</p> <ul style="list-style-type: none"> Venae comitantes unite to form the popliteal vein Which continues as the femoral vein. 	<p>Deep veins receive blood from superficial veins Through perforating veins.</p>
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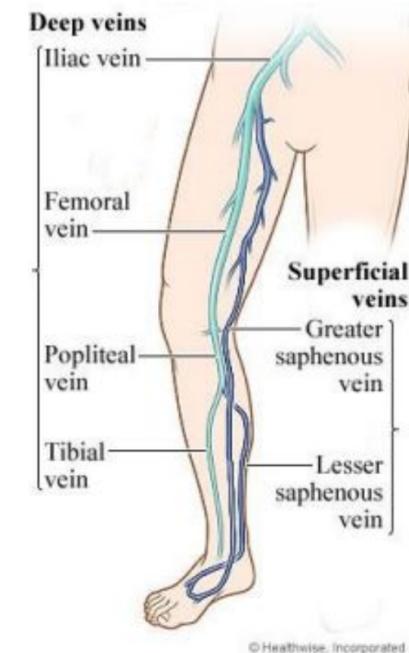
Veins of Foot & Leg

- The main venous structure of the foot is the dorsal venous arch, which mostly drains into the superficial veins.
- Some veins from the arch penetrate deep into the leg, forming the anterior tibial vein.
- The plantar aspect of the foot, medial and lateral plantar veins arise.
- These veins combine to form the posterior tibial and fibular veins.
- The posterior tibial vein accompanies the posterior tibial artery, entering the leg posteriorly to the medial malleolus.
- On the posterior surface of the knee, the anterior tibial, posterior tibial and fibular veins unite to form the popliteal vein.



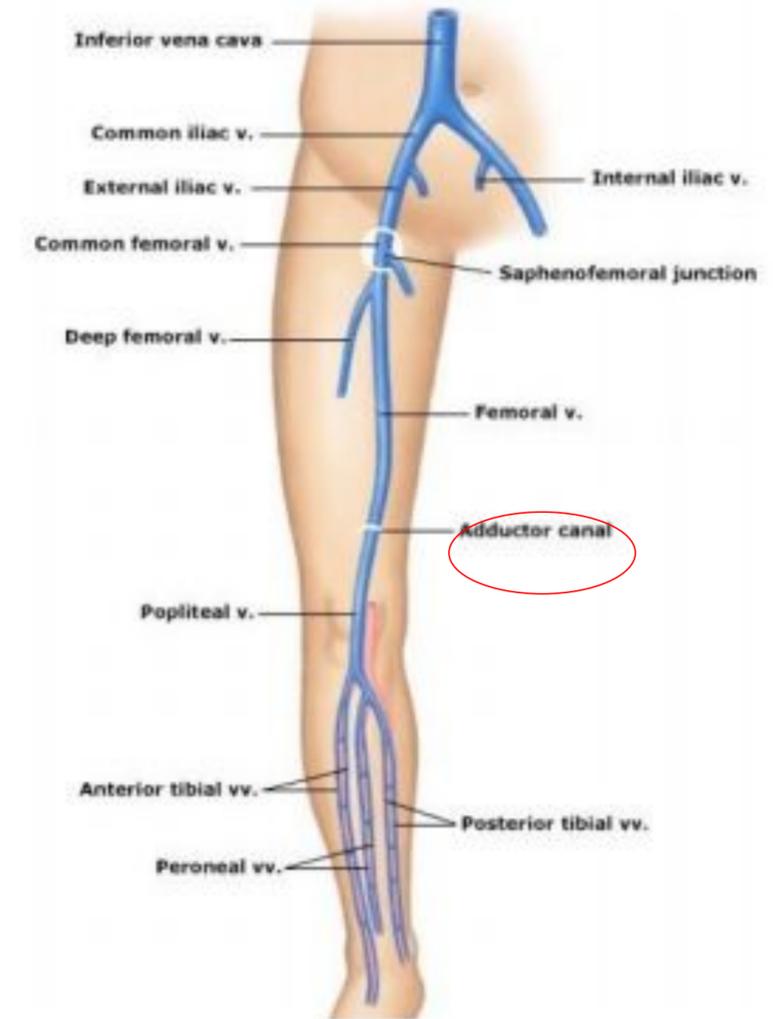
Popliteal Vein

- Comprise the venae comitantes, which accompany popliteal artery.
- Formed by the unite of anterior, posterior tibial and fibular veins.
- Popliteal vein then continues as the femoral vein.
- Receive blood from superficial veins through perforating veins. (small saphenous vein)



Femoral Vein

- The femoral vein is a blood vessel that accompanies the femoral artery in the femoral sheath.
- It is a continuation of the popliteal vein.
- Ends at the inferior margin of the inguinal ligament, where it becomes the external iliac vein.

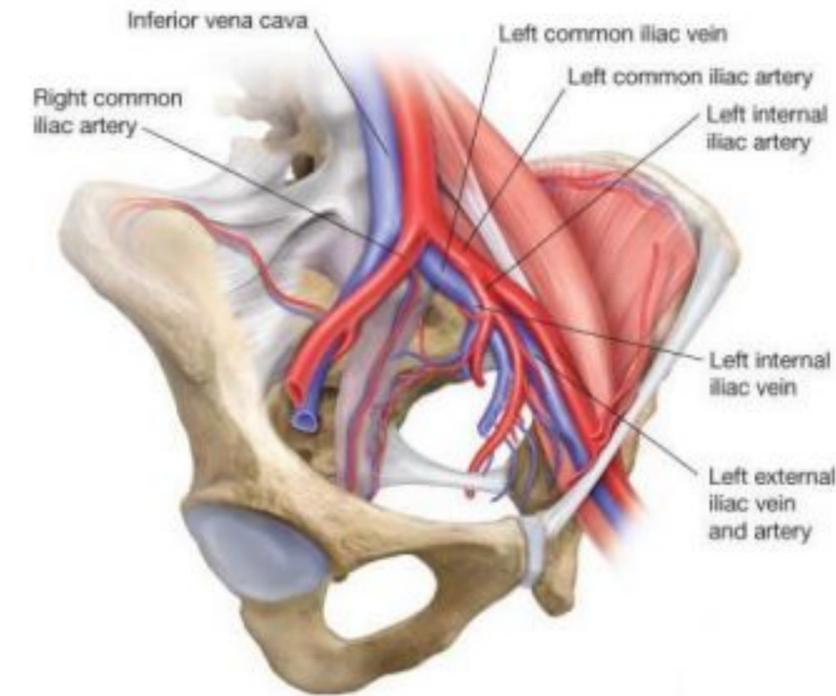


VEINS OF PELVIC REGION

1. External Iliac

(take all the blood from the lower limb)

- External iliac join internal iliac to form common iliac veins
- Both right and left common iliac veins form inferior vena cava that drains the entire low part of the body.
- Inferior vena cava drains into right atrium.



2. Internal Iliac

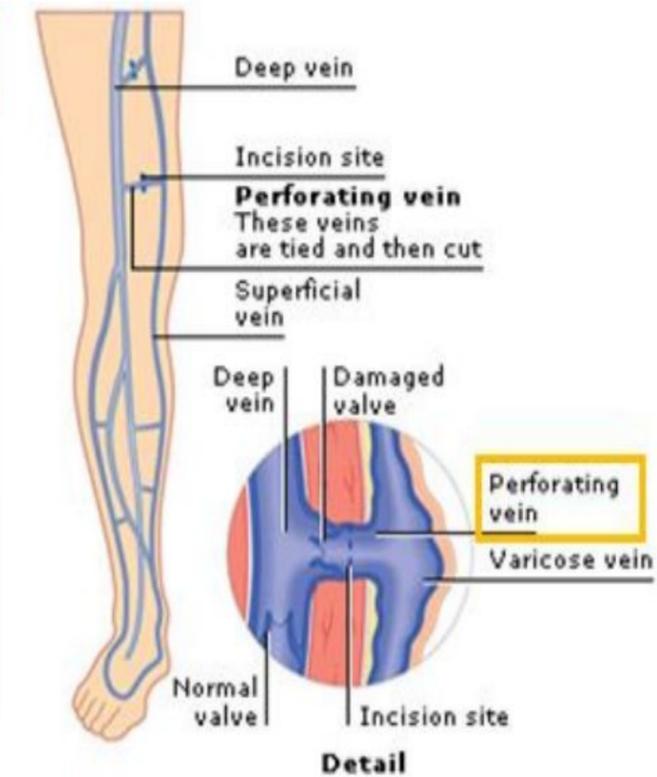
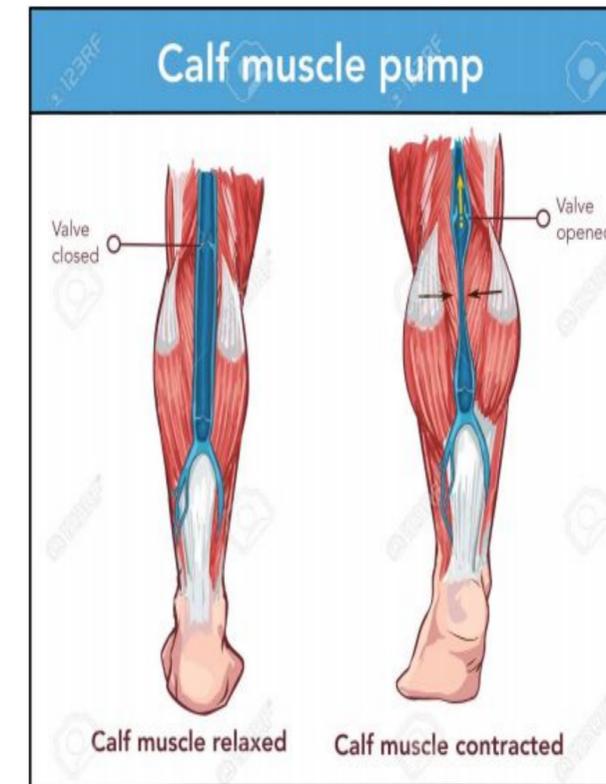
- It is responsible for the majority of **pelvic venous drainage**,
- It receives numerous tributaries from veins that drain the pelvic region.
- It is formed near the greater sciatic foramen, ascending anteriorly to the sacroiliac joint, before combining with the external iliac vein to form the common iliac vein.

It receives venous blood from the followings:

- Superior and inferior gluteal veins
- Internal pudendal vein
- Obturator vein
- Lateral sacral veins
- Middle rectal vein
- Vesical veins
- Uterine and vaginal veins

Mechanism of venous return from lower limb

- 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 the blood flow is reversed and the veins become **varicose**
- Most common in posterior and medial parts of the lower limb, particularly in **old people**.

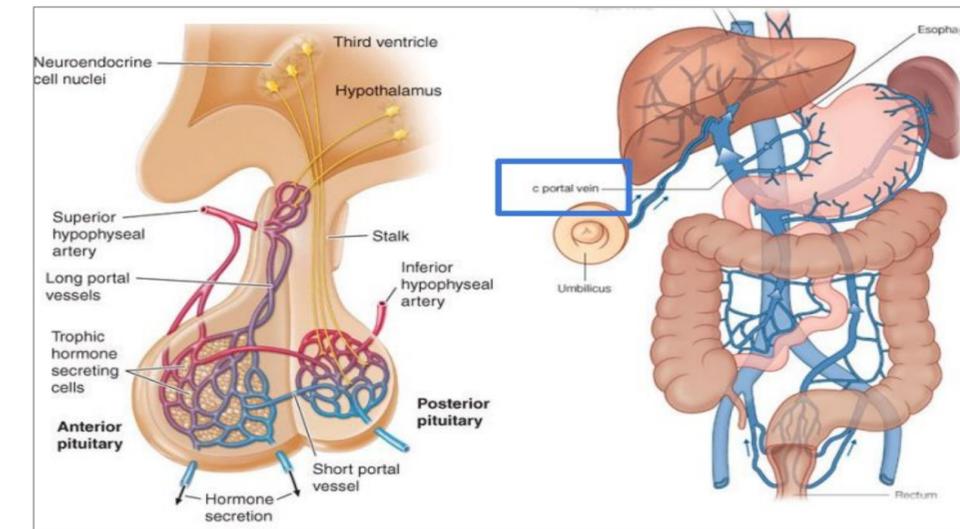


Portal circulation

- A portal venous system is a series of veins or venules that **directly connect two capillary beds** (of arteriole & venule)

Examples of such systems include:

1. **Hepatic portal vein**
2. **Hypophyseal portal system**

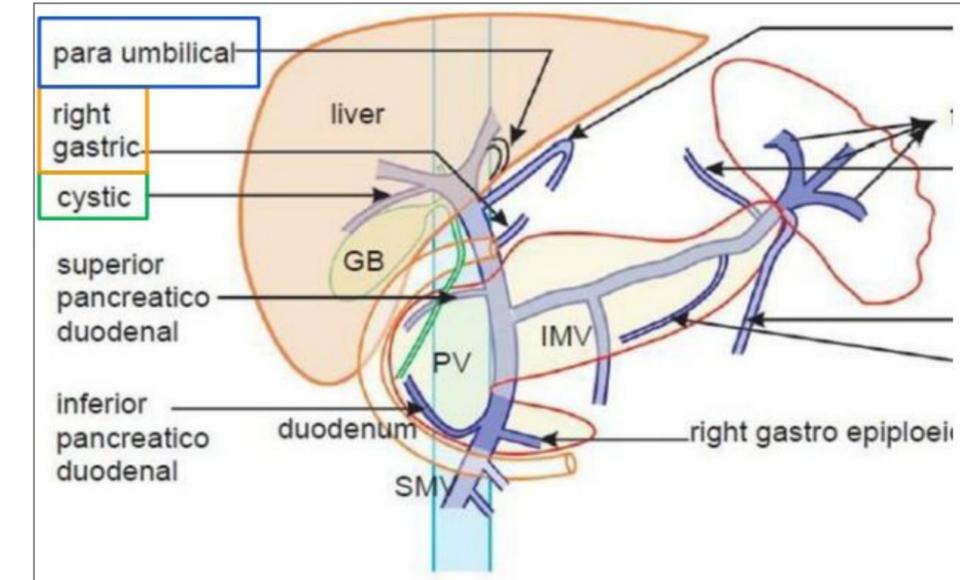
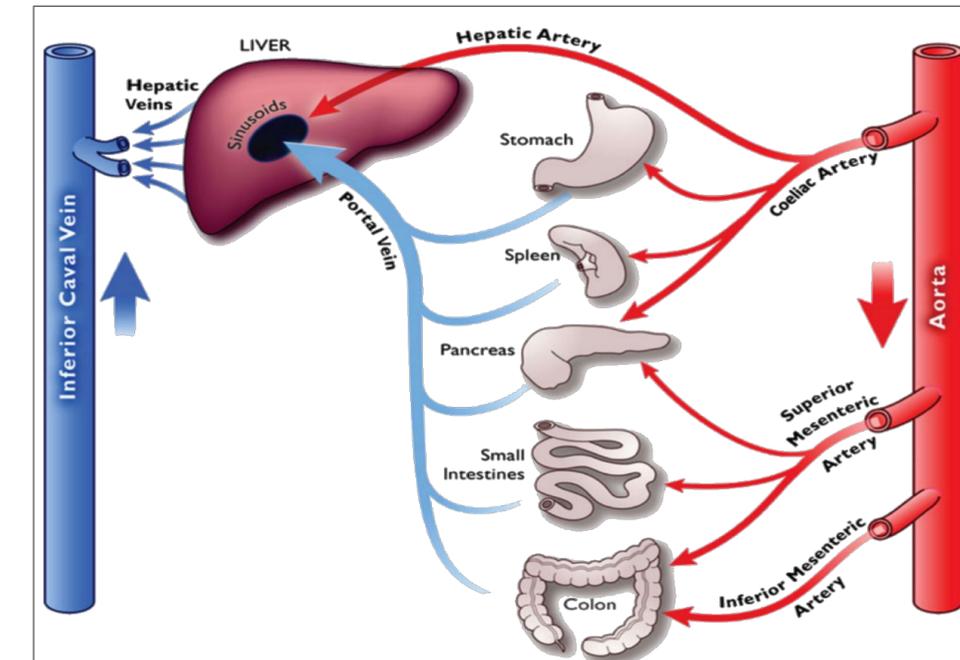


Hepatic portal vein

- Drains blood from the GIT 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. **The site is very important*

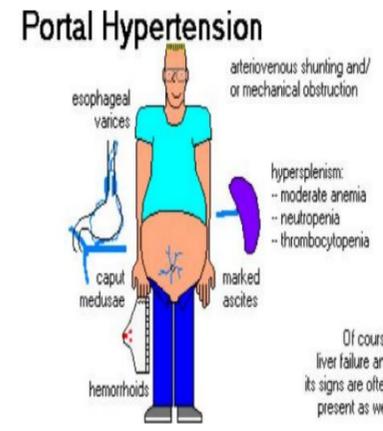
Tributaries:(4)

- Right and left **gastric veins**
- **Cystic vein** from the gallbladder joins its right branch.
- **Para-umbilical** veins that drain veins from anterior abdominal wall to the hepatic portal vein.



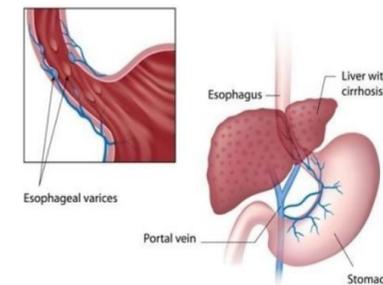
Portocaval anastomosis

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

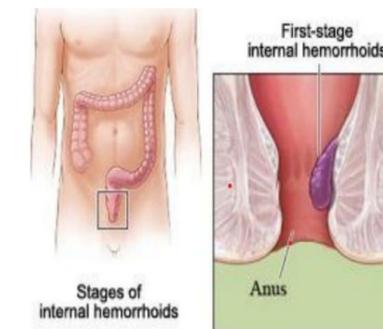


Site	Portal vein	Systemic vein	Associated condition
Lower end of esophagus	Left gastric vein	Esophageal branch of azygos vein	Esophageal varices
Lower part of rectum =Upper end of anal canal	Superior rectal vein	Middle and inferior rectal veins	Hemorrhoids
Paraumbilical region	Paraumbilical veins	Superficial epigastric vein	Caput medusae
Retroperitoneal	Colic veins	Veins of the posterior abdominal wall (retroperitoneal veins)	Without any clinical sign.
Patent ductus venosus (intrahepatic portosystemic shunt)	Umbilical vein and portal vein	Inferior Vena Cava	<ul style="list-style-type: none"> • *during fetal development: Portosystemic shunts may be congenital or may be acquired with diseases that cause portal hypertension, hepatomegaly, Ascitis and signs of portal hypertension.
Bare area of liver	There is some anastomosis between portal venous channels in the liver and azygous system of veins above the diaphragm		

Esophageal varices



hemorrhoids



Caput medusae



TEST YOURSELF!

Q1: What is the portal venous system ?

A: Veins take all the blood from GIT organs to the liver to filter and then back to the heart

Q2: What the tributaries that formed the popliteal vein ?

A: Anterior tibial , Posterior tibial , Fibular veins

Q3: What are the veins that drain the neck ?

A: Superficial: External & Anterior jugular veins / Deep: Internal jugular vein

Q4: What the tributaries that form the inferior vena cava ?

A: Left common iliac & Right common iliac

THANK YOU !

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