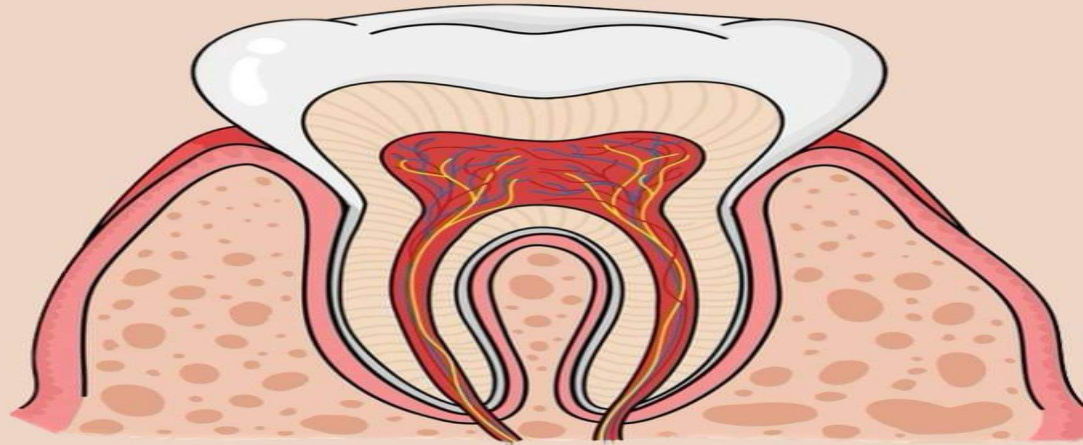




ANATOMY



LEC NO. : 15 CVS P.2
DONE BY : Amir A. Freatat

وَقُلْ رَبِّ زِدْنِي عِلْمًا



Anatomy & Embryology

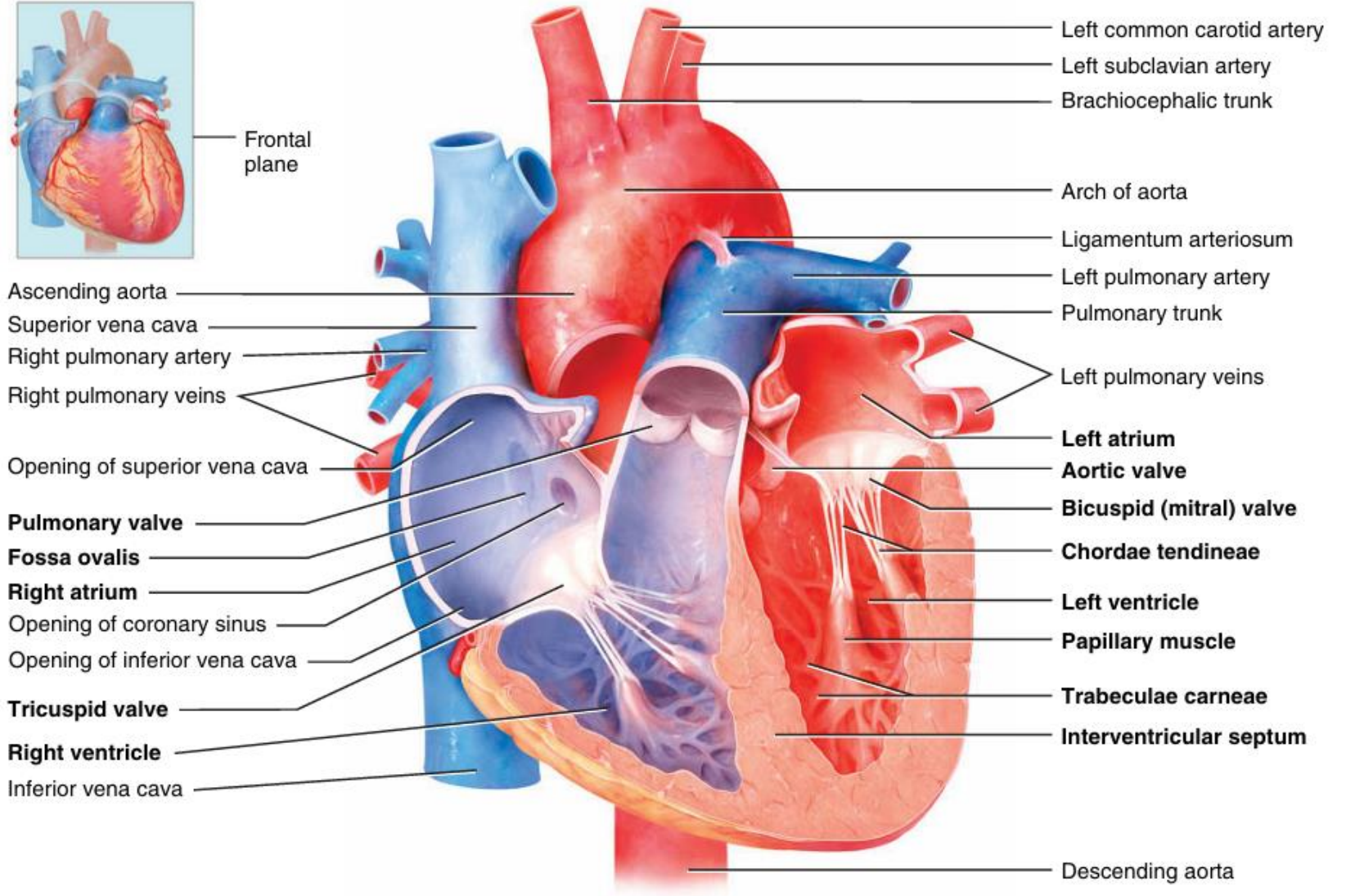
Cardiovascular system (Part 2)

Dr. Heba Ali

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Quick
recap.....



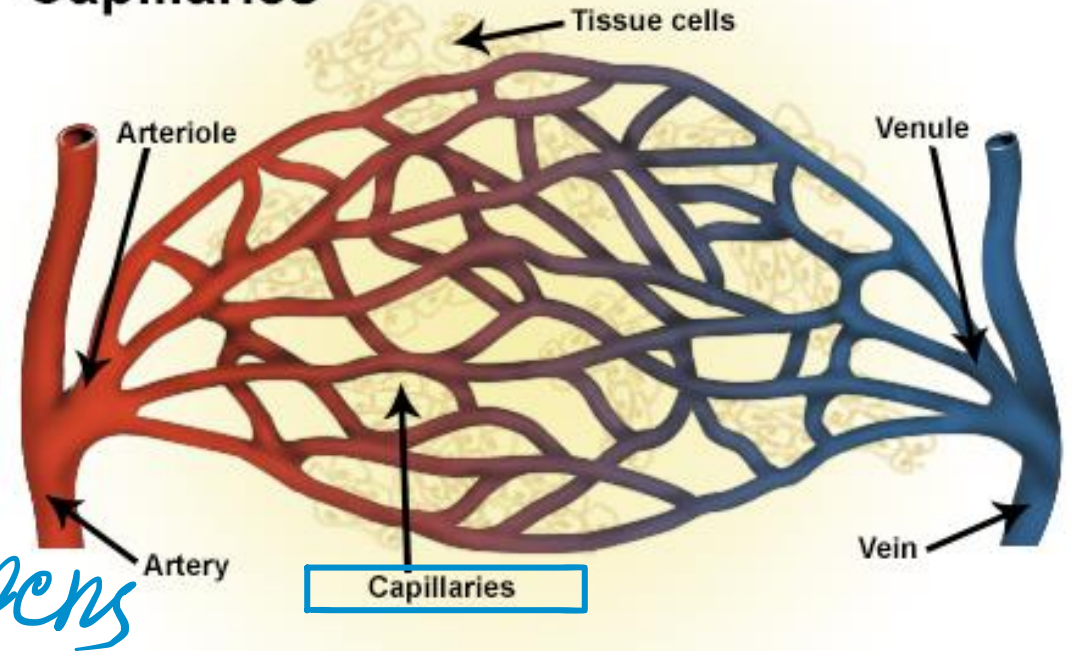
(a) Anterior view of frontal section showing internal anatomy

Types of blood vessels

- 5-7 litres of blood
- 60,000 miles of vessels

- **Arteries**
- **Capillaries** (or in some tissues **sinusoids**) the smallest of blood vessels, *where the exchange happens*
- **Veins**

Capillaries



Gas and nutrients exchange occur at the capillaries

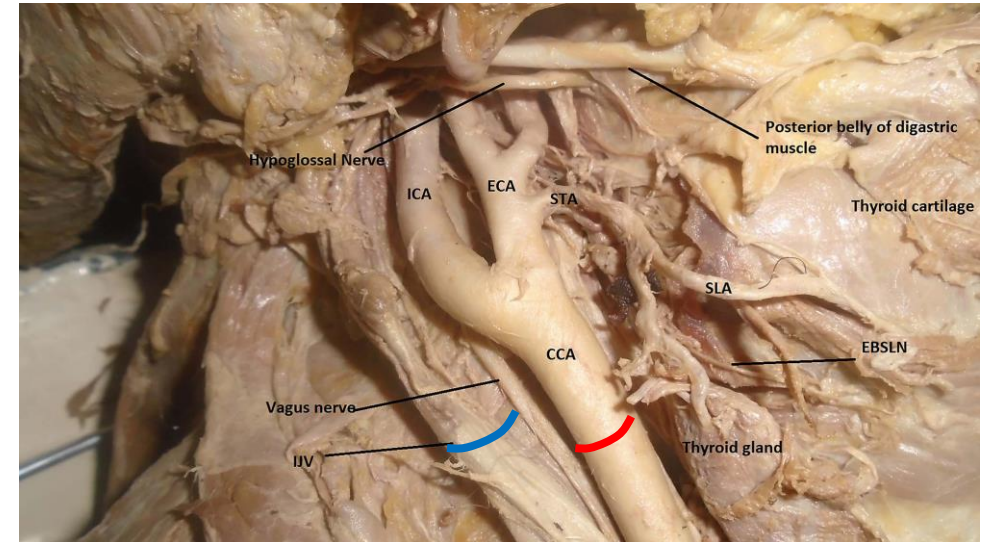
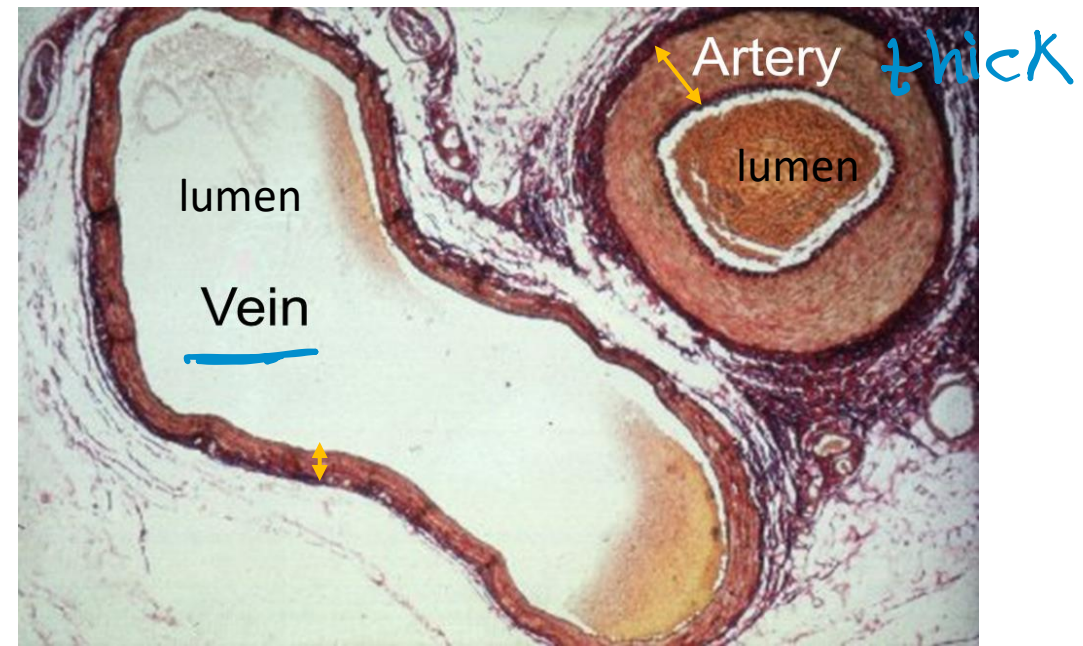
Artery vs Vein

Artery	Vein
Carry oxygenated blood Except: pulmonary artery	Carry non-oxygenated blood Except: pulmonary vein
Carry blood away from the heart	Carry blood towards the heart
No valves	Have valves
Narrow lumen, thick wall	wide lumen, thin wall
Walls are rich with smooth muscles >>> non-compressible	Walls are poor with smooth muscles >>> compressible

سبب الضغط ←

Venous valves are important in moving blood toward the heart against the force of gravity.

تتحكم في حركة الدم في vein ليتحرك في اتجاه واحد دون رجعة



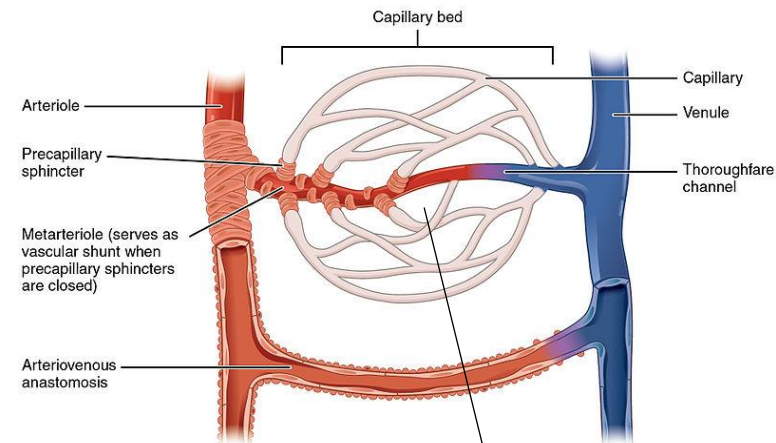
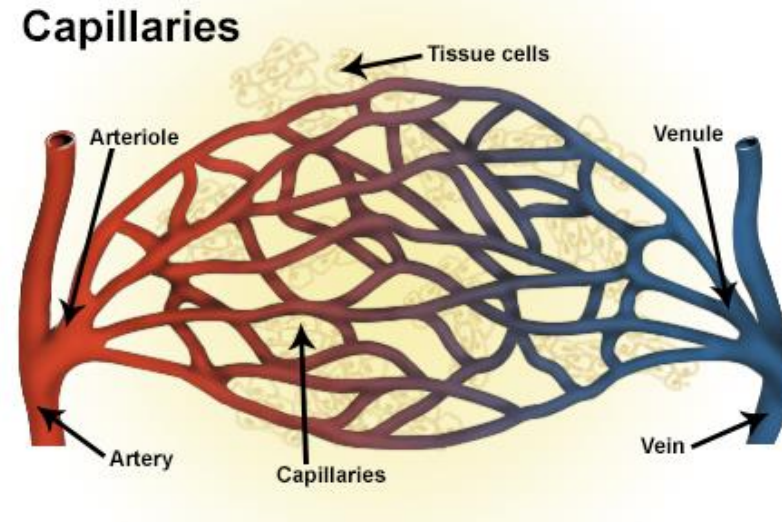
- **Capillaries**, the smallest and most numerous of the blood vessels, form the connection between the vessels that carry blood away from the heart (arteries) and the vessels that return blood to the heart (veins).

- The primary function of capillaries is the exchange of materials between the blood and tissue cells.

يتحرك الدم مباشرة من الشريان للوريد

- **Direct Arterio-venous anastomoses** is a direct connection between small arteries and small veins in certain tissues with **NO** capillary section between them (completely bypassing the capillary bed)

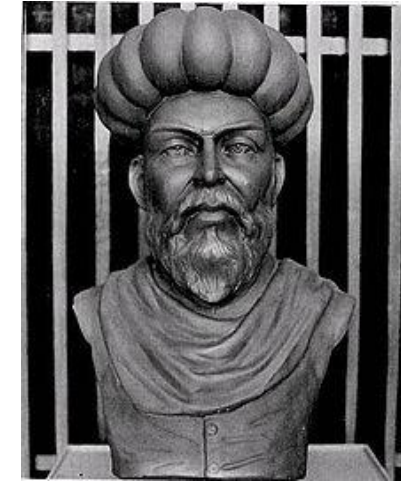
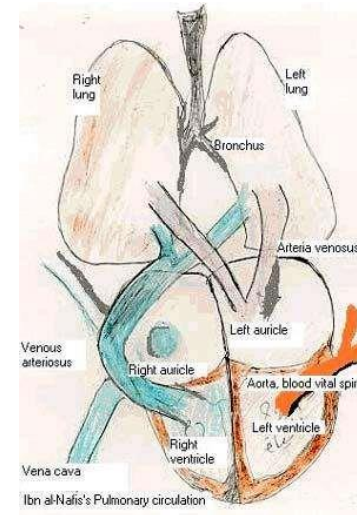
- Regulation of blood flow
- Regulation of the body temperature



Arterio-venous anastomosis

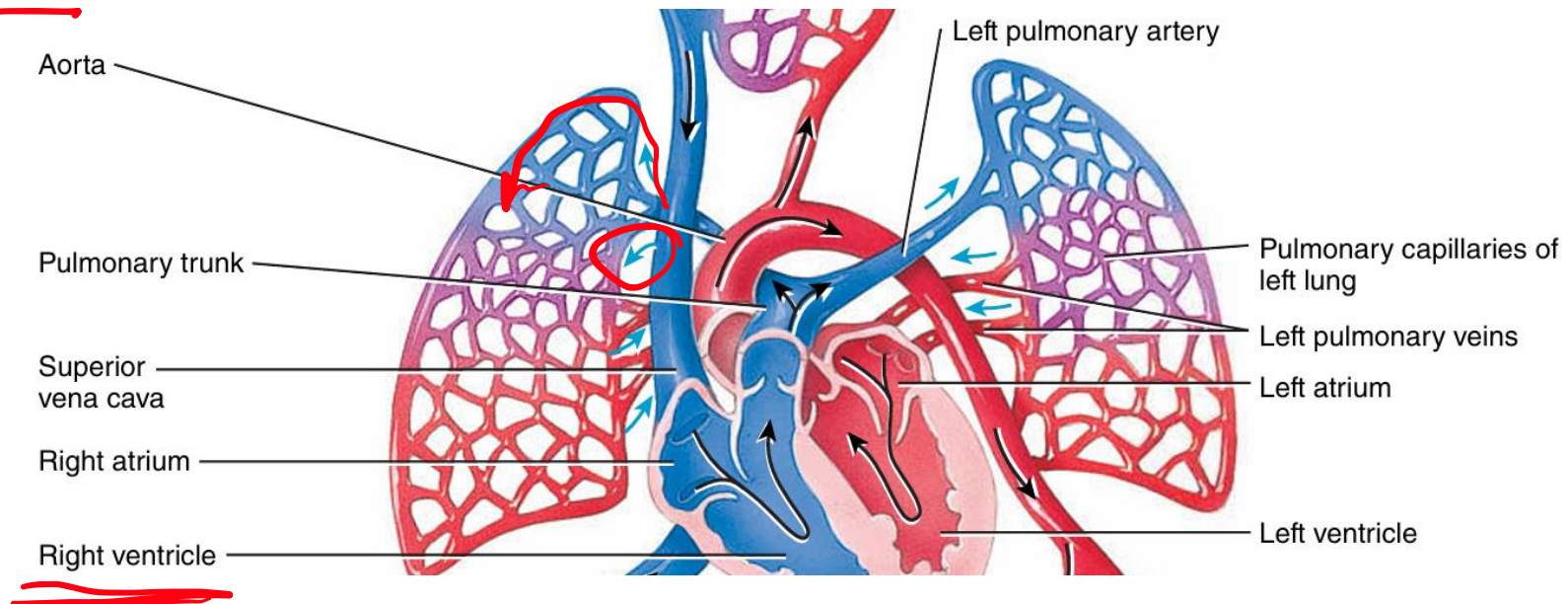
Pulmonary circulation

- First described by the muslim physician Ibn Al-Nafees



- Blood leaves right ventricle to the lungs through pulmonary arteries and returns back to the heart through pulmonary veins.

قبل وجودہ کاتے مداریں دہن
تصدیق کی ایسا ہی
L and R ventricle connected
to each other

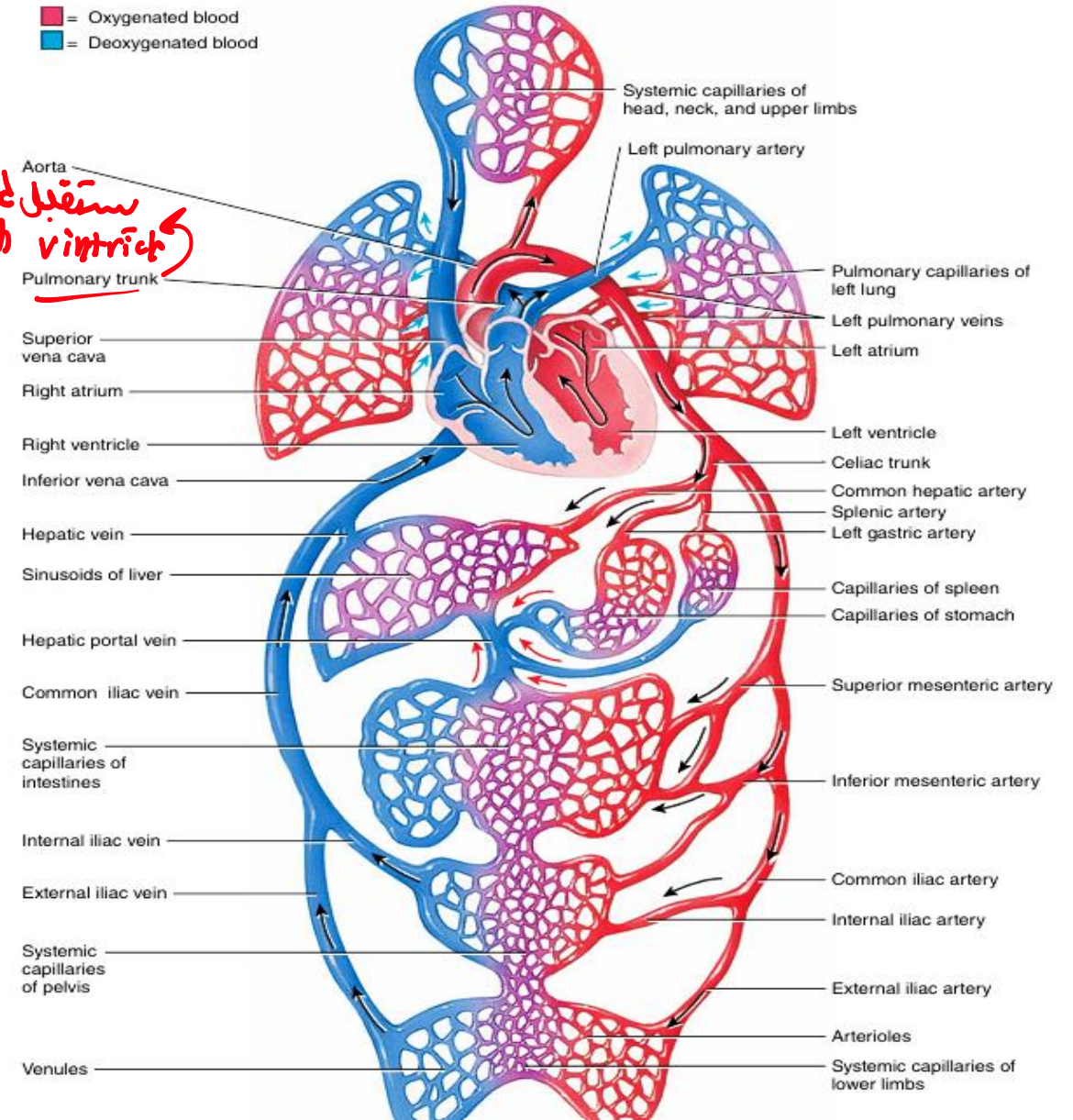


all body tissues

Systemic circulation

- Blood leaves **left ventricle** through aorta to all tissues of the body.
- Includes all arteries and arterioles that carry oxygenated blood from the left ventricle to systemic capillaries, plus the veins and venules that return deoxygenated blood to the right atrium after flowing through capillaries in the body organs.

تنقل الدم (which includes) O_2
من طريق الشرايين إلى ventricle



The main blood vessels in the human body

1. Pulmonary trunk arises from right ventricle and carries de-oxygenated blood to the lungs.

يرضع القلب م

2. Aorta consists of four segments:

صاعر من القلب

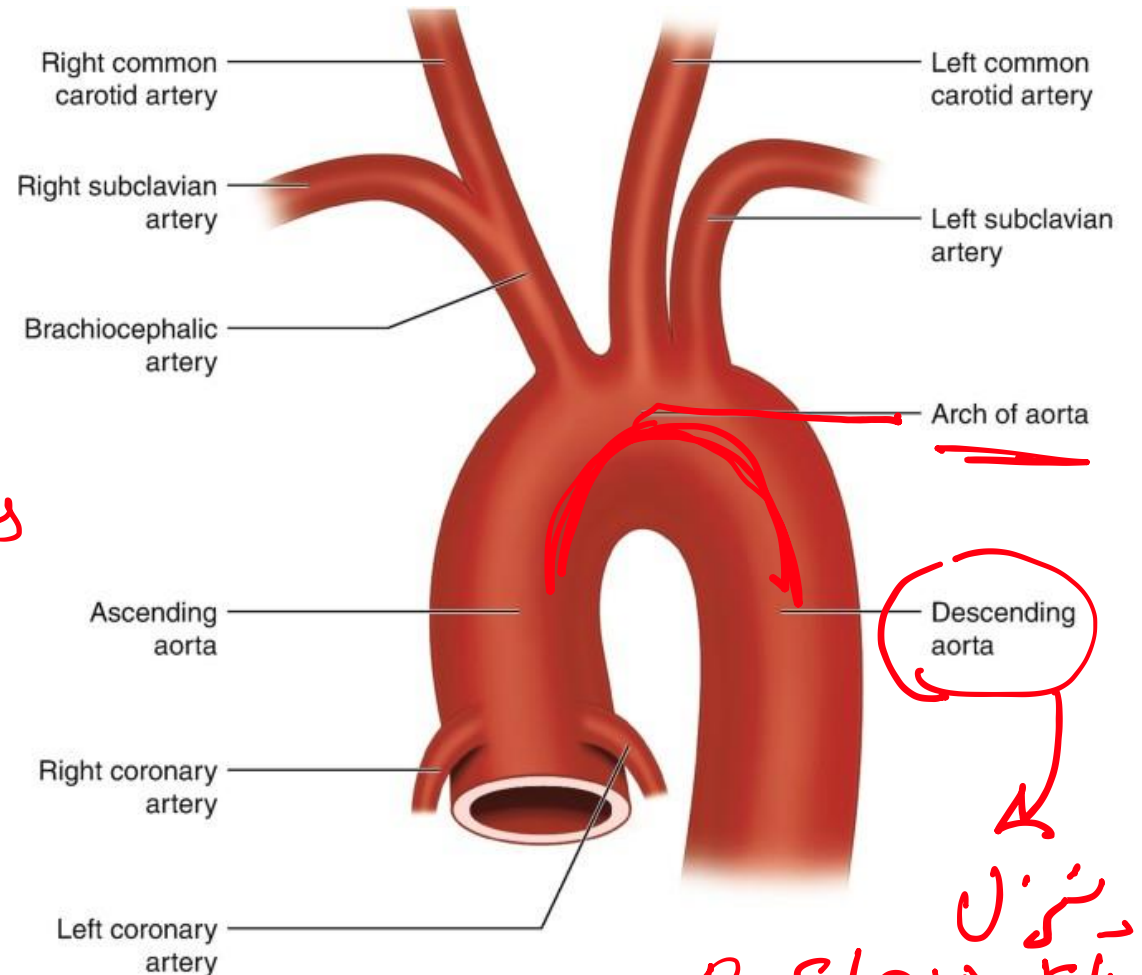
➤ Ascending aorta

→ 2 branches

➤ Arch of aorta

➤ Descending thoracic aorta

➤ Descending abdominal aorta



Segments of the aorta

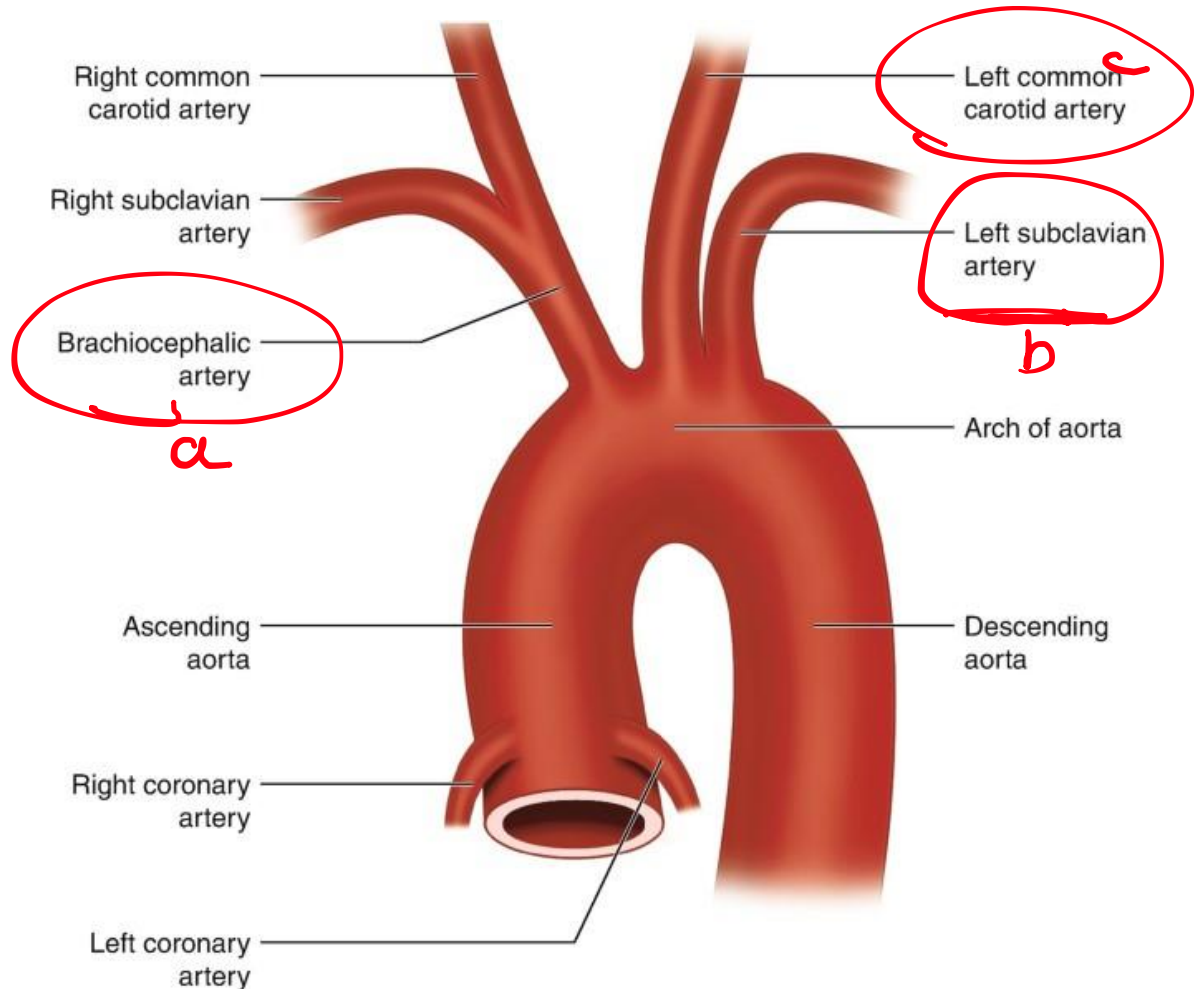
a+b+c branches
of arch

1. **Ascending aorta** (about 5cm in length, lies within the **fibrous pericardium**, passes upward to the right).

- Branches:

- **Right coronary artery**

- **Left coronary artery**



2. Arch of aorta, continues from the ascending aorta and lies mainly within the **superior mediastinum**

Branches:

1. **Left subclavian artery** → upper limb

2. **Left common carotid artery** → neck

3. **Brachiocephalic artery** (or brachiocephalic trunk) is the largest branch in diameter.

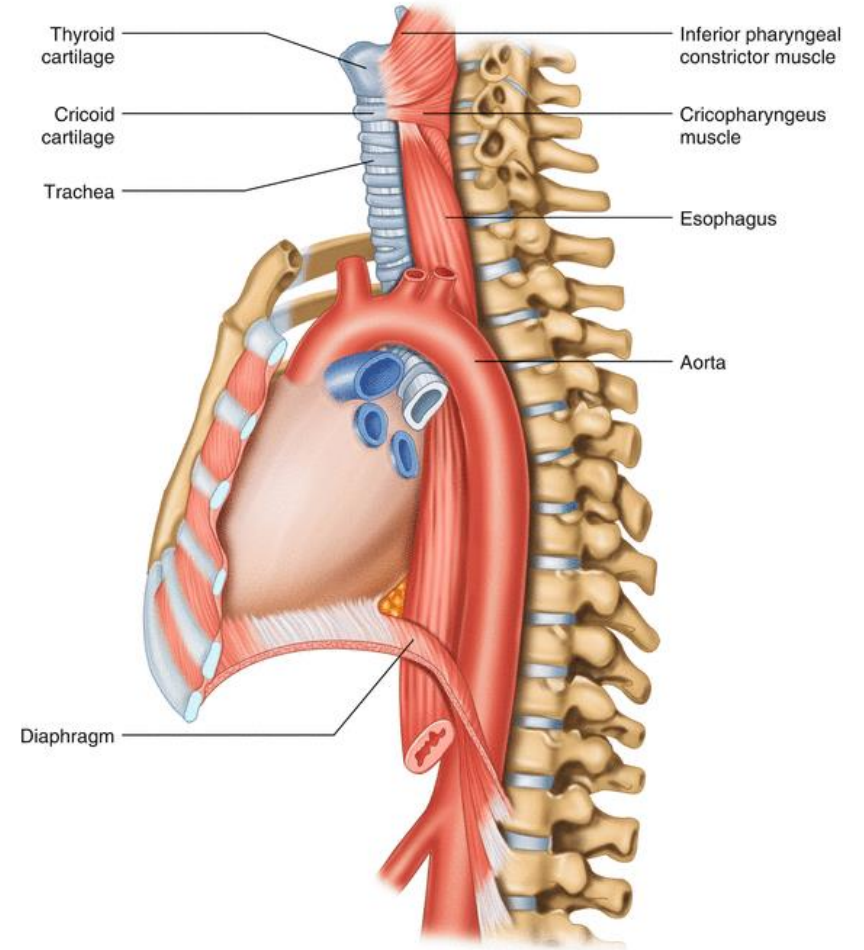
Divides into:

➤ **Right subclavian artery**

➤ **Right common carotid artery**

تفریح بخیر صبا ہے

The arch of aorta is anterior to the oesophagus and the trachea

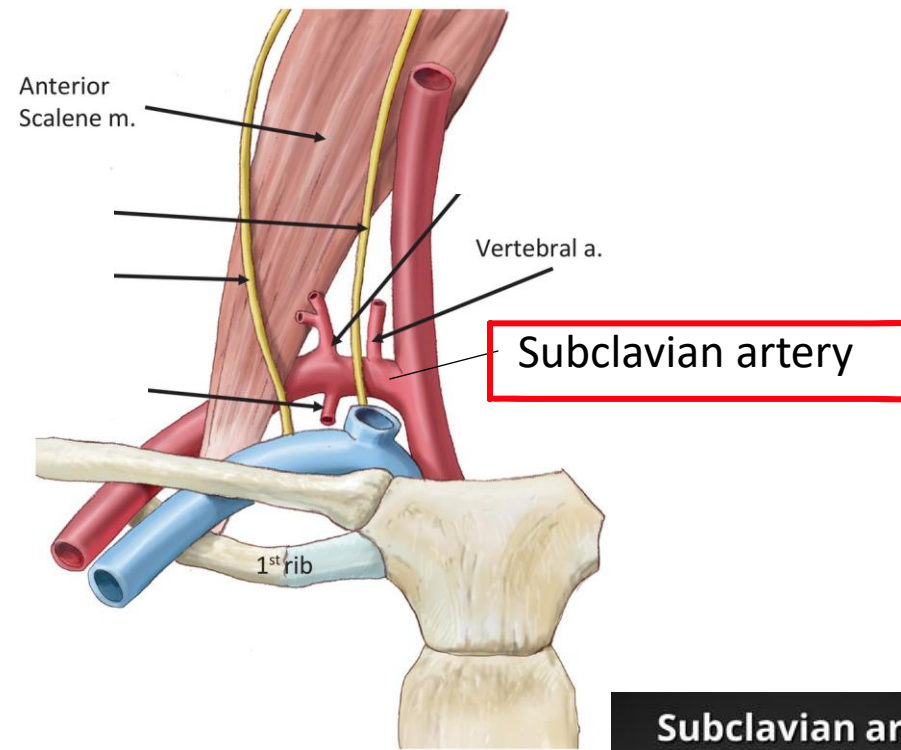


Subclavian arteries:

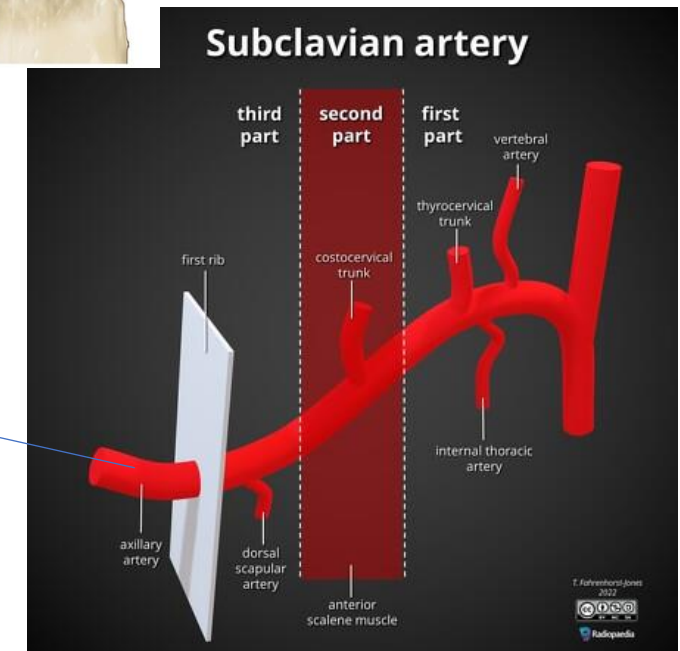
The right subclavian artery is a branch of the brachiocephalic trunk, while the **left subclavian** is a direct branch of the aortic arch.

Subclavian artery is divided into three segments: *دوم القطع*

1. First part from its origin to the **medial border of scalenus anterior**;
2. Second part **posterior to scalenus anterior**.
3. Third part from the **lateral margin of scalenus anterior to the outer border of the first rib**



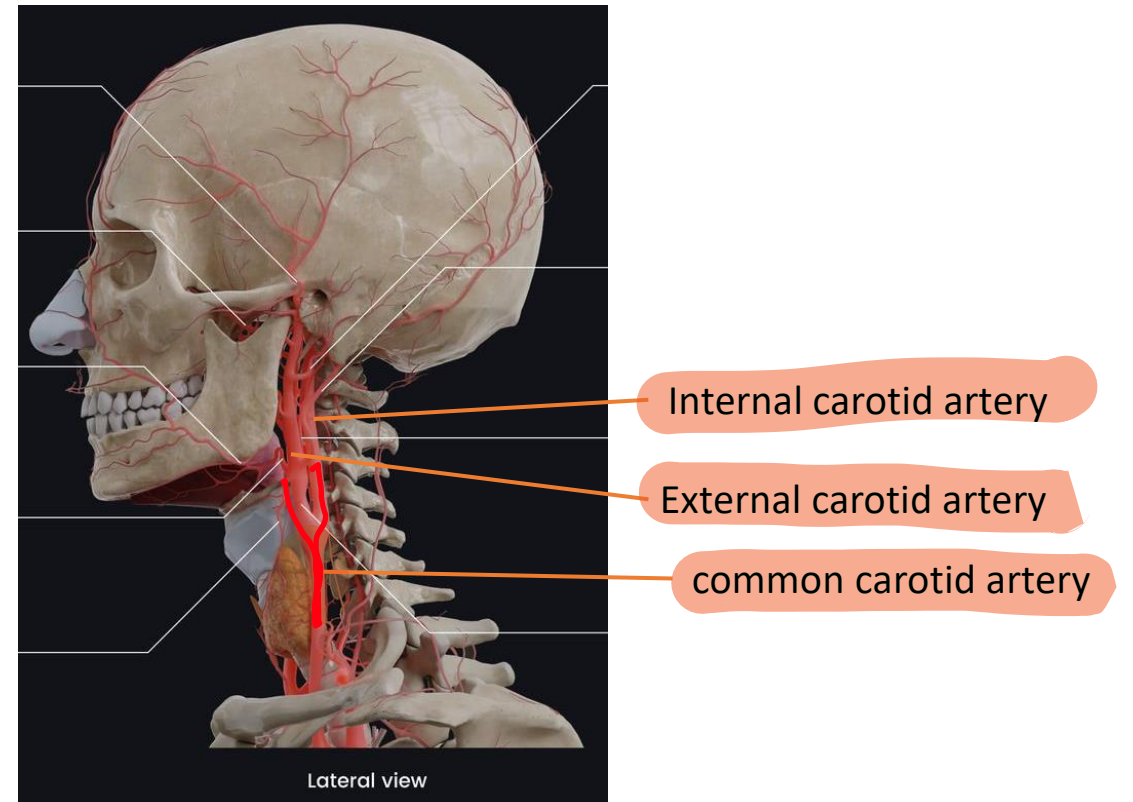
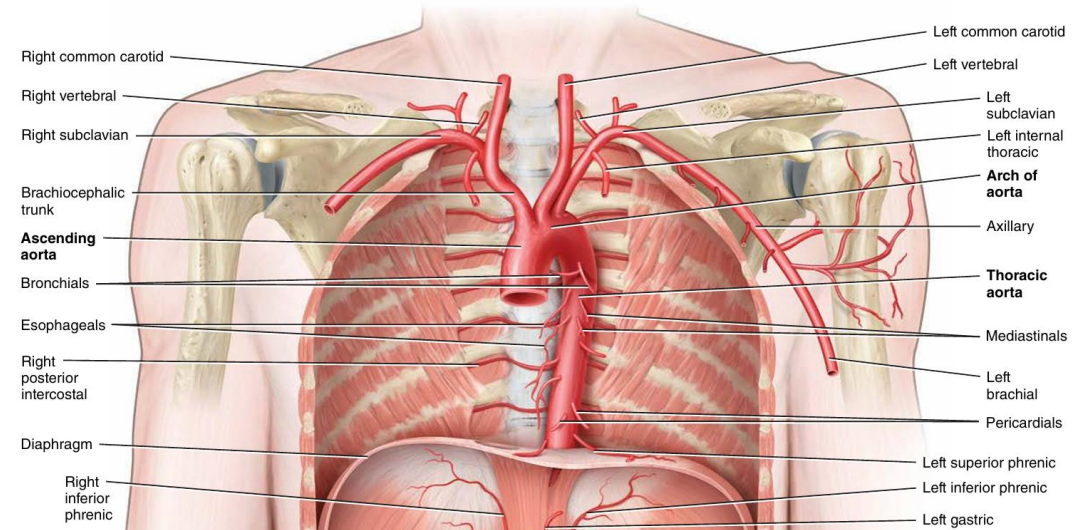
Axillary artery



The right common carotid has only a **cervical part** whereas the left common carotid has **cervical and thoracic parts**.

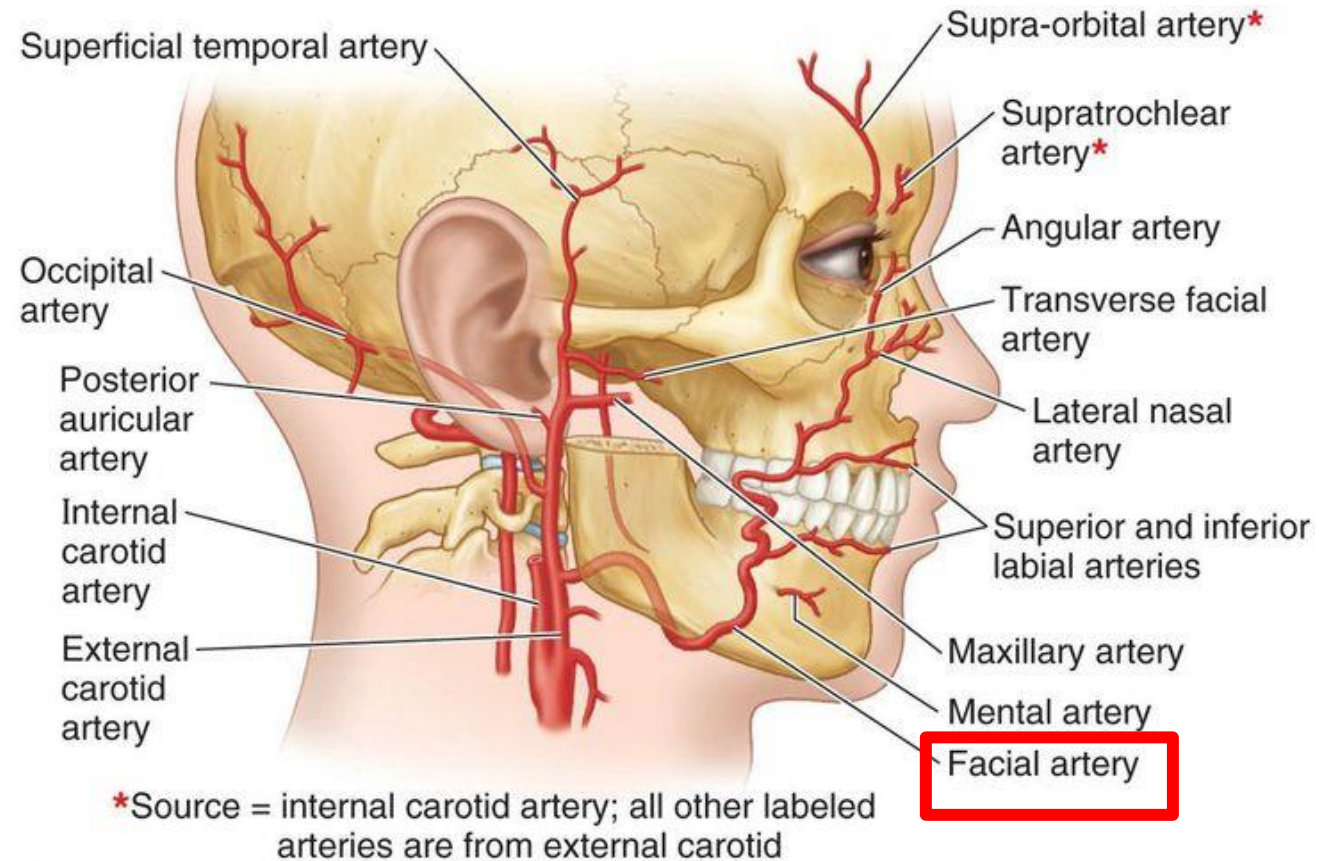
Common carotid artery divides into:

1. **External carotid artery** which supplies the **face and neck**.
2. **Internal carotid artery** which provides main arterial blood supply to the **brain**.



→ not straight (متعرج)

Facial artery is a branch of the **external carotid artery**, it has **tortuous** route along the nasolabial fold towards the medial angle of the eye. This is important as muscles and organs of the face are **very movable**

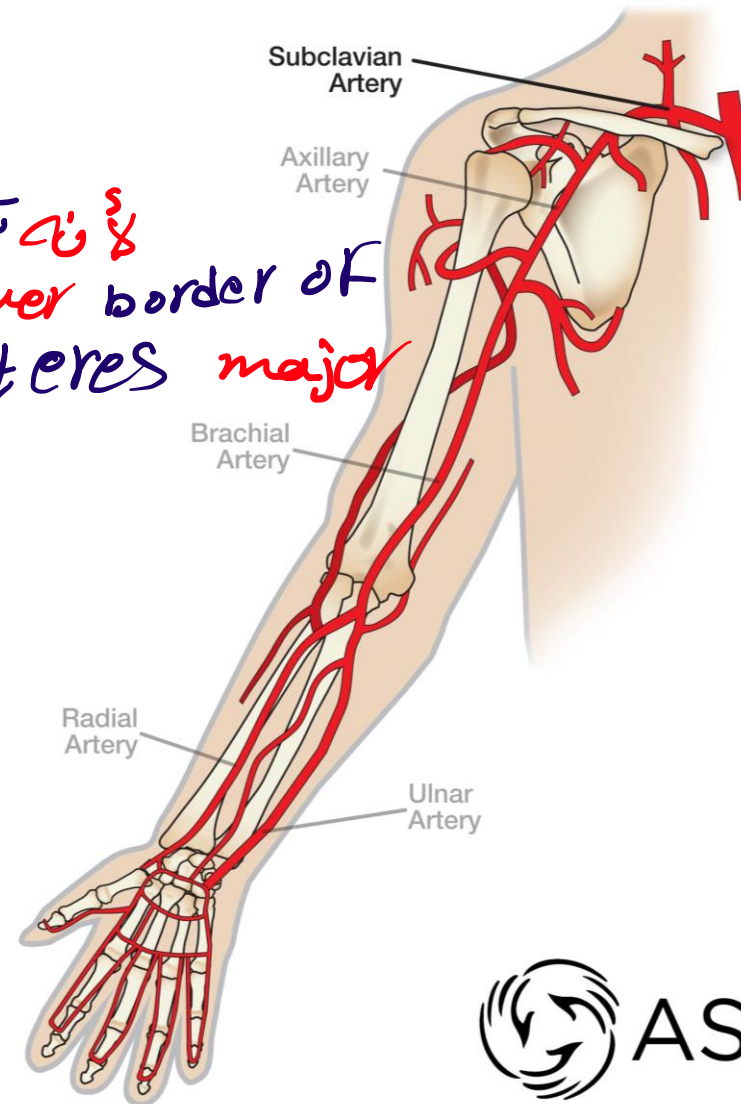


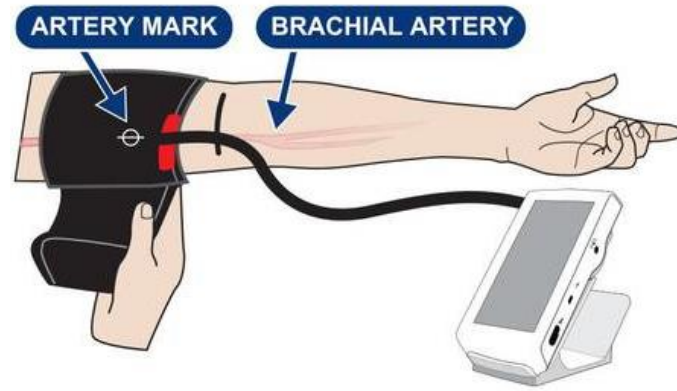
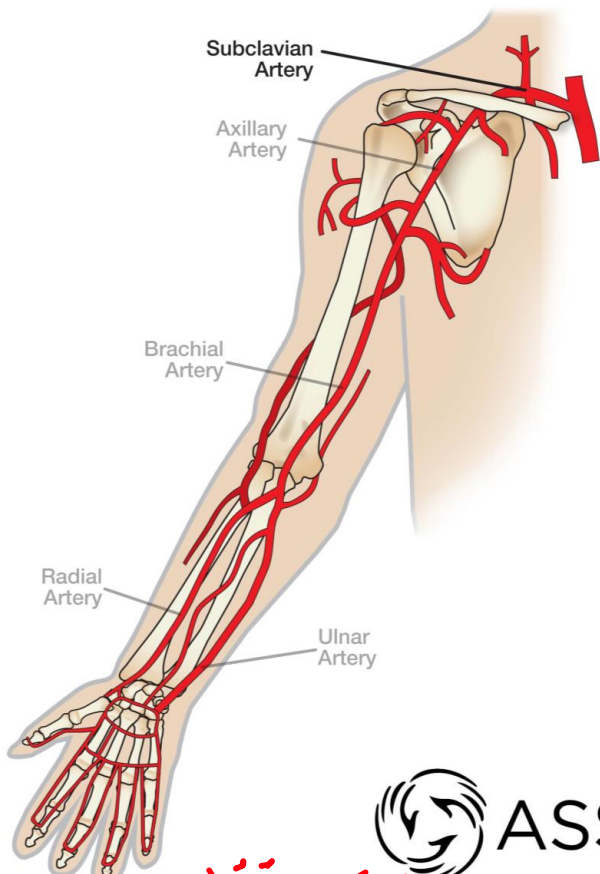
The axillary artery, a continuation of the subclavian artery, begins at the outer border of the first rib and ends at the inferior border of teres major, where it becomes the **brachial artery** →

The brachial artery is a continuation of the axillary artery. It begins at the inferior border of the tendon of teres major and ends about a centimetre distal to the elbow joint (at the level of the neck of the radius) by dividing into the radial and ulnar arteries.

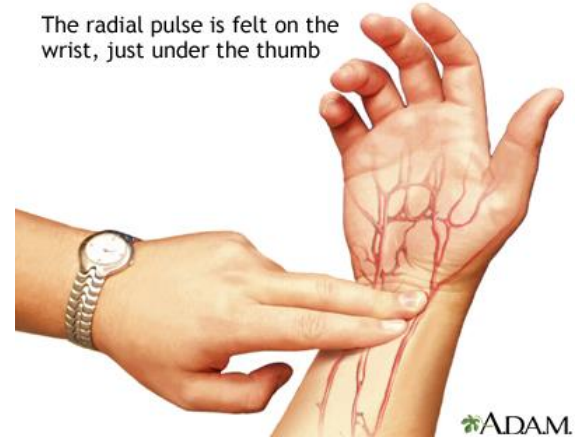
Radial artery is at the lateral side of forearm while the **ulnar artery** is at the medial side.

لأنه تحل في
Lower border of
teres major





The radial pulse is felt on the wrist, just under the thumb



 ASS
 دھم لقیاس قہف الدم

- **Brachial artery** is the artery used to measure your blood pressure medial to the tendon of biceps brachii.

→ wrist joint

The radial pulse is easily felt by the tip of the index and third fingers just lateral to the tendon of the flexors carpi radialis

3. Descending thoracic aorta, lies within the posterior mediastinum.

Extends between T4-T12.

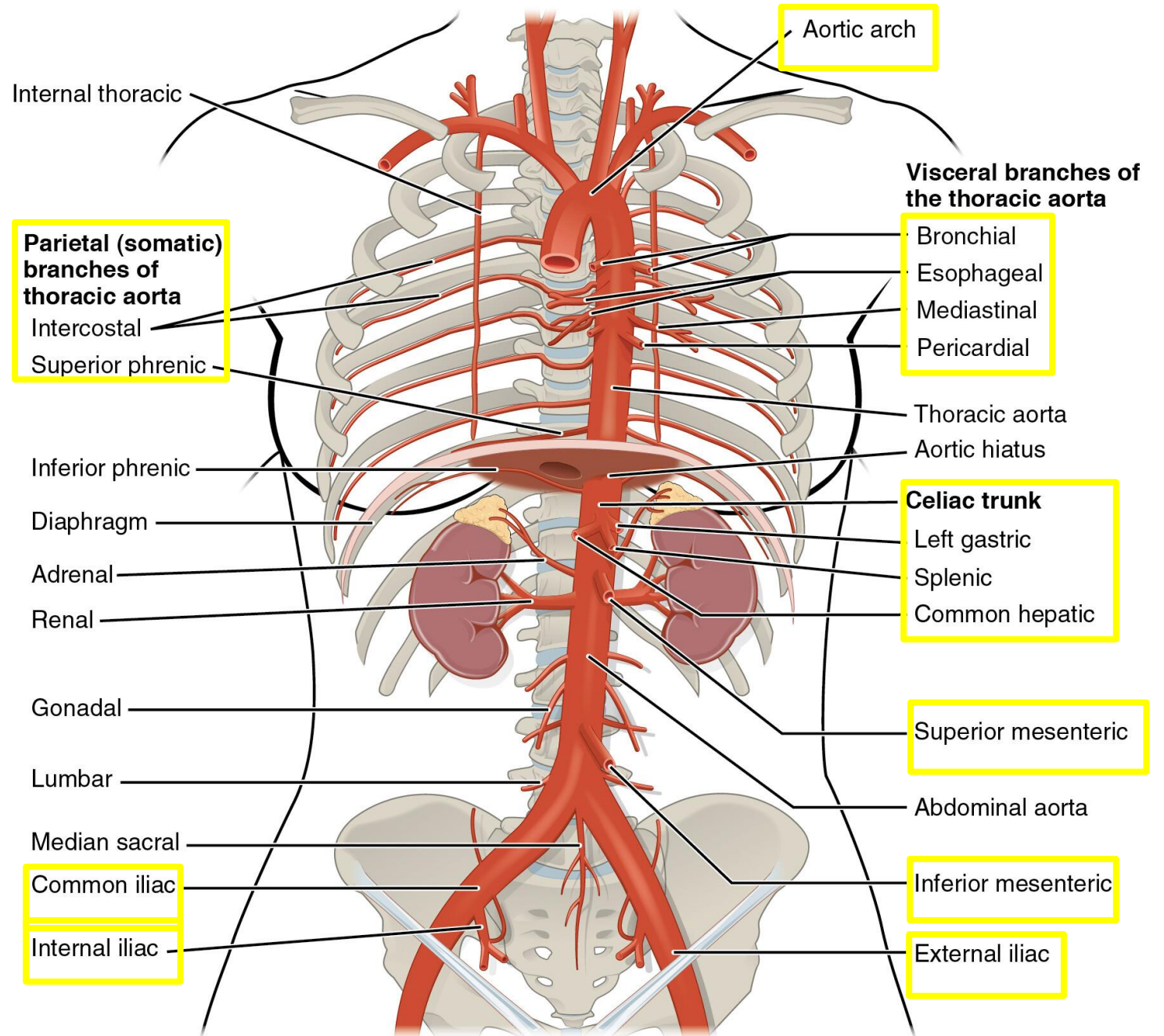
Main branches are divided into:

Visceral branches:

1. Pericardial branches
2. Bronchial arteries
3. Oesophageal arteries
4. Mediastinal arteries

Parietal branches:

1. Intercostal arteries
2. Superior phrenic



4. Descending abdominal aorta, starts at **T12 and ends at L4** main branches are:

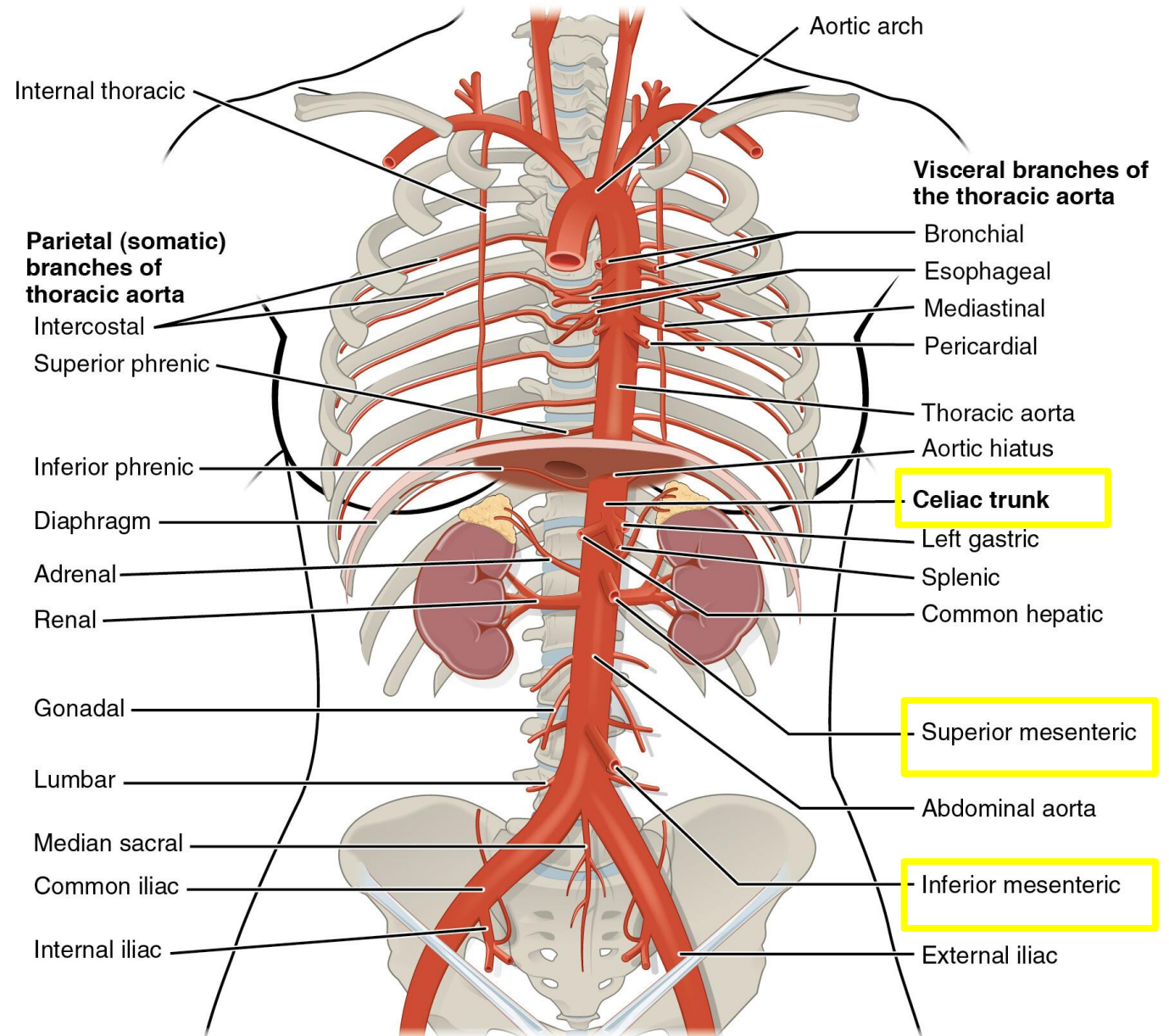
■ Unpaired branches that arise from the anterior aspect:

1. Celiac trunk
2. Superior mesenteric artery
3. Inferior mesenteric artery

■ Paired branches arise from the lateral aspect

1. Renal arteries
2. Adrenal arteries
3. Gonadal arteries
4. Four lumbar arteries

■ Terminal branches (two common iliac arteries)

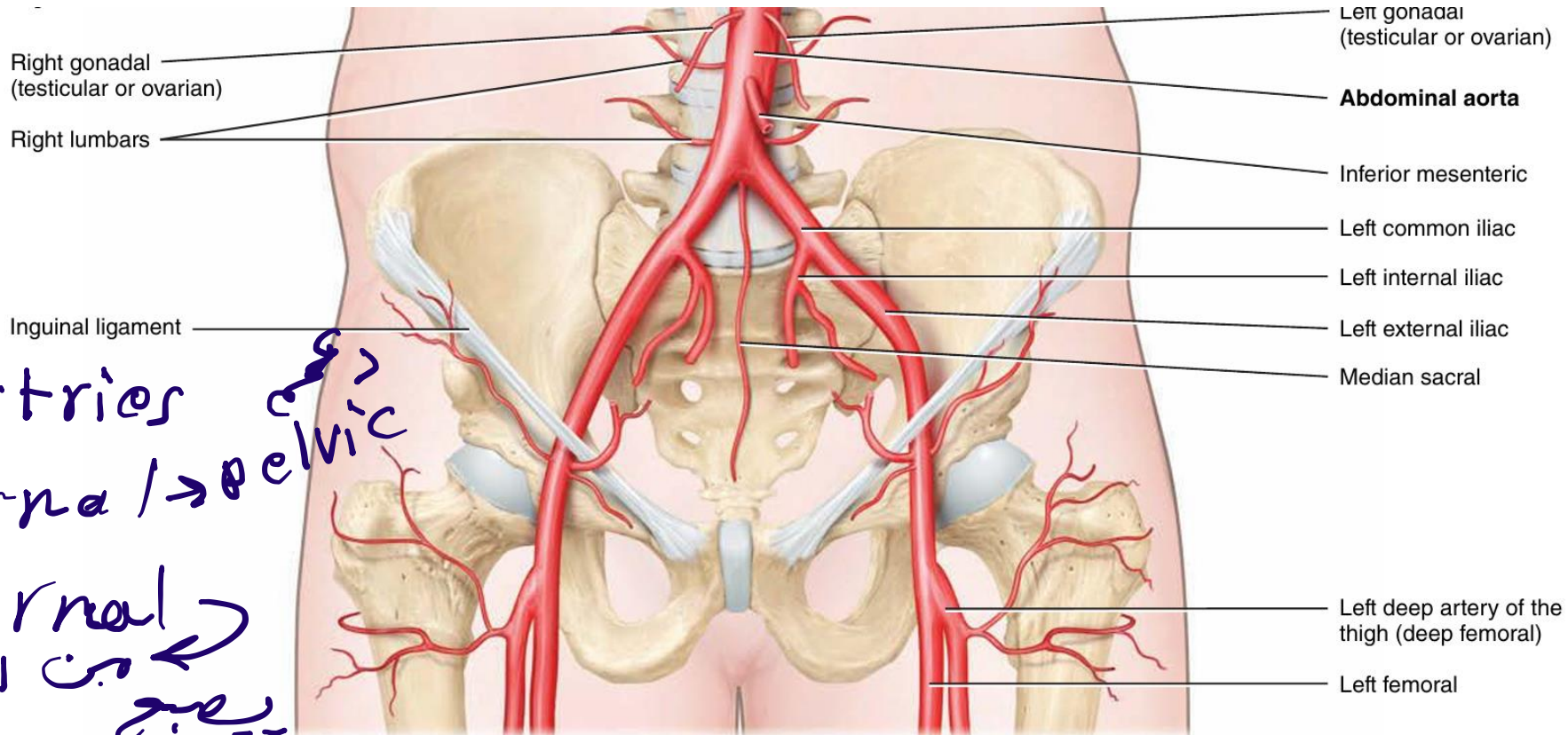


مخرج الشرايين

Arterial supply to the lower limb

pelvis ←

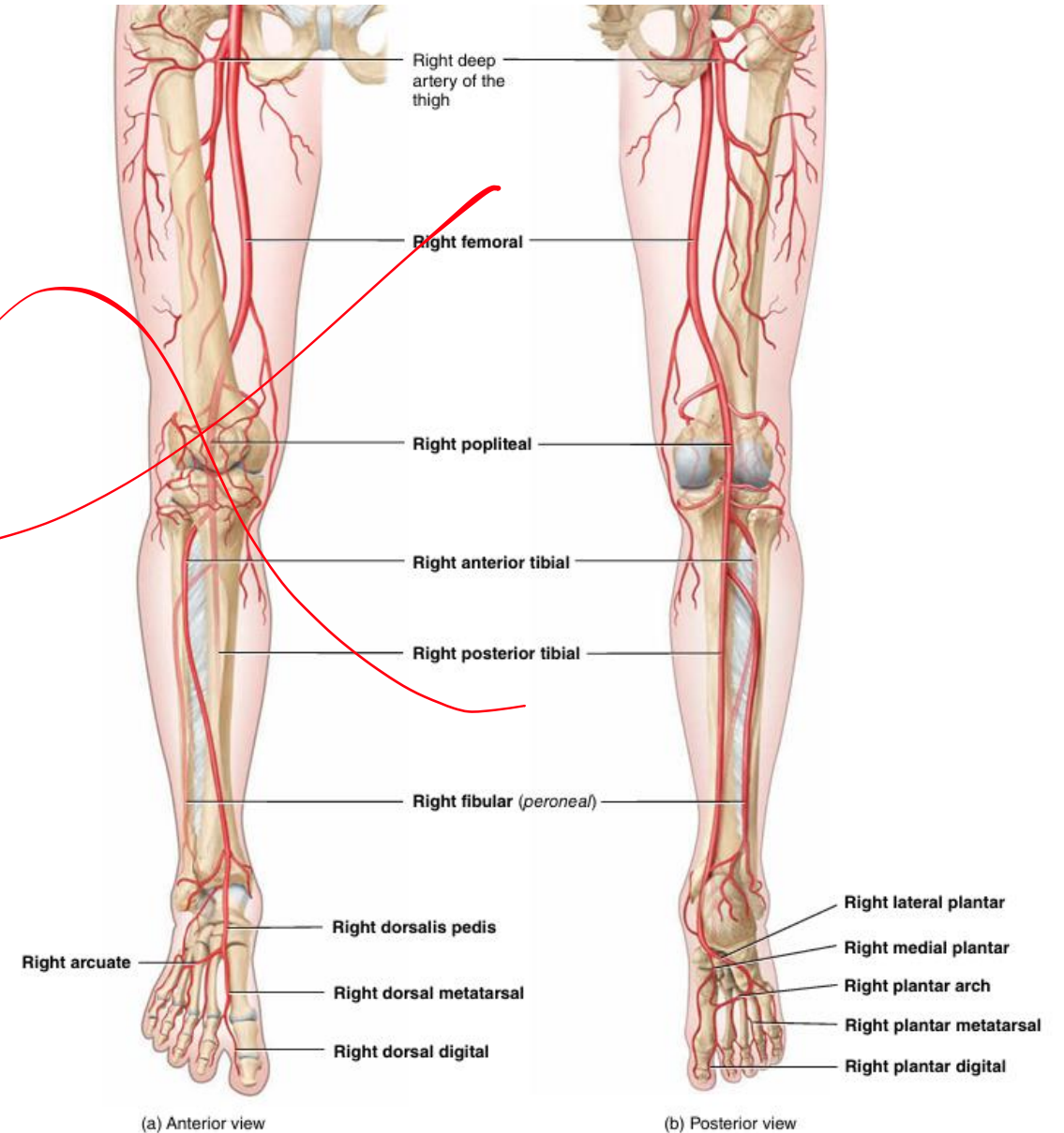
The **femoral artery** is a continuation of the **external iliac artery** and provides the principal arterial supply to the lower limb. It begins posterior to the inguinal ligament, midway between the anterior superior iliac spine and the pubic symphysis, descends in **the femoral triangle**, enters and passes through the adductor canal, and becomes the **popliteal artery** as it passes through an opening in adductor magnus.



iliac arteries
↳ internal → pelvic
↳ external → femoral
بين الخلف
يسبق

Arterial supply to the lower limb

- **Popliteal artery** is the continuation of the **femoral artery** and crosses the popliteal fossa. It descends laterally from the opening in adductor magnus to the femoral intercondylar fossa.
- It gives two branches; **the anterior and posterior tibial arteries.**

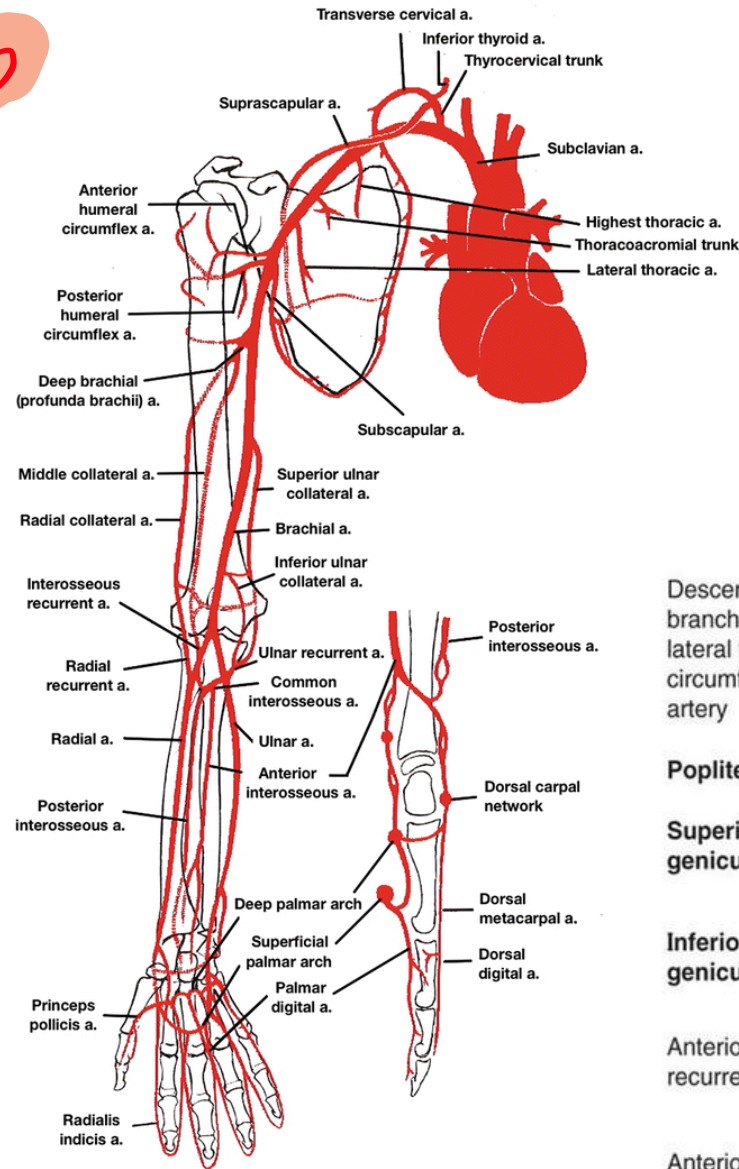


mostly in upper limb

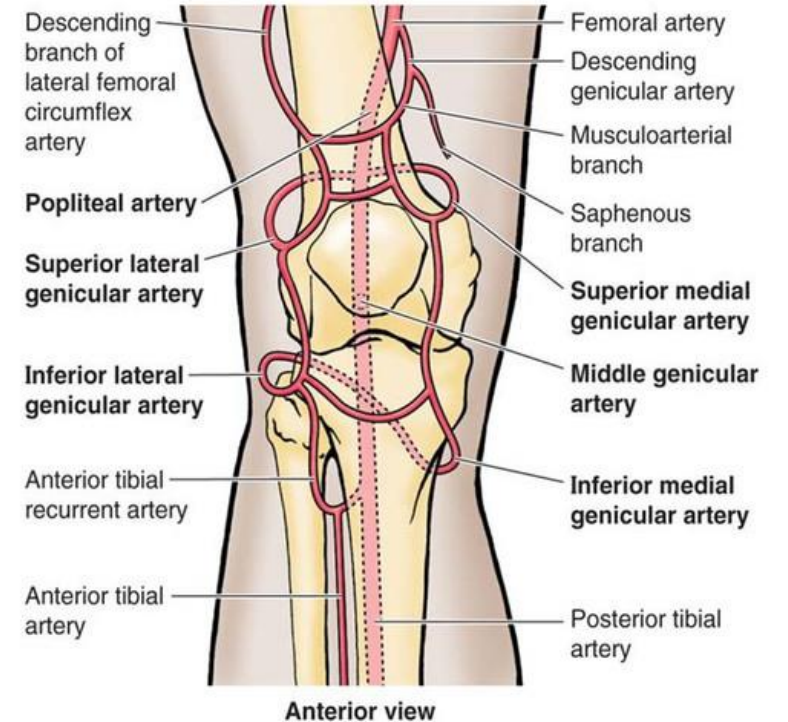
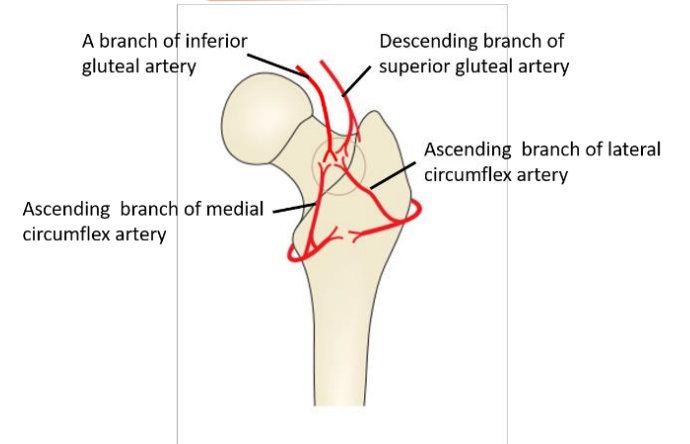
Collateral circulation

Mostly in joints

- Is a connection or (anastomosis) between the branches of adjacent arteries
- Back-up blood supply in case of blockages.
- **Exists mainly around joints**

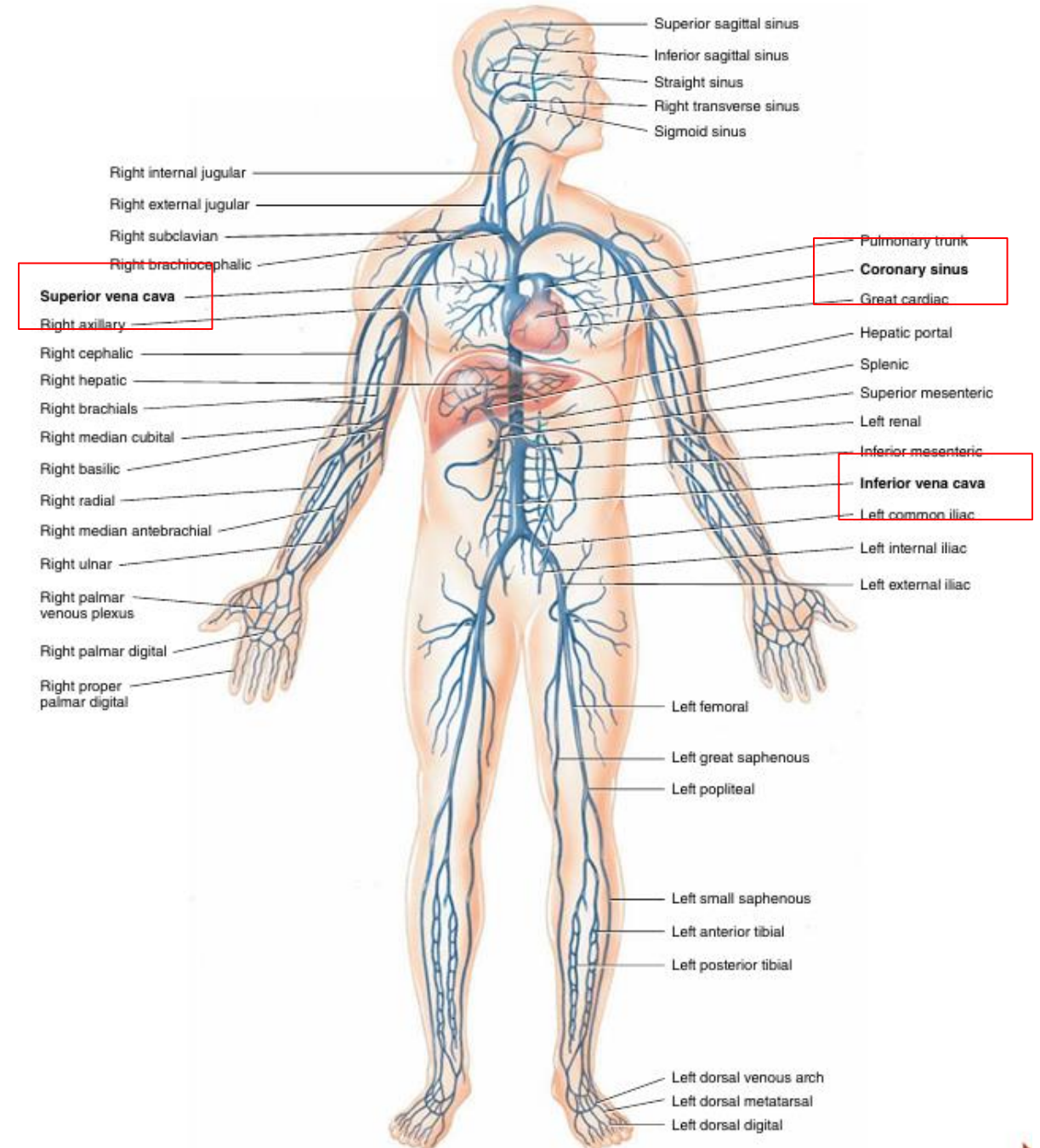


Trochanteric Anastomosis



Venous drainage of the body

- Deoxygenated blood returns to the heart via 3 main veins: the **superior and inferior venae cavae** and the **coronary sinus**.
- There are two types of veins:
 1. **Superficial veins:** beneath the skin
 2. **Deep veins** : accompany the arteries, some arteries have wo accompanying veins called v=ena comitans; one vein at each side of the artery.



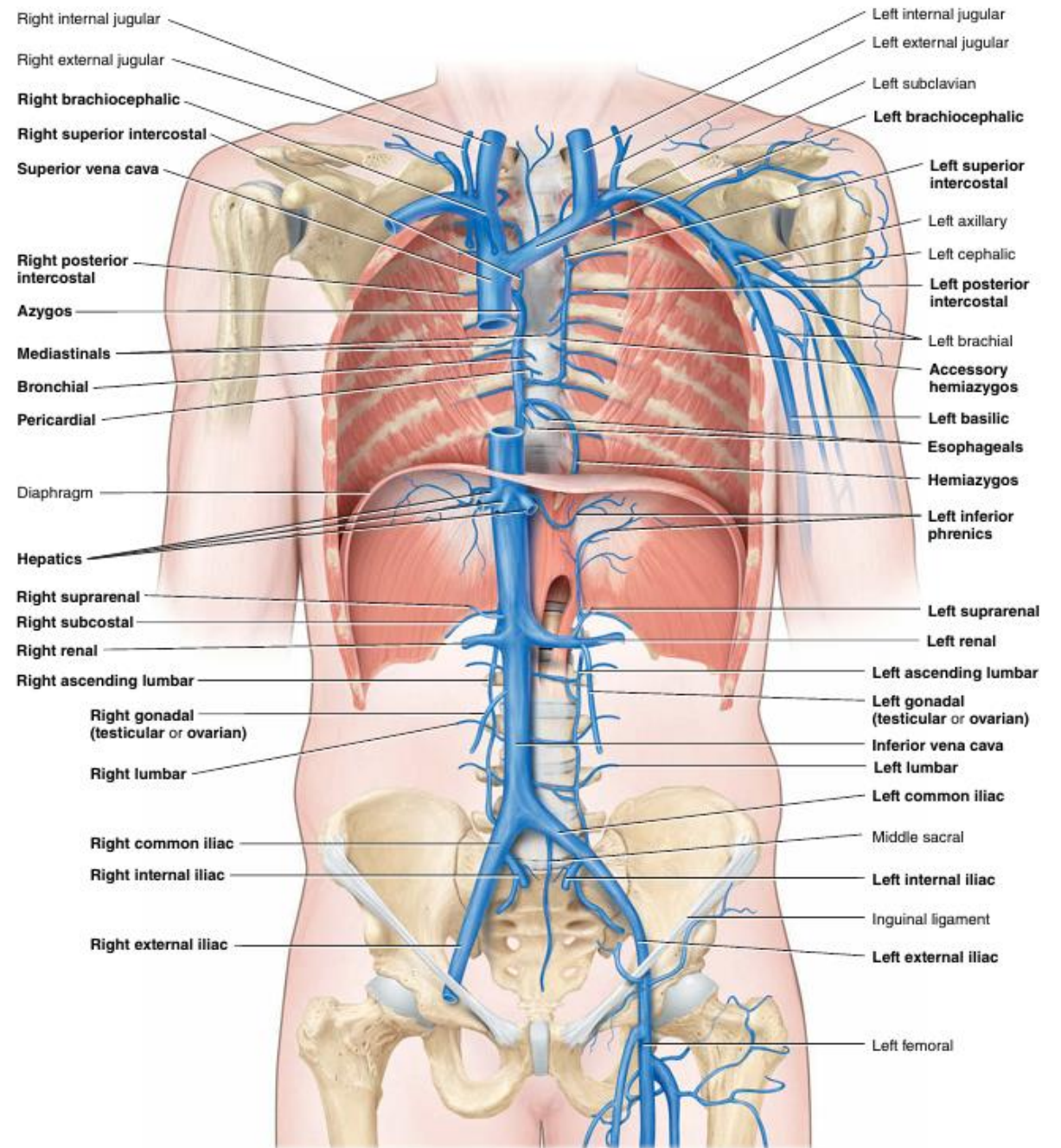
Large venous vessels

- Superior vena cava

Returns blood to the heart from the tissues above the respiratory diaphragm. Formed by the junction of the left and right brachiocephalic veins.

- Inferior vena cava

Returns blood to the heart from tissues below the respiratory diaphragm..

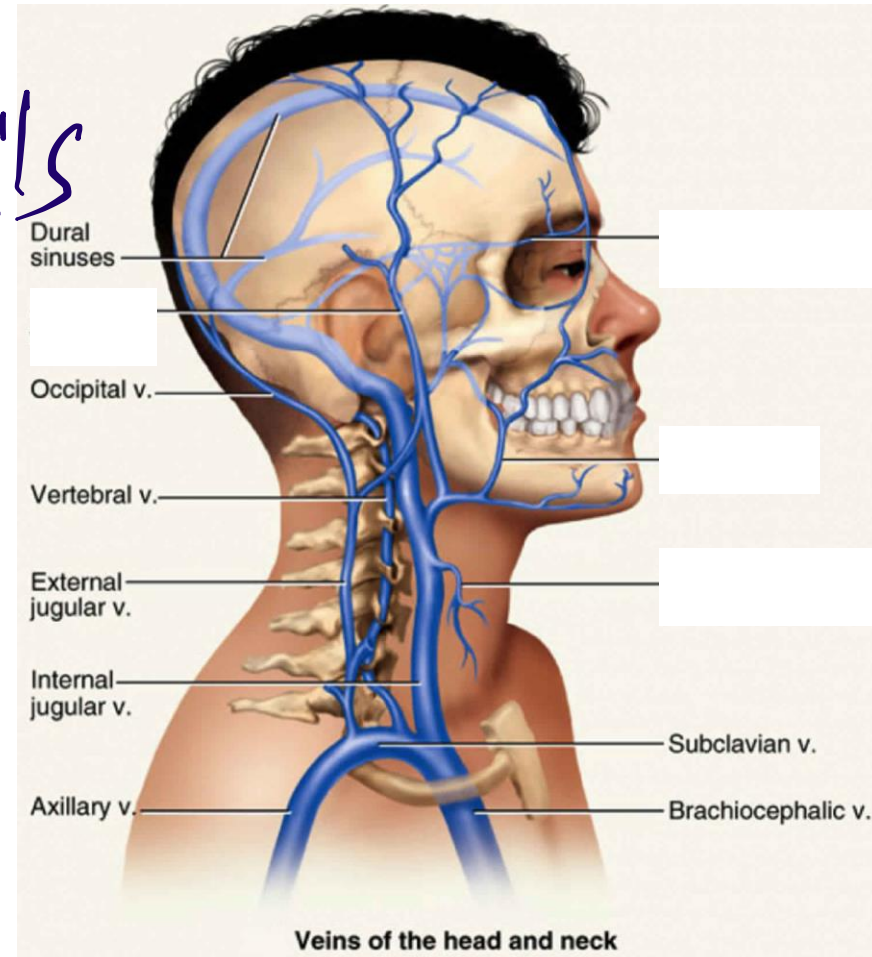


Venous drainage of the upper limb, head and neck

→ single layer of cells

- **Dural venous sinuses** are valveless
- All drain into the **internal jugular vein**
- Internal jugular vein joins **subclavian vein** to form **brachiocephalic vein**

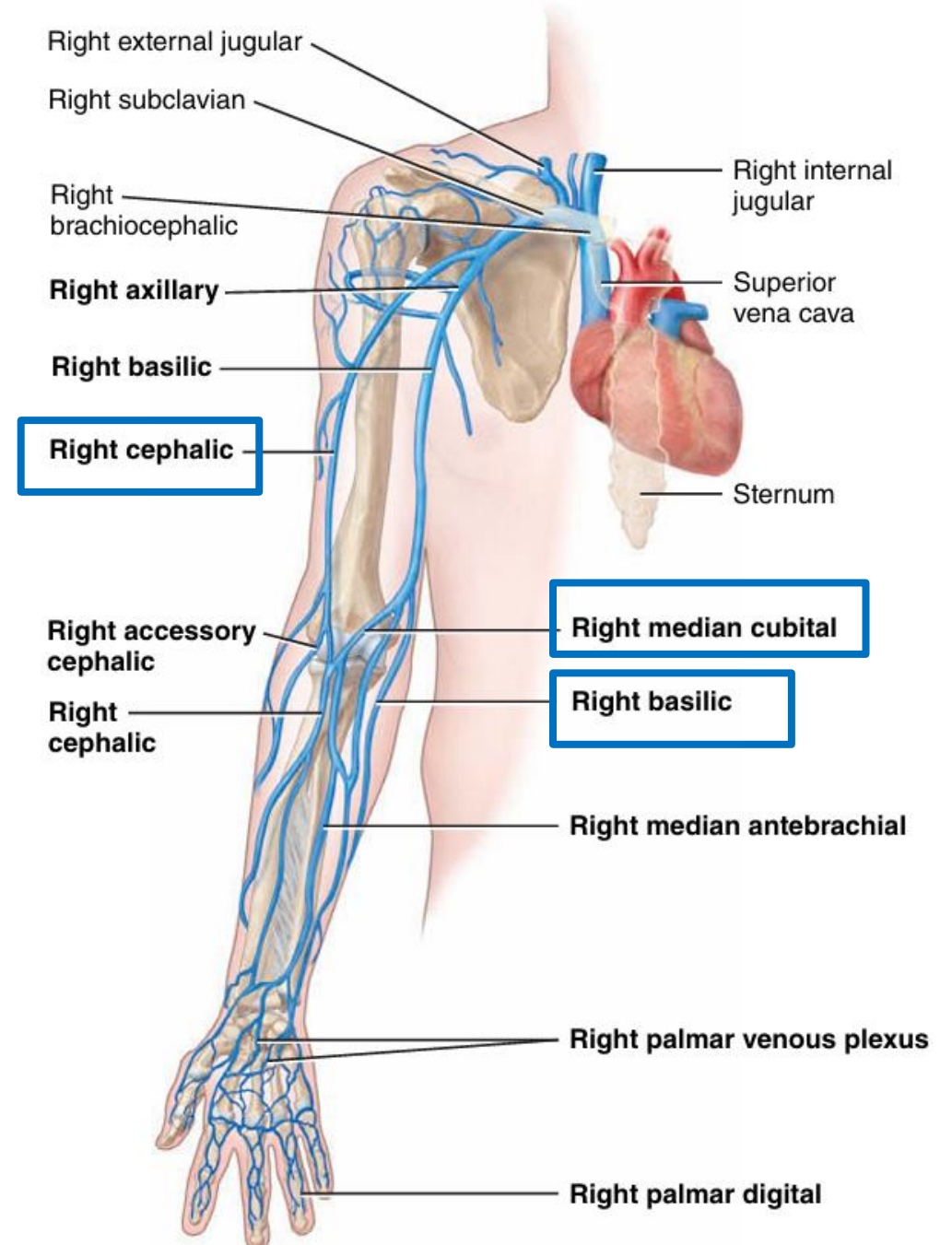
تدخل في كالمسجون
for men



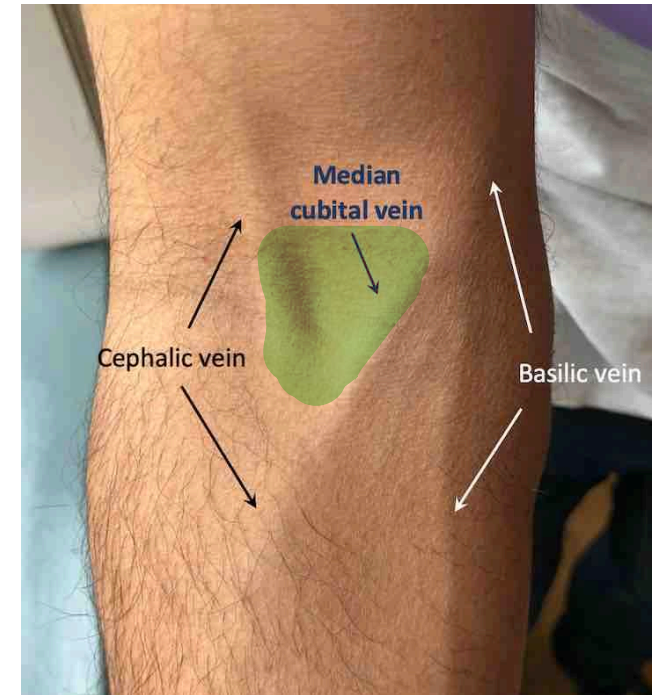
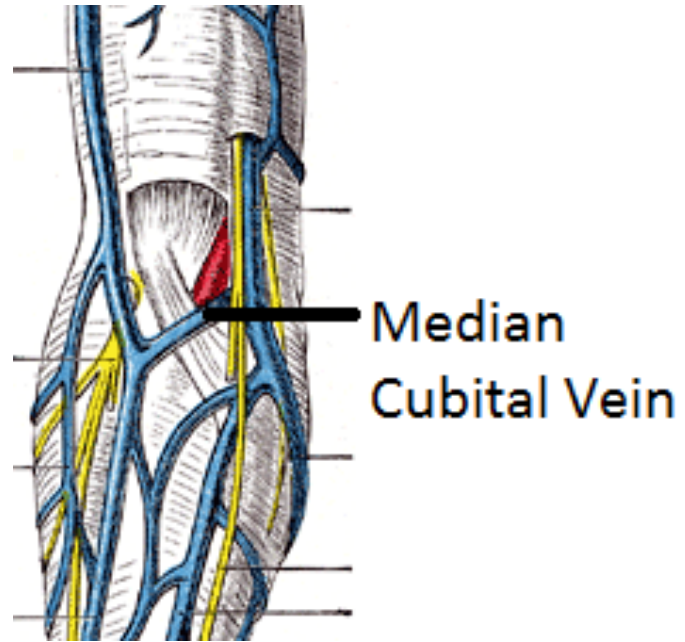
Venous drainage of the upper limb

- **Cephalic veins** begin on the lateral aspect of dorsal venous arch
- **Basilic veins** begin on the medial aspects of dorsal venous arch.
- Connected to the cephalic veins anterior to the elbow by the median cubital veins

← لسحب الدم



The median cubital vein is the most superficial vein in the body and connects the cephalic and basilic veins.



Venous drainage of the lower limb

All veins of the lower limbs have valves.

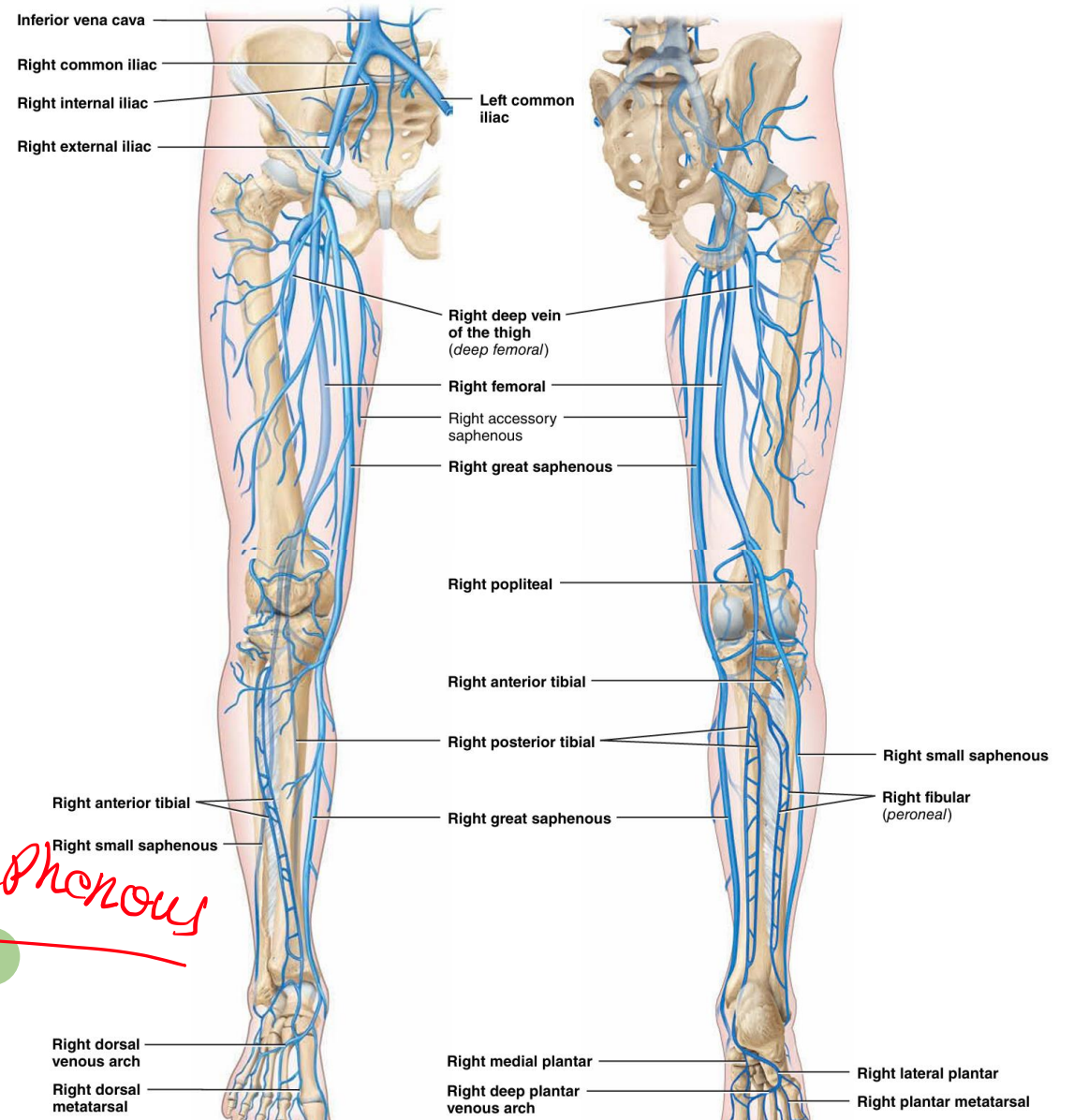
(الدوائى في الدم)

Great saphenous veins are the longest veins in the body. Pass anterior to the medial malleolus of the tibia and then superiorly along the medial aspect of the leg and thigh.

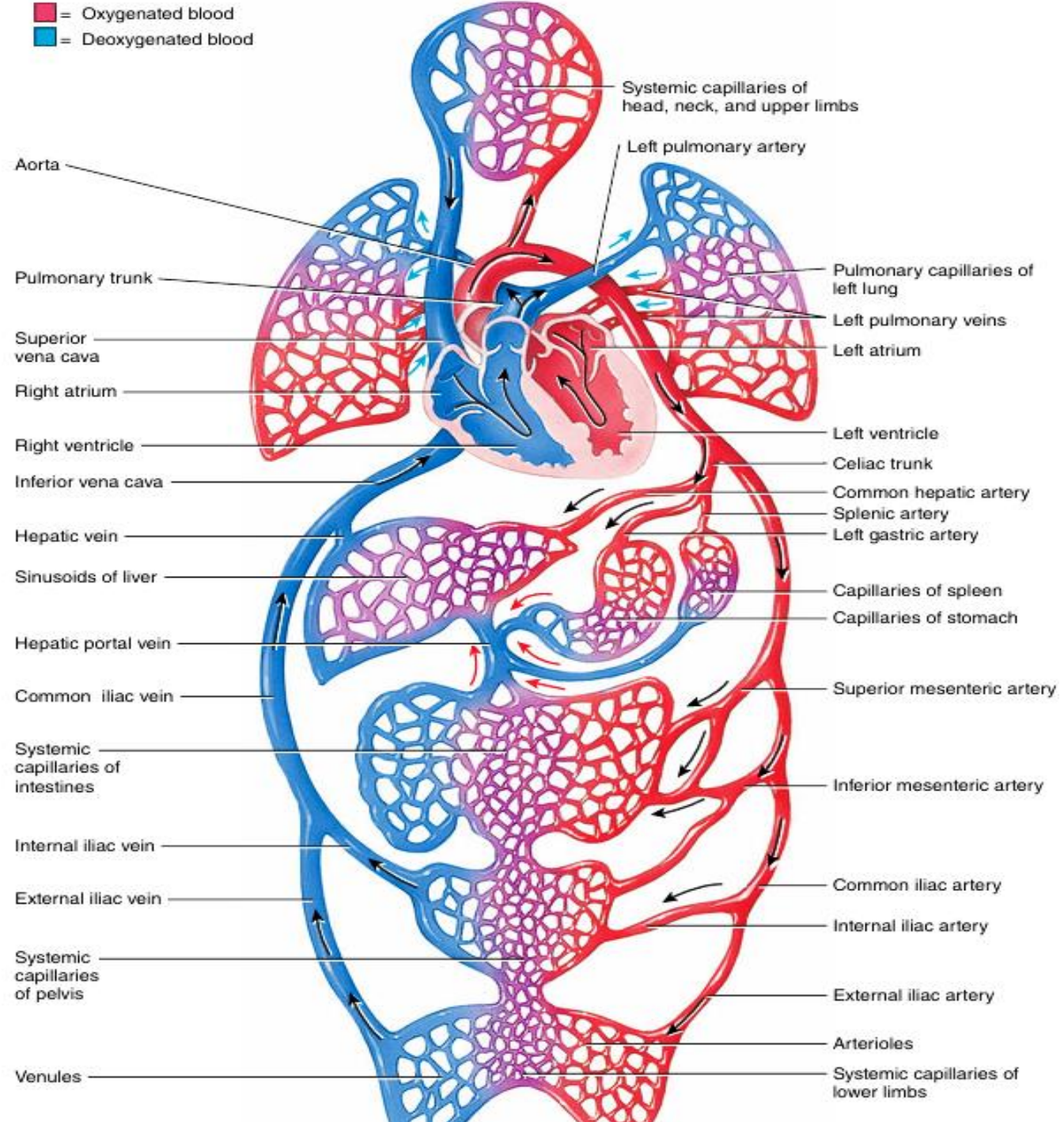
Small saphenous veins begin at the lateral aspect of the dorsal venous arches of the foot; pass posterior to the lateral malleolus of the fibula.

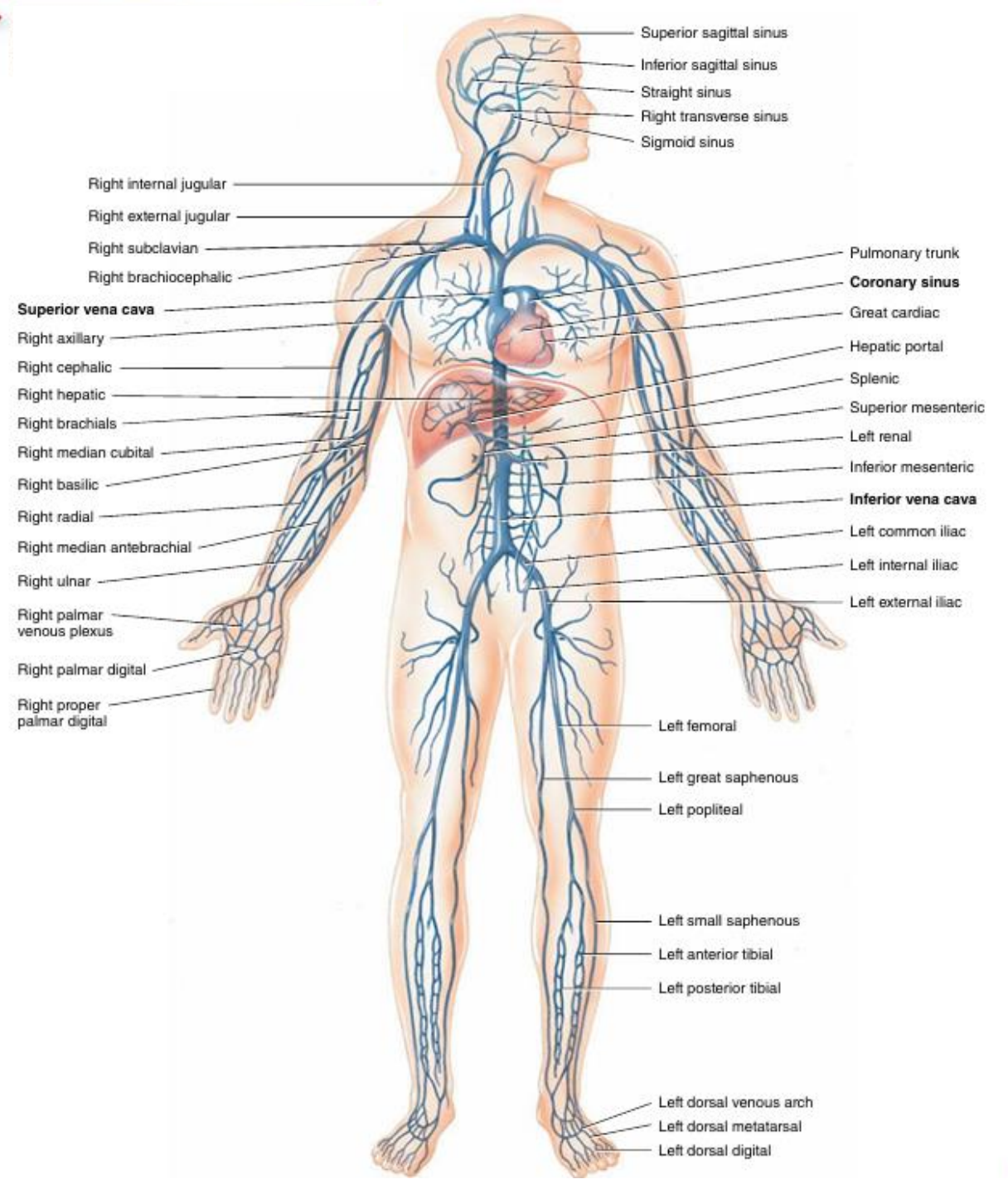
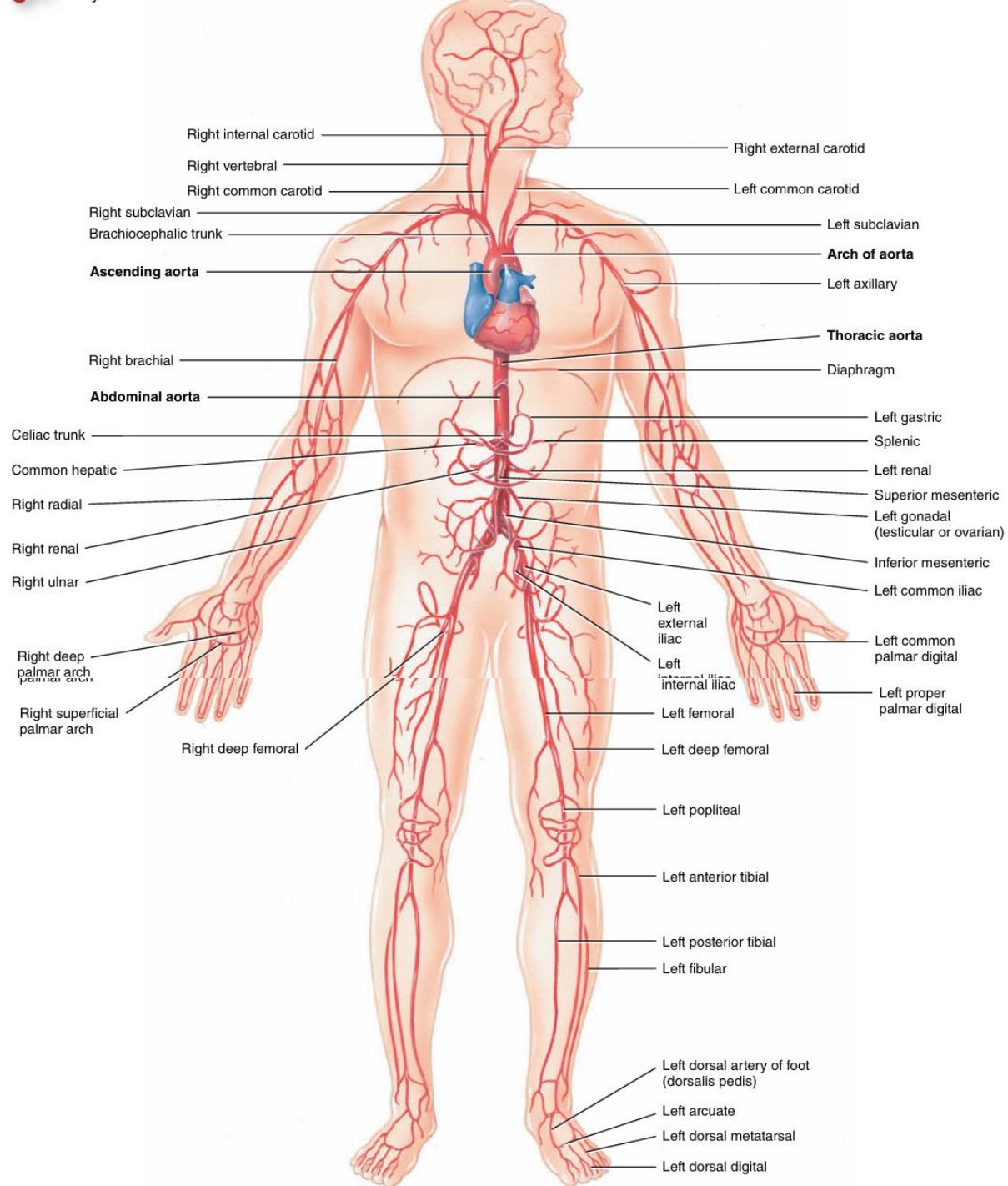
Clinical notes: *related to great saphenous*

- More likely to be subject to Varicose veins than other veins in the lower limbs.
- Prolonged administration of intravenous fluids.
- Coronary artery bypass grafting



■ = Oxygenated blood
■ = Deoxygenated blood





- Thank you!