



Vascular Anatomy Of The Upper Limb

Musculoskeletal block- Anatomy-lecture 11

Editing file



Objectives

Color guide :

Only in boys slides in **Blue**

Only in girls slides in **Purple**

important in **Red**

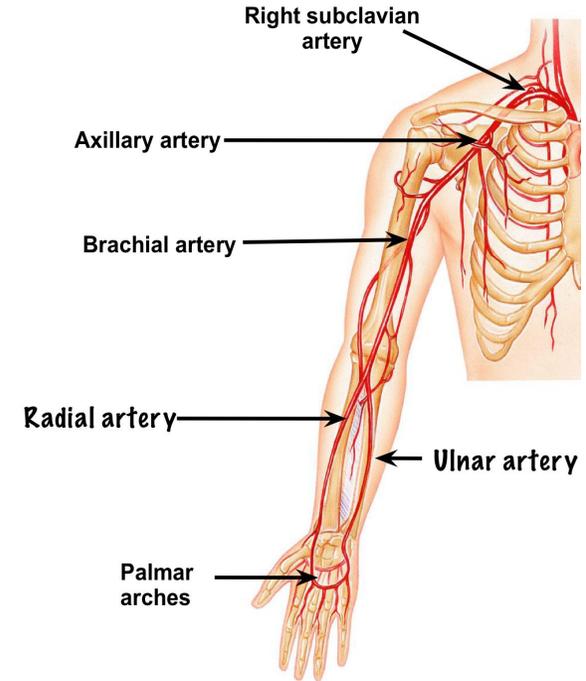
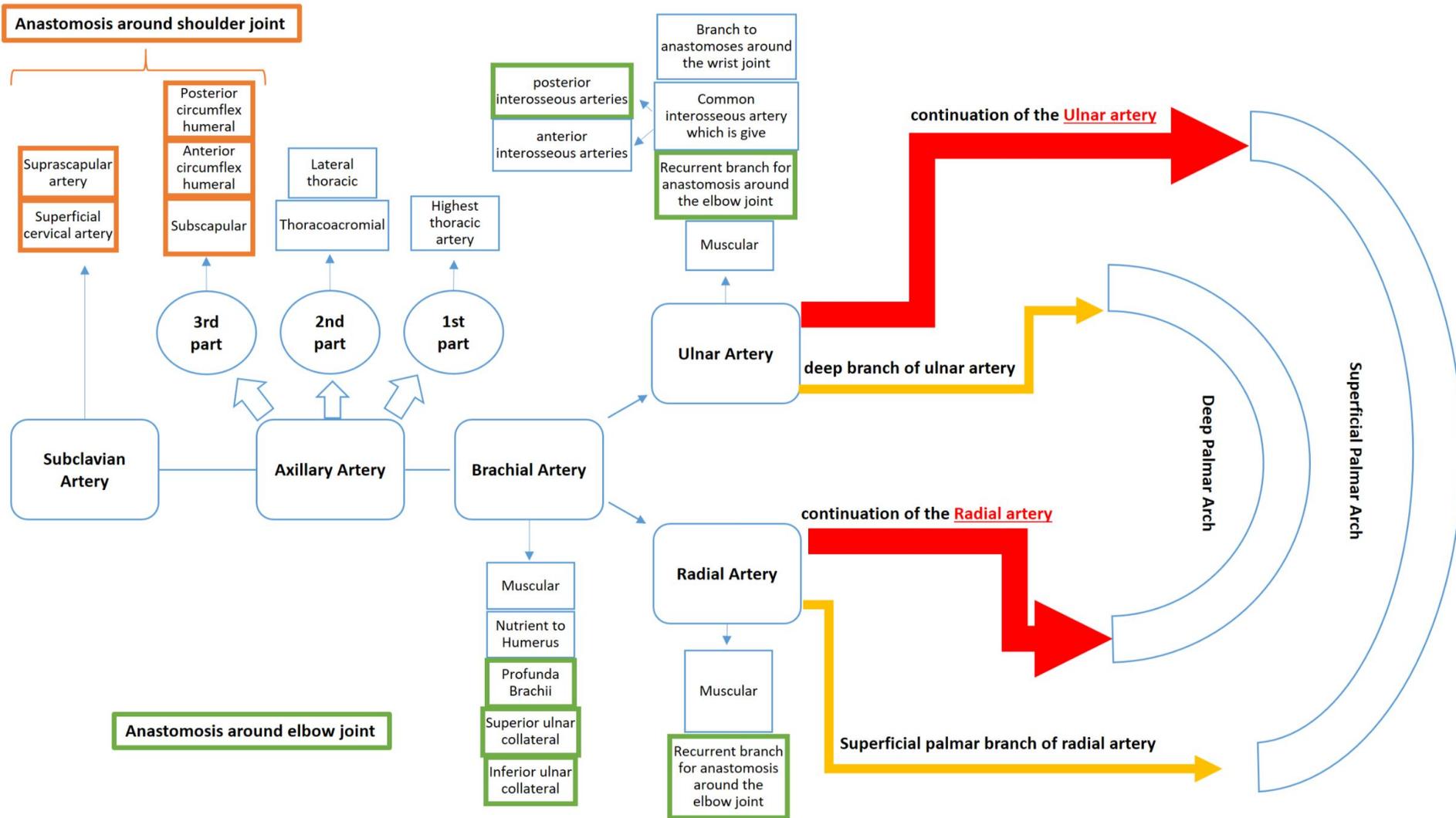
Doctor note in **Green**

Extra information in **Grey**

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

- ✓ Identify the origin of the vascular supply for the upper limb.
- ✓ Describe the main arteries and their branches of the arm, forearm & hand.
- ✓ Describe the vascular arches for the hand.
- ✓ Describe the superficial and deep veins of the upper limb

Overview : Arteries Of The Upper Limb :



Arteries Of The Upper Limb

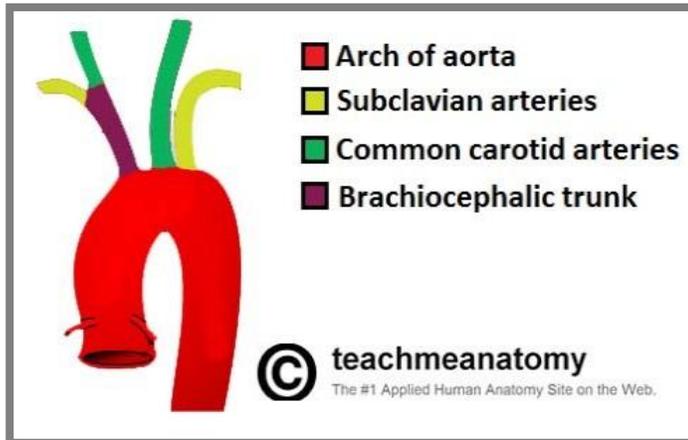
The Subclavian Artery:

Right

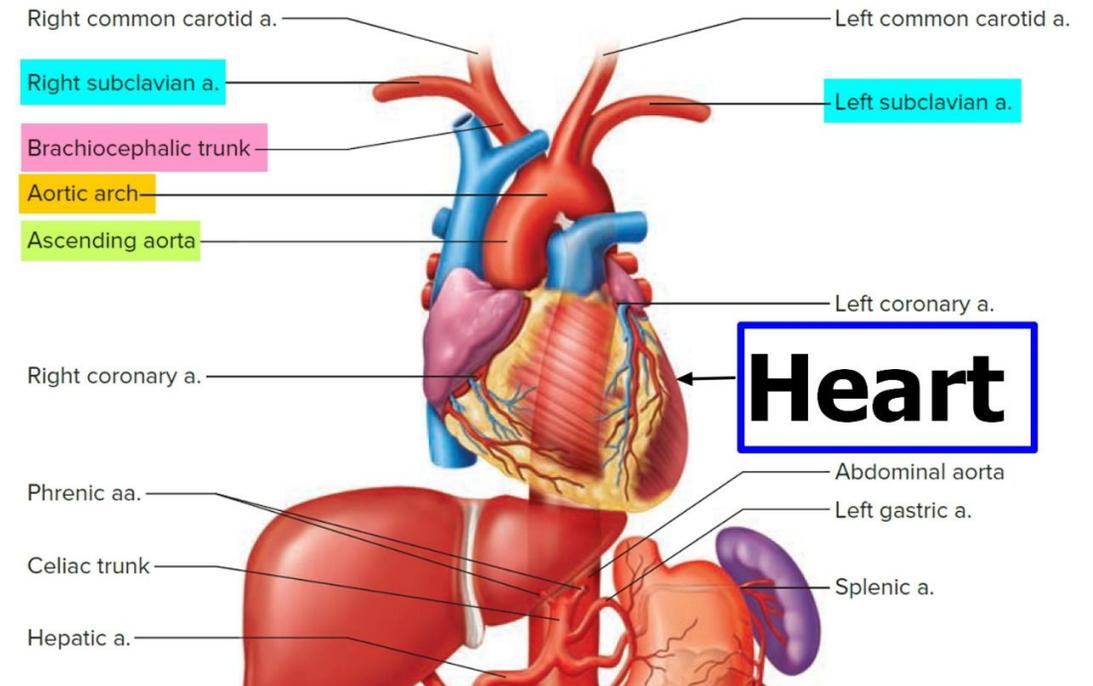
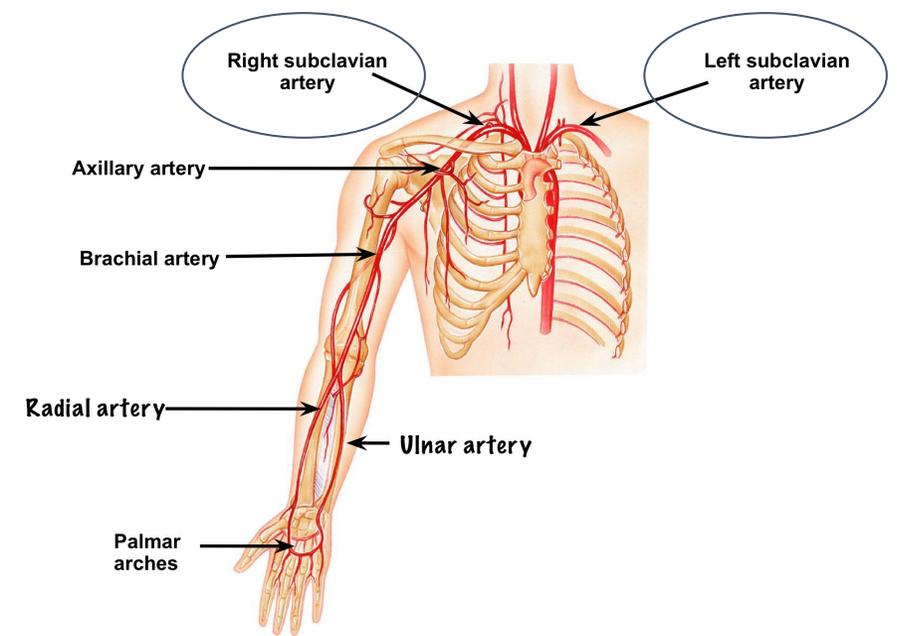
Left

The **right subclavian artery** originates from the brachiocephalic artery.

The **left subclavian artery** originates from the **arch of the aorta**.



both Continue as **Axillary** artery at the **lateral(outer) border of the 1st rib**



2)The Axillary Artery

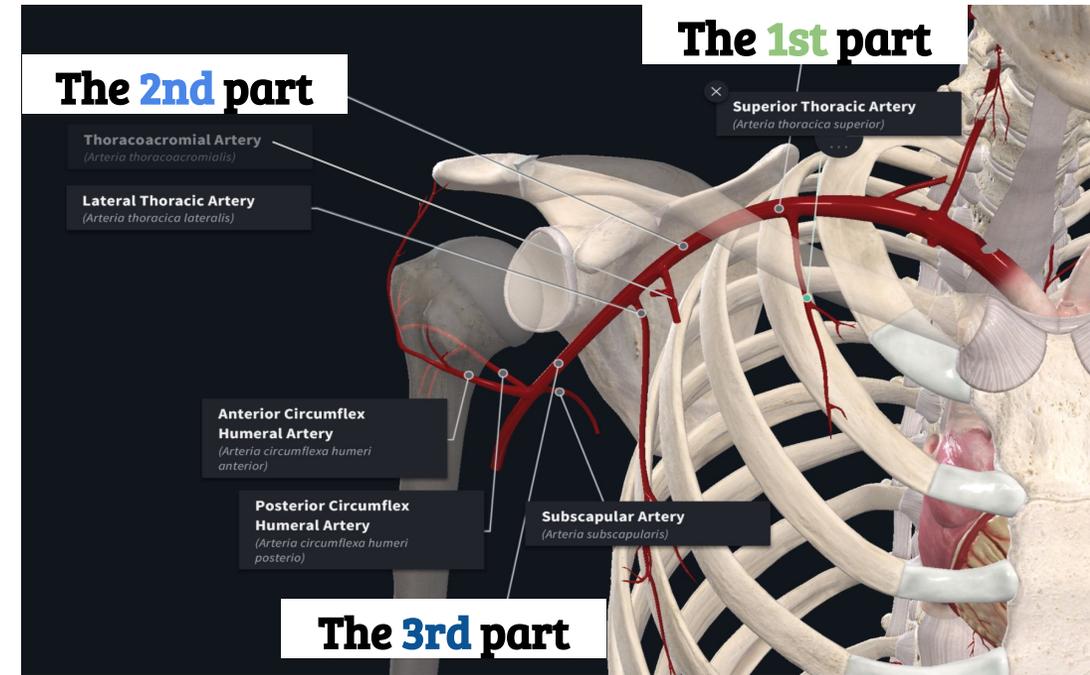
Begins at the lateral border of the 1st rib as continuation of the **subclavian artery**.

It's closely related: to the cords of **brachial plexus** and their branches

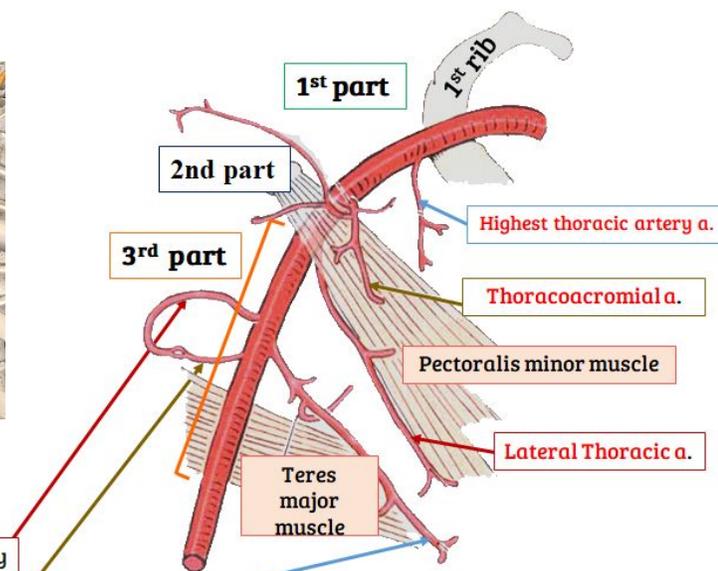
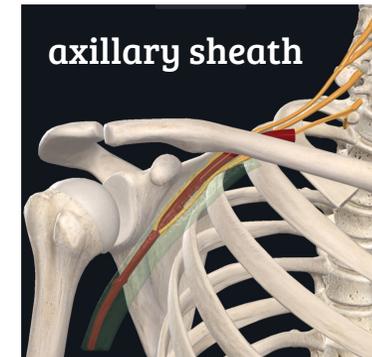
It's enclosed (with axillary vein) within the **axillary sheath**.

It's crossed anteriorly by the **pectoralis minor muscle**, and is divided into **three** parts; **1st, 2nd & 3rd**.

Continues as **brachial artery** at lower border of **teres major muscle**.

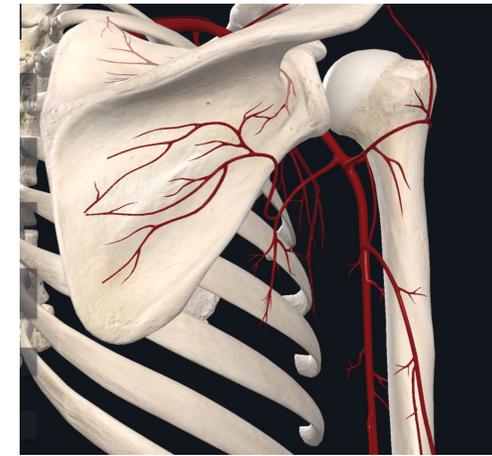


The 1st part	The 2nd part	The 3rd part
<p>-Extends from the lateral border of 1st rib to upper border of the pectoralis minor muscle.</p> <p>-Related: Anteriorly: to the pectoralis major muscle Laterally: to the cords of the brachial plexus.</p> <p>-It gives; ONE branch: Highest thoracic artery</p>	<p>-Lies: behind the pectoralis minor muscle.</p> <p>-It is related: medially, laterally, and posteriorly to the corresponding cord of the brachial plexus.</p> <p>-It gives; TWO branches 1-Thoracoacromial. 2-Lateral thoracic.</p>	<p>-Extends from the lower border of pectoralis minor muscle to the lower border of teres major muscle.</p> <p>-Related: medially, laterally, and posteriorly, to the branches of the cords of the brachial plexus</p> <p>-It gives; THREE Branches: 1-Anterior circumflex humeral 2-Posterior circumflex humeral. 3-Subscapular</p>



- 1- Anterior circumflex humeral artery
- 2- Posterior circumflex humeral artery
- 3- Subscapular artery

Anastomosis around shoulder joint



Anastomosis occurs between branches of **Subclavian** and **Axillary** arteries

Branches from Subclavian Artery

Branches from Axillary Artery
The 3rd part

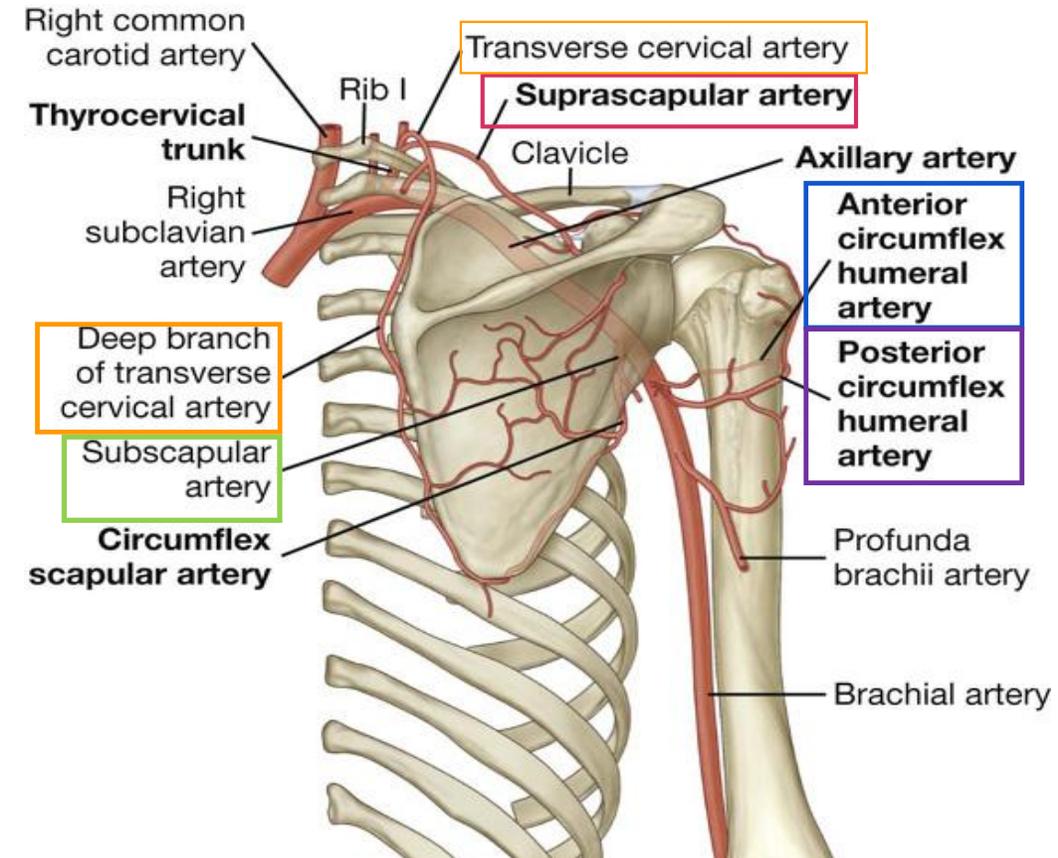
Suprascapular artery

Transverse cervical artery

Subscapular artery

Anterior circumflex humeral artery

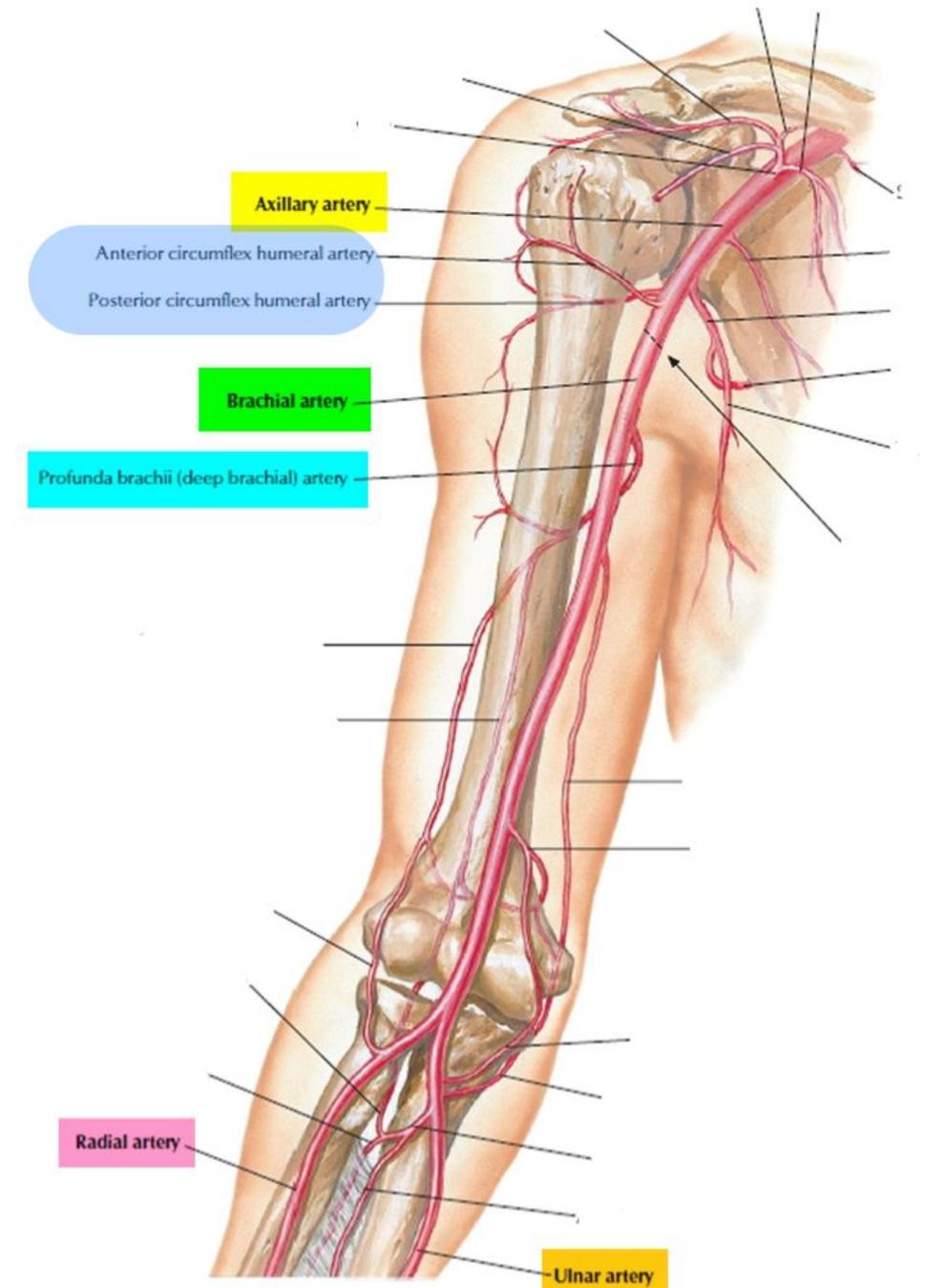
Posterior circumflex humeral artery



3)The Brachial Artery

- Is a continuation of the **axillary artery** at the lower border of teres major muscle.
- Provides main arterial supply to the arm.
- Terminates** opposite **Neck of Radius** by dividing into **Radial & Ulnar arteries**.

Relations	branches
<ol style="list-style-type: none"> 1. •Anteriorly: crossed from above downward by medial cutaneous nerve of the forearm, median nerve, and bicipital aponeurosis. 2. •Posteriorly: triceps, coracobrachialis and brachialis. 3. •Medially: basilic vein, ulnar and median nerves. 4. •Laterally: coracobrachialis and biceps 	<p><u>Muscular.</u></p> <p><u>Nutrient to humerus.</u></p> <p>Profunda brachii (Moving with the Radial N)</p> <p>Superior ulnar collateral. In Front of M epicondyle of Humerus</p> <p>Inferior ulnar collateral. Behind M epicondyle</p>



4) The Ulnar Artery

- The **larger** of the two terminal branches of the brachial artery.
- Begins in the cubital fossa at the level of neck of radius.
- Descends through **the anterior compartment** of the forearm.
- Enters the palm **in front** of the flexor retinaculum, with the **ulnar nerve**.
- Ends by forming **the superficial palmar arch**, by anastomosing with superficial palmar branch of radial artery.

branches

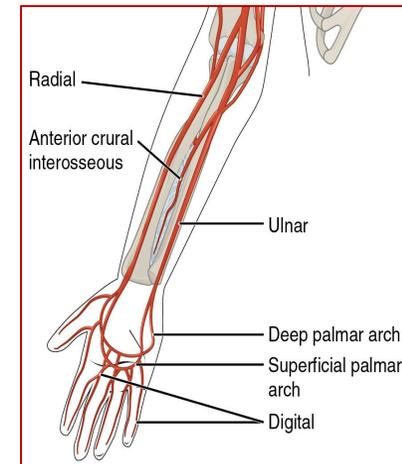
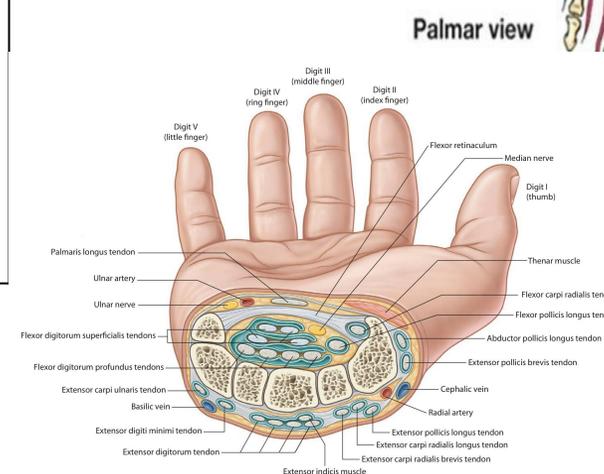
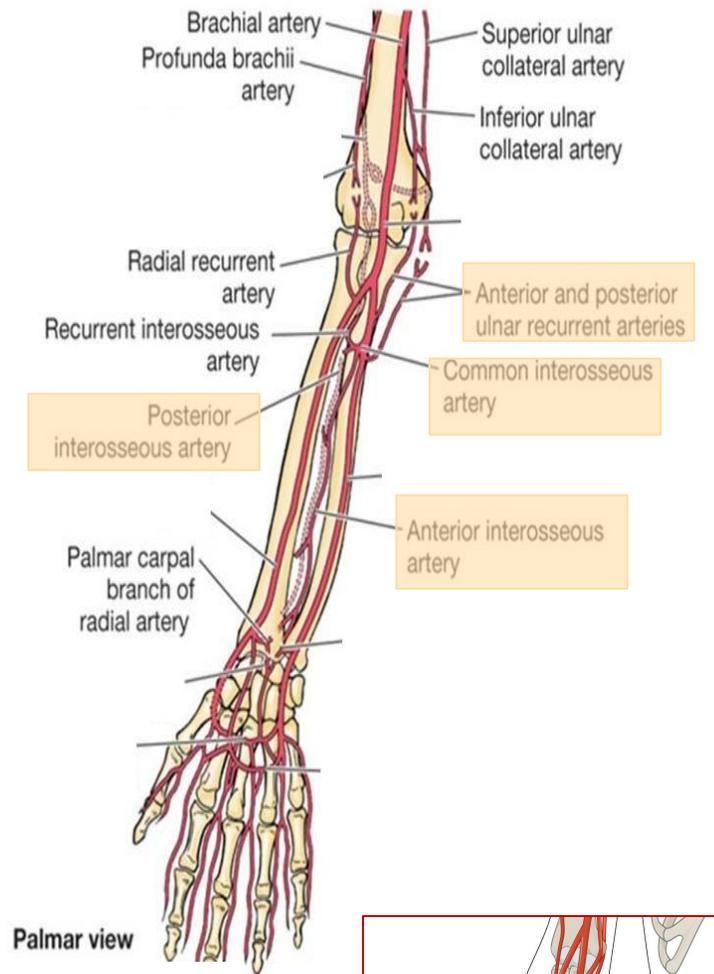
• Muscular.

1- Recurrent branch (for anastomosis around the elbow joint).

2- Common Interosseous artery, which gives:

- **Anterior** Interosseous arteries
- **Posterior** Interosseous arteries.

3- Branch to anastomoses around the wrist joint.

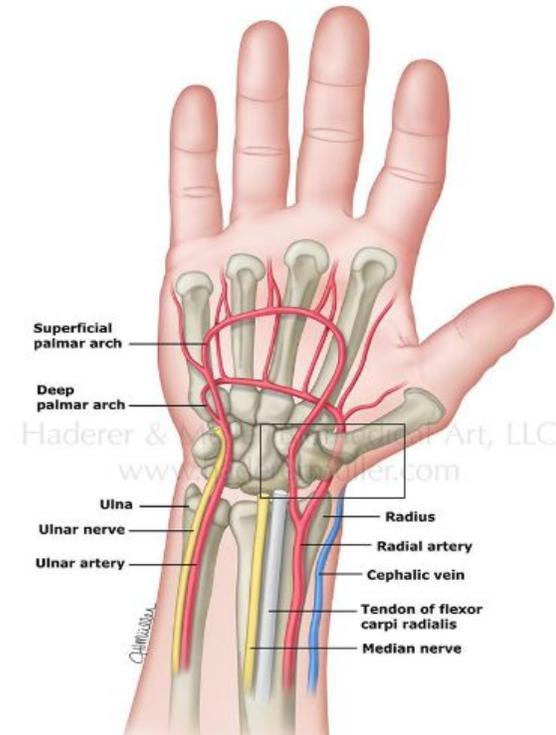
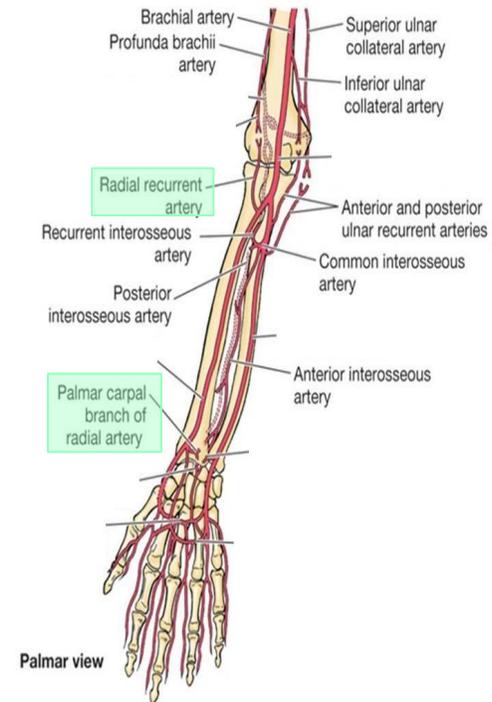
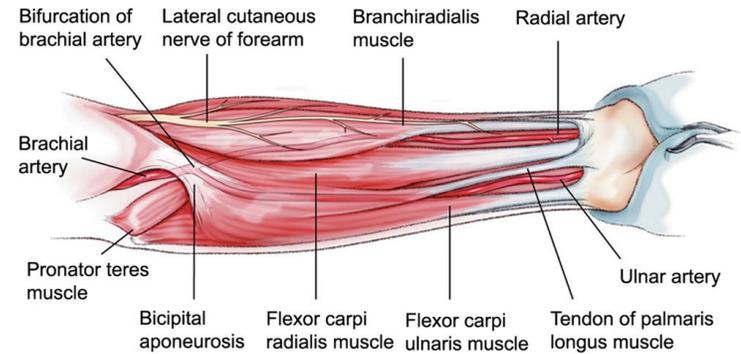


5) The Radial Artery

- The **smaller** of the two terminal branches of the brachial artery.
- Begins in the cubital fossa at the level of neck of radius.
- Descends downward and **laterally**.
- Leaves the forearm by **winding** around the **lateral aspect of the wrist** to reach the **dorsum of the hand**.

branches

- 1- Muscular
- 2- **Recurrent branch** (for anastomosis around the elbow joint).
- 3- **Superficial palmar branch**, joins the ulnar artery to form the superficial palmar arch.

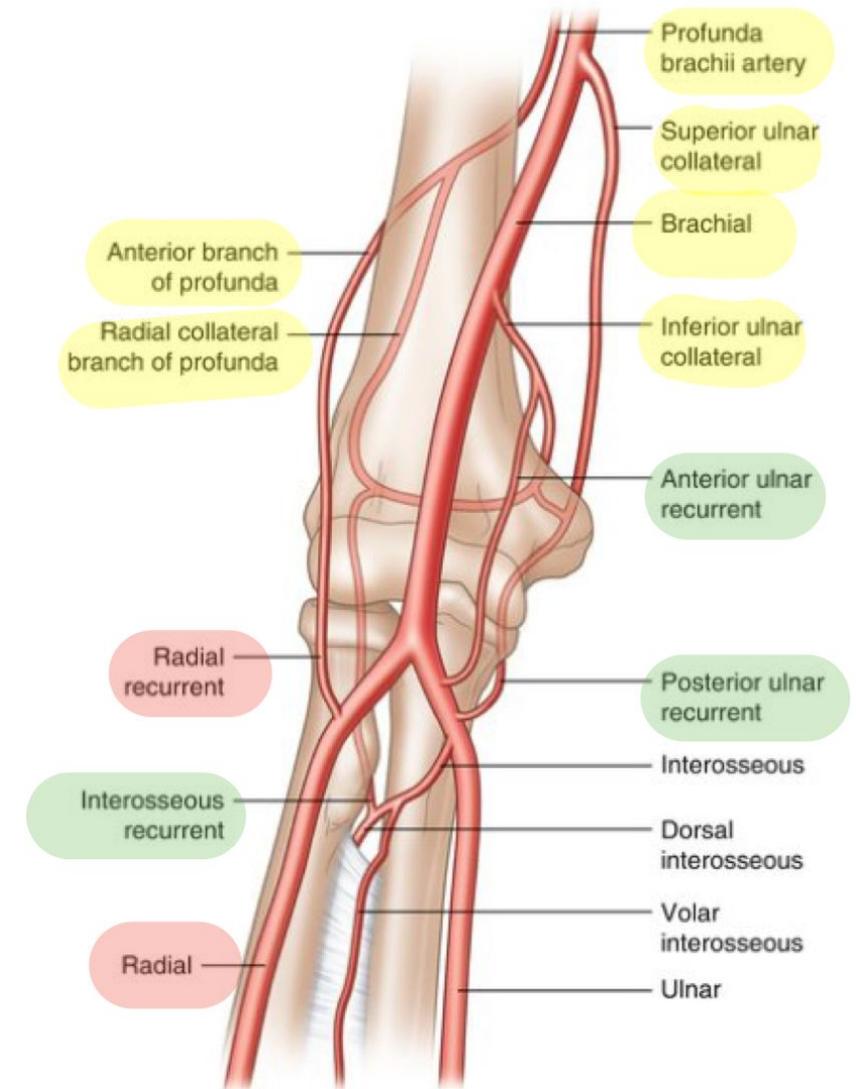


Anastomosis around Elbow Joint

Anastomosis occurs between **branches** of **Brachial**, **Radial** and **Ulnar arteries**

Around the epicondyle of humerus (medial & lateral) :

Branches from Brachial Artery:	Branches from Ulnar and Radial Arteries:
<ul style="list-style-type: none"> ● Profunda Brachii artery ● Superior ulnar collateral artery ● Inferior ulnar collateral artery 	<ul style="list-style-type: none"> ● Radial & ulnar recurrent arteries ● Posterior Interosseous recurrent artery (from ulnar)



Lateral

Medial

Around the **lateral epicondyle** The profunda brachii branches anastomose with the radial recurrent artery and the interosseous recurrent artery.

Around the **medial epicondyle**, the superior ulnar collateral artery anastomoses with the posterior ulnar recurrent. The inferior ulnar collateral artery anastomoses with the anterior ulnar recurrent

Arteries of the palm

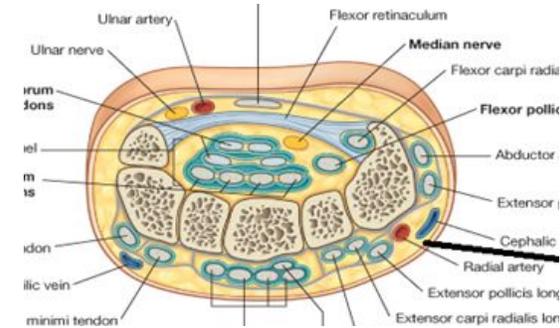
Ulnar artery

Enters the hand:

- anterior to the flexor retinaculum,
- on the lateral side of the ulnar nerve and pisiform bone.

Continue as the **superficial palmar arch**.

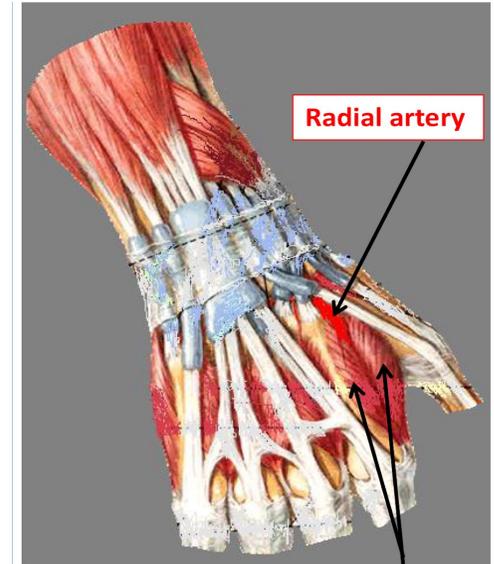
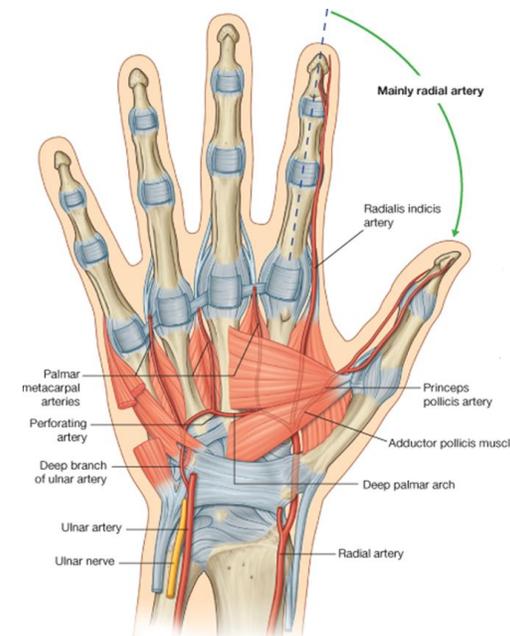
- Gives a **deep branch**



Radial artery

-Leaves dorsum of the hand by turning forward between the proximal ends of the 1st and 2nd metacarpal bones, and between **two heads of the 1st dorsal interosseous muscle**. This place called anatomical snuff box.

- On entering the palm it continues as **deep palmar arch**.
- gives; arteria **radialis indices** and arteria **princeps pollicis**.



1st dorsal interosseous muscle

Arteries of the palm

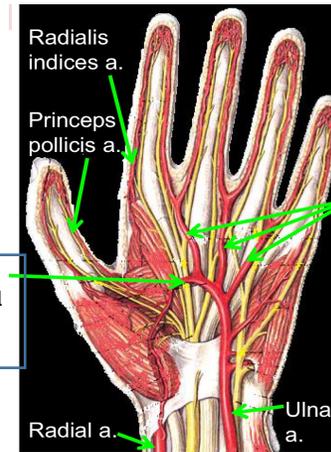
1- The Superficial Palmar Arch

Is the direct continuation of the **ulnar artery**, as it curves laterally behind the palmar aponeurosis

Is completed by **branch from the radial artery**.

Lies approximately at the level of the **Distal Border of the Extended Thumb**.

Gives: **digital arteries** from its convexity to supply the fingers.



Note: The superficial palmar arch is **more distal** than the deep palmar arch

2- The deep Palmar Arch

Is a continuation of the **radial artery** as it curves medially beneath long flexor tendons, in front of the metacarpal bones and interosseous muscles.

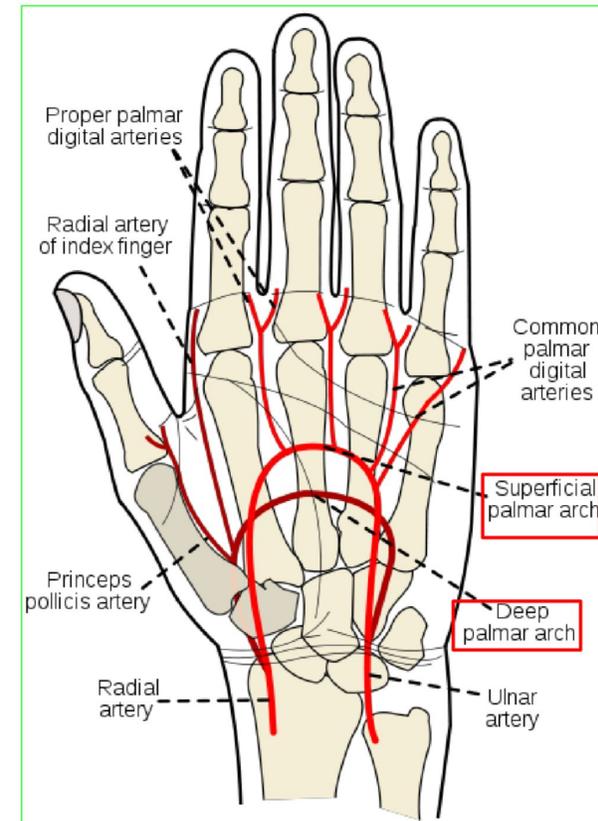
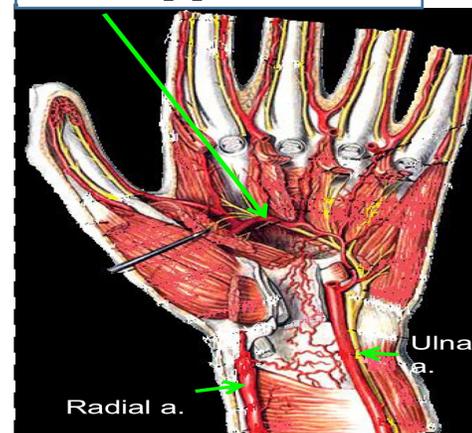
Is completed on the medial side by **deep branch of ulnar artery**.

Lies at a level of the **Proximal Border of Extended thumb**.

It sends branches:

- 1- **superiorly** to share in anastomosis around the wrist joint
- 2- **inferiorly** to join branches of the superficial palmar arch.

The deep palmar arch



Palpation and compression of arteries

Only in girls slide

Arteries of the upper limb can be palpated or compressed in an emergency.

Subclavian artery	Axillary artery (3rd part)	Brachial artery	Radial artery	Ulnar artery
<p>can be traced in the root of posterior triangle of the neck as it crosses the 1st rib to become the axillary artery</p>	<p>can be felt in the axilla as it lies anterior to teres major muscle.</p>	<p>can be palpated in the arm as it lies on brachialis and is overlapped from the lateral side by the biceps brachii.</p>	<p>it lies superficial anterior to distal end of radius between tendons of brachioradialis and flexor carpi radialis (radial pulse) or as it crosses the anatomical snuffbox.</p>	<p>can be palpated as it crosses anterior to the flexor retinaculum lateral to pisiform bone.</p>



A. axillaris



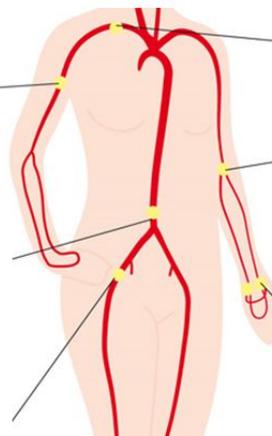
A. subclavia



A. brachialis



A. ulnaris/radialis



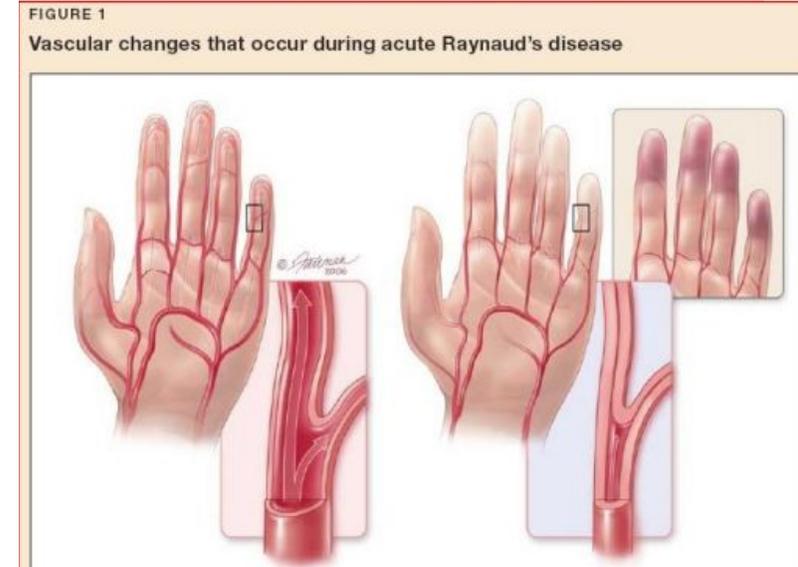
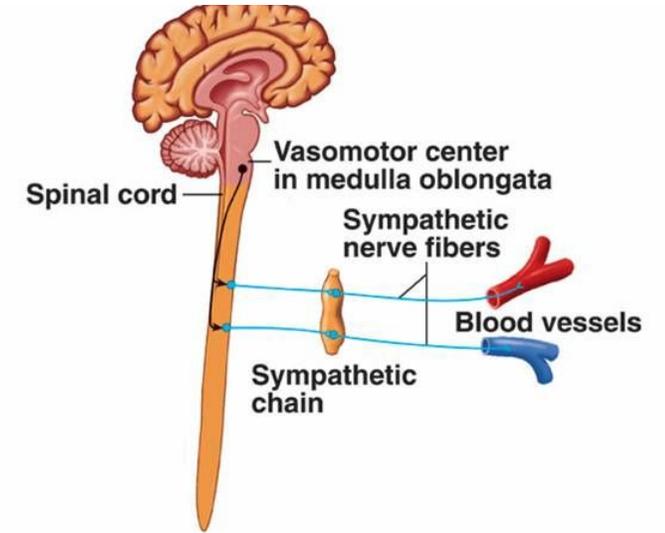
Arterial Innervation And Raynaud's Disease

- Sympathetic innervation of the upper limb arteries is carried on by; preganglionic fibers from cell bodies from **2nd to 8th thoracic segments**
- They ascend in the sympathetic trunk to synapse in middle and inferior cervical and 1st thoracic.
- Postganglionic fibers are distributed along branches of the brachial plexus.

→ **Raynaud's disease is a vasospastic disease involves digital arteries.**

It may require **Cervicodorsal** preganglionic sympathectomy , to prevent necrosis of the fingers.

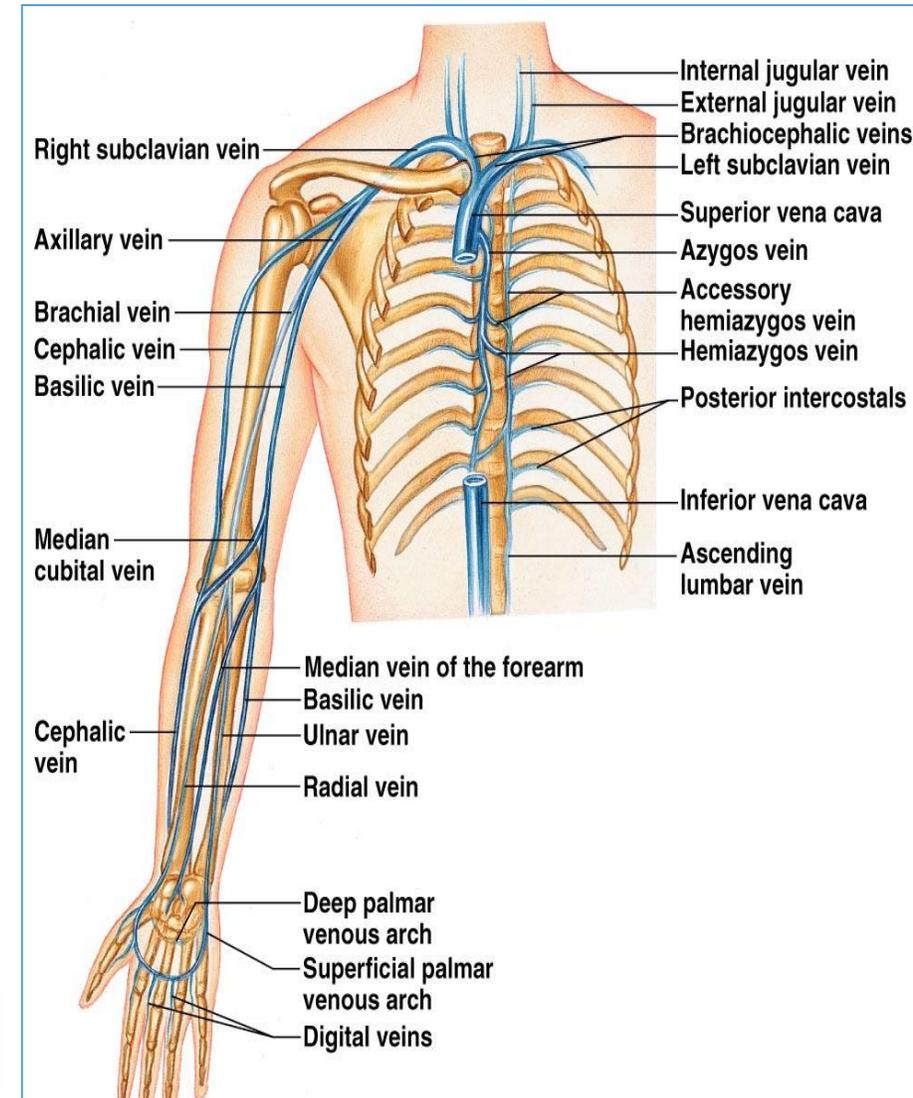
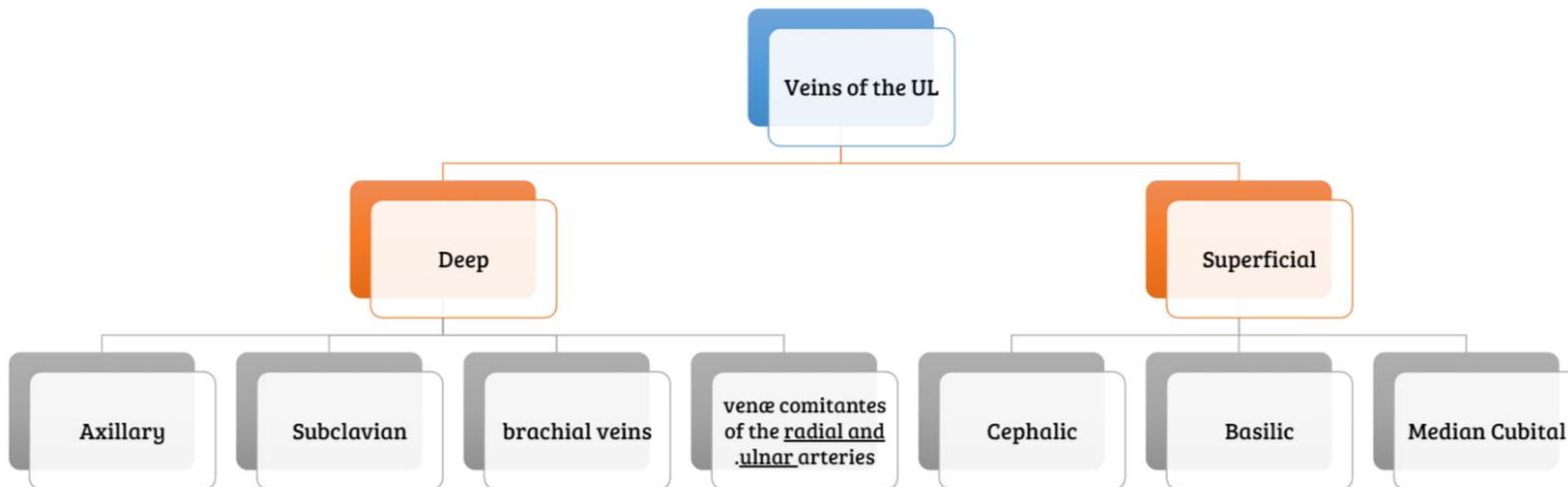
A **sympathectomy** is an irreversible procedure during which at least one sympathetic ganglion is removed.



Veins Of The Upper Limb :

- The veins of the upper limb are divided into two sets: Superficial and Deep
- The two sets anastomose frequently with each other

1- The superficial veins	placed immediately beneath the skin, in the superficial fascia
2- The deep veins	accompany the arteries, and constitute the venae comitantes of those vessels.



Note: we study the veins from distal to proximal because they return the blood back to the heart

Superficial Veins

- The **dorsal digital veins** drain into **dorsal metacarpal veins**, which unite to form a **dorsal venous arch or network**.
- Dorsal venous network lies on the dorsum of the hand, **in the subcutaneous tissue, proximal to the metacarpophalangeal joints**.
- Drains into the **cephalic vein** laterally, and **basilic vein** medially

1- Cephalic Vein

Arises from the **lateral end** of the dorsal venous arch of hand.

Ascends on **radial side** of the forearm to the elbow and continues up to the arm in the **deltopectoral groove**.

It pierces **clavipectoral fascia** to drain into the **axillary vein**.

2- Basilic Vein

Arises from the **medial side** of the dorsal venous arch of hand.

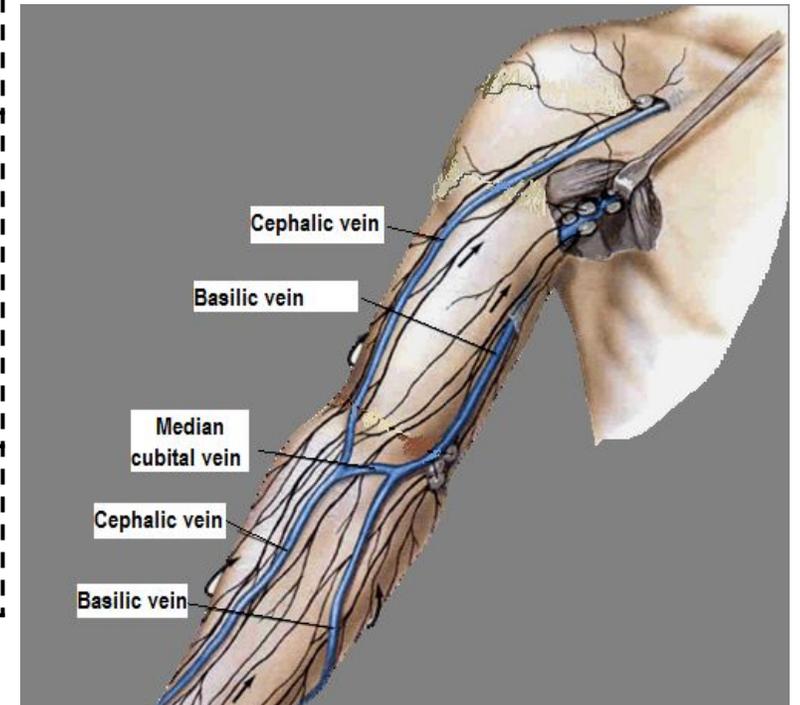
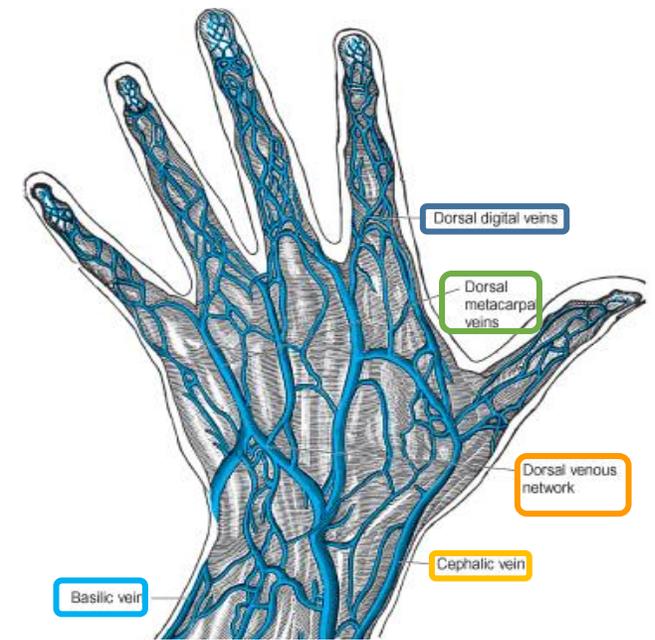
Ascends on the **ulnar side** of forearm to the elbow.

In the middle of the arm it pierces the deep fascia and joins the **brachial vein** or **axillary vein**.

3- Median Cubital Vein

Links cephalic vein and basilic vein in the cubital fossa.

Is a frequent site for venipuncture.



Deep Veins

1- Venae comitantes

They are generally arranged in **pairs**. situated one on either side of the corresponding artery. connected at intervals by short transverse branches.

The superficial and deep palmar arterial arches are each accompanied by a pair of venae comitantes which:

- A- constitute the **superficial and deep palmar venous arches**.
- B- receive the veins corresponding to the branches of the arterial arches.

The **deep veins of the forearm** are the **venae comitantes** of the radial and ulnar **arteries**.

2- Axillary vein

Begins at the **lower border of the Teres major**, as the continuation of the basilic vein.

Ends at the **outer border of the first rib** as the subclavian vein.

Receives:
1- The **brachial veins**.
2- The **cephalic vein** (close to its termination).

3-Subclavian vein

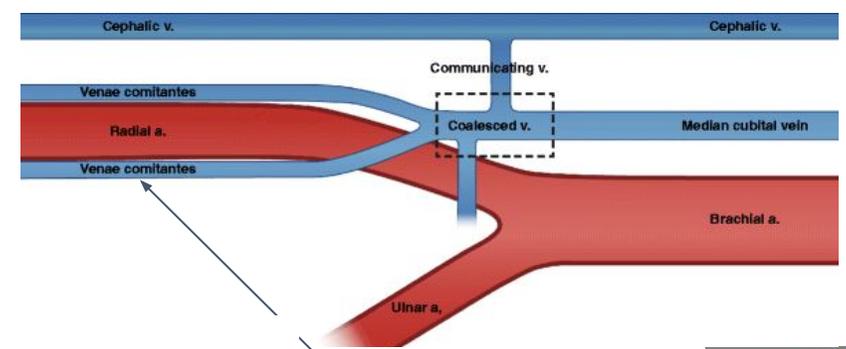
Is the continuation of the **axillary vein**.

Extends from the **outer border of the first rib to the sternal end of the clavicle**.

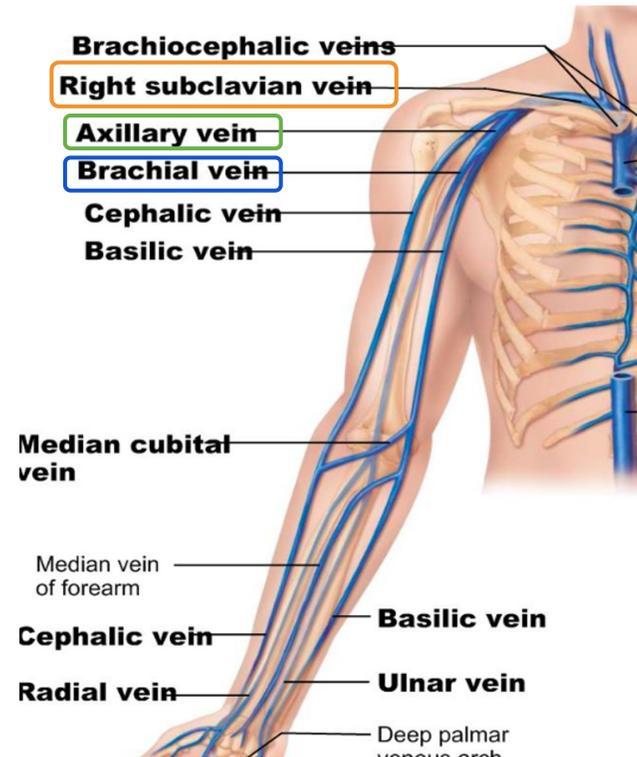
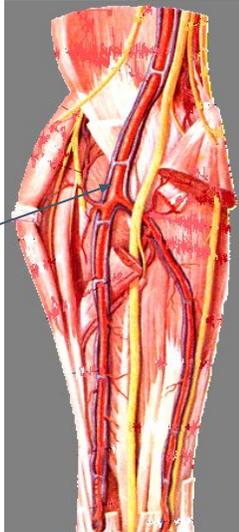
unites with the internal jugular to form the **Brachiocephalic (Innominate) vein**.

4- brachial vein

placed one on either side of the **brachial artery**.



Venae comitantes



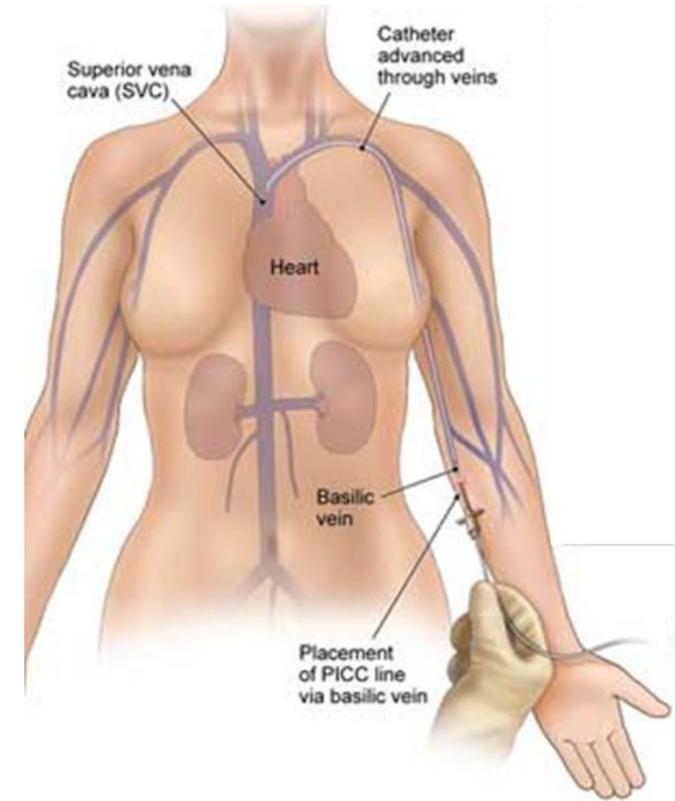
Vein Catheterization

-The **Basilic vein** is the vein of choice for central venous catheterization. (قسطرة)

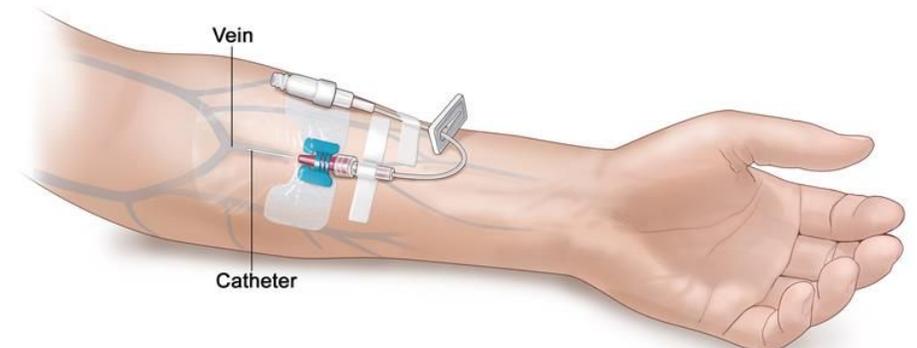
From the cubital fossa until reaching the axillary vein it **increases** in diameter and lies in direct line with the axillary vein

Abduction of the arm will overcome the troublesome caused by the valves in the axillary vein, and permits the catheter to move past the obstruction

-While The **Cephalic vein:** **does not increase** in size as it ascends in the arm, and frequently divides into small branches At it's termination it joins the axillary vein at right angle ,so it is difficult to maneuver the catheter around this angle



Peripheral Venous Catheter



MCQs

Question 1: The left subclavian artery originates from

- A. left common carotid artery
- B. aorta artery
- C. suprascapular artery
- D. the arch of aorta

Question 2: The 3rd part of the axillary artery ends at

- A. lower border of the pectoralis major
- B. lower border of the teres major
- C. lower border of the pectoralis minor
- D. lower border of the teres minor

Question 3: Which of the following are branches of axillary artery

- A. subscapular artery
- B. posterior circumflex humeral artery
- C. anterior circumflex humeral artery
- D. all of the above

Question 4: A branch of brachial artery is

- A. submuscular
- B. lateral ulnar collateral
- C. medial radial collateral
- D. profunda brachii

Question 5: The deep palmar arch is more proximal than:

- A. superficial palmar arch
- B. ulnar artery
- C. radial artery
- D. brachial artery

Question 6: Which one of these veins is choice for injection

- A. basilic
- B. cephalic
- C. median cubital
- D. axillary

Question 7: Which one of these veins is choice for central venous catheterization

- A. basilic
- B. cephalic
- C. C-median cubital
- D. axillary

Question 8: correct about the basilic vein?

- A. lies in indirect line with the axillary vein
- B. Ascends on the radial side
- C. Ascends on the ulnar side
- D. both A&B

Team members

Boys team:

- ★ Khalid Al-Dossari
- ★ Naif Al-Dossari
- Faisal Alqifari
- Salman Alagla
- Ziyad Al-jofan
- Suhail Basuhail
- Ali Aldawood
- Khalid Nagshabandi
- Mohammed Al-huqbani
- Jehad Alorainy
- Khalid AlKhani
- Omar Alammari

Team leaders

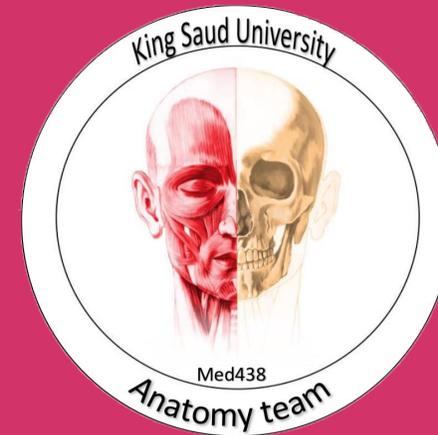
- ★ Abdulrahman Shadid
- Ateen Almutairi

★ =This lecture done by

Girls team :

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- Alhanouf Al-haluli
- Sara Al-Abdulkarem
- Rawan Al Zayed
- Reema Al Masoud
- Renad Al Haqbani
- Nouf Al Humaidhi
- Fay Al Buqami
- Jude Al Khalifah
- Nouf Al Hussaini
- Alwateen Al Balawi
- Rahaf Al Shabri
- Danah Al Halees
- Haifa Al Waily
- Rema Al Mutawa
- Amirah Al Dakhilallah
- Maha Al Nahdi
- Renad Al Mutawa
- Ghaida Al Braithen
- Reham Yousef

Special thank for
Anatomy team 436



Good luck

Give us your feedback:

