

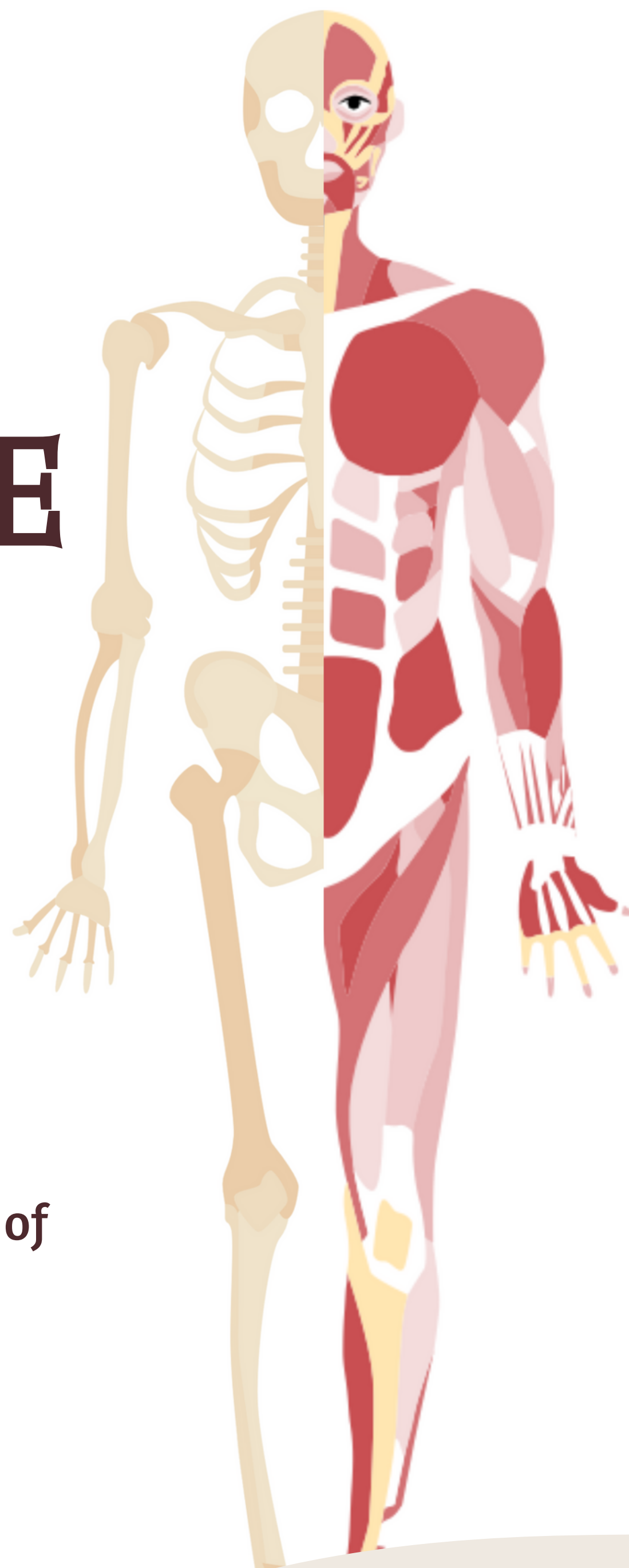
# Lecture 12

# VASCULAR ANATOMY OF THE UPPER LIMBS



## OBJECTIVES

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



### Color Index:

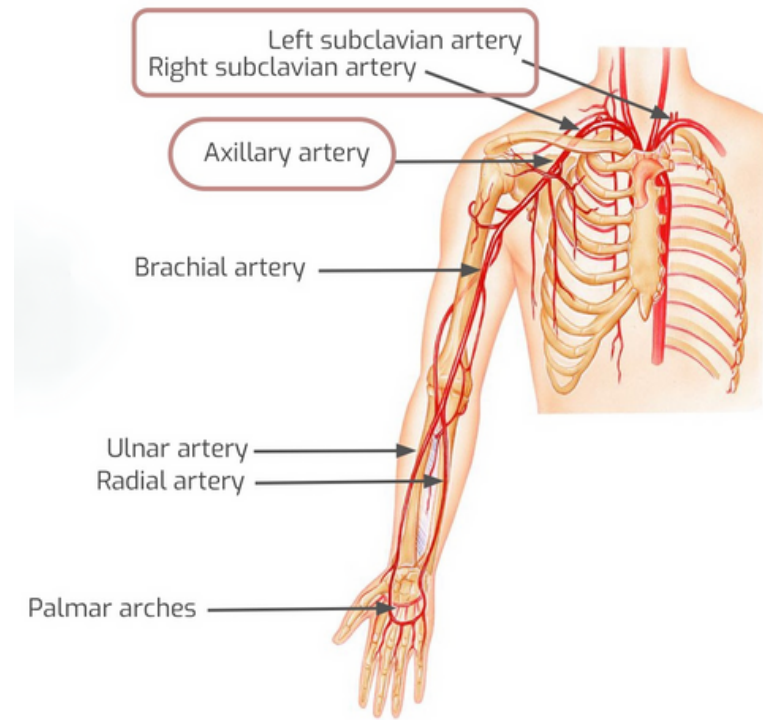
- Main text
- Boys' Slides
- Girls' Slides
- Important
- Dr's Notes
- Extra



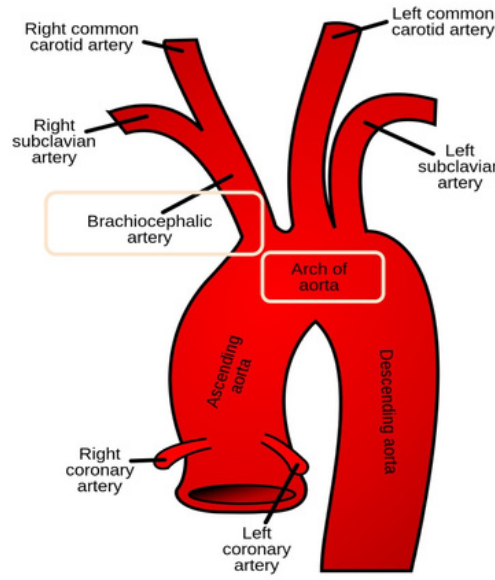
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# Arteries of the upper limb

## 1 Subclavian artery



### Subclavian artery



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 Axillary artery

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

- Continues as brachial artery at lower border of teres major muscle.
- It's closely related: to the cords of brachial plexus and their branches
- It's enclosed within the axillary sheath. ( axillary sheath is a fibrous sheath that encloses the axillary artery and the three cords of the brachial plexus to form the neurovascular bundle )
- It's crossed anteriorly by the pectoralis minor muscle, and is divided into three parts; 1st, 2nd & 3rd.

So obviously

1st -> 1 branch

2nd -> 2 branches

3rd -> 3 branches

### The 1st part

Extends from the lateral border of 1st rib to upper border of the pectoralis minor muscle

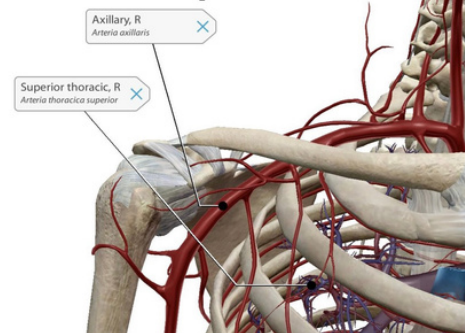
Related:-Anteriorly:to the pectoralis major muscle, skin, and crossed by the cephalic vein.

- 2-Posteriorly: The long thoracic nerve
- 3-Laterally:to the cords of the brachial plexus.
- 4-Medially: the axillary vein



**gives ONE branch:**  
**Highest thoracic artery**  
(also called superior)

#### The 1st part



### The 2nd part

Lies **behind** the pectoralis minor muscle.

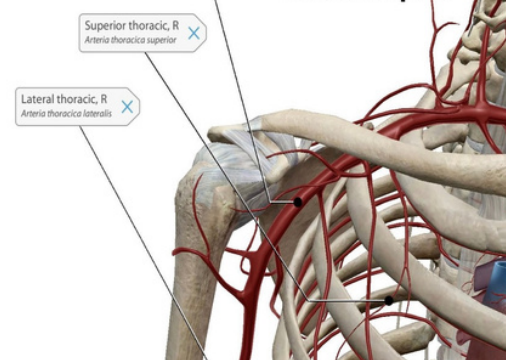
Anteriorly:pectoralis minor,the pectoralis major muscle, and, skin.

- 2-Posteriorly: the posterior cord of the brachial plexus, the subscapular muscles and, shoulder joint
- 3.Laterally:the lateral cord of the brachial plexus
- 4.Medially:the medial cord of the brachial plexus, and the axillary vein.



**it gives TWO branches**  
**1-Thoracocromial**  
**2-lateral thoracic**

#### The 2nd part



### The 3rd part

Extends from the **lower border of pectoralis minor** muscle to the **lower border of teres major** muscle.

Anteriorly: the pectoralis major muscle, lower down crossed by medial root of the median nerve

Posteriorly: the subscapular, latissimus dorsi, and the teres major muscles and, the axillary and radial nerves.

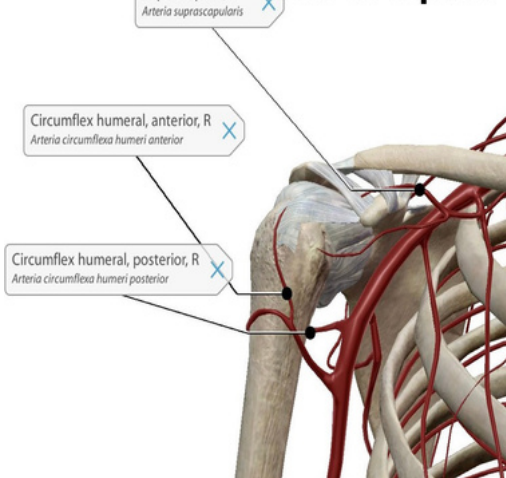
Laterally: the coracobrachialis, biceps, and humerus, lateral root of the median nerve and musculocutaneous nerves

Medially: the ulnar nerve, the axillary vein, and, the medial cutaneous nerve of the arm.



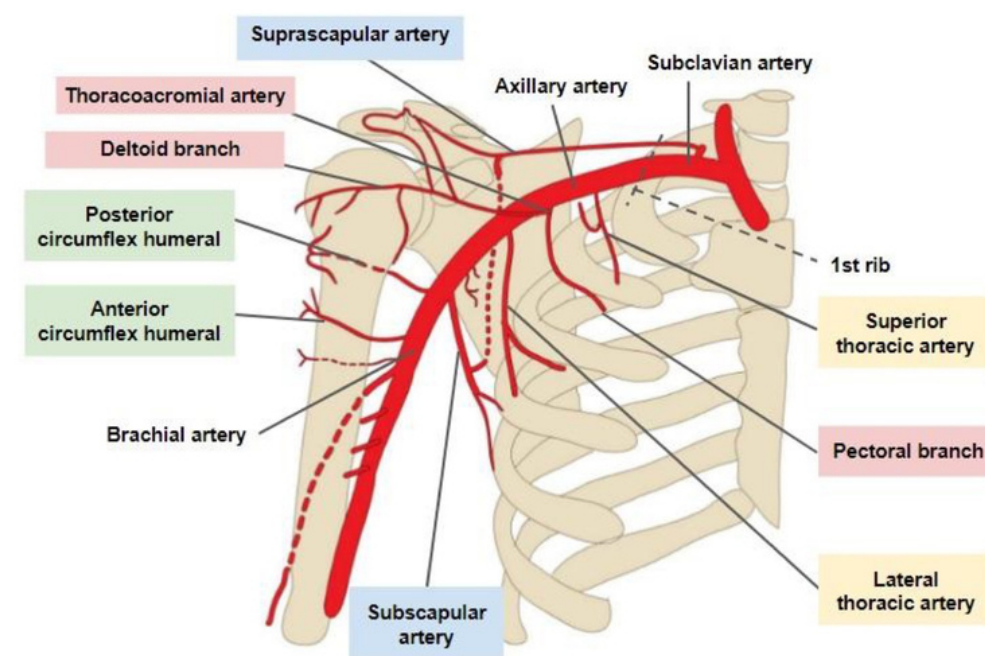
**it gives THREE branches:**  
**1- Anterior circumflex humeral**  
**2-Posterior circumflex humeral**  
**3-subscapular**

#### The 3rd part



# Anastomosis around shoulder joint

- ✦ The wide range of movement of the shoulder may be accompanied with kinking (التواء) of the axillary artery and a temporary occlusion (انسداد) of its lumen
- ✦ Anastomosis occurs between branches of **Subclavian** and **Axillary** arteries



Subclavian Artery branches	Axillary Artery branches
Suprascapular Artery	Subscapular artery
Transverse cervical Artery Another name: (superficial cervical artery)	Anterior circumflex humeral artery
	Posterior circumflex humeral artery

## 3 Brachial Artery

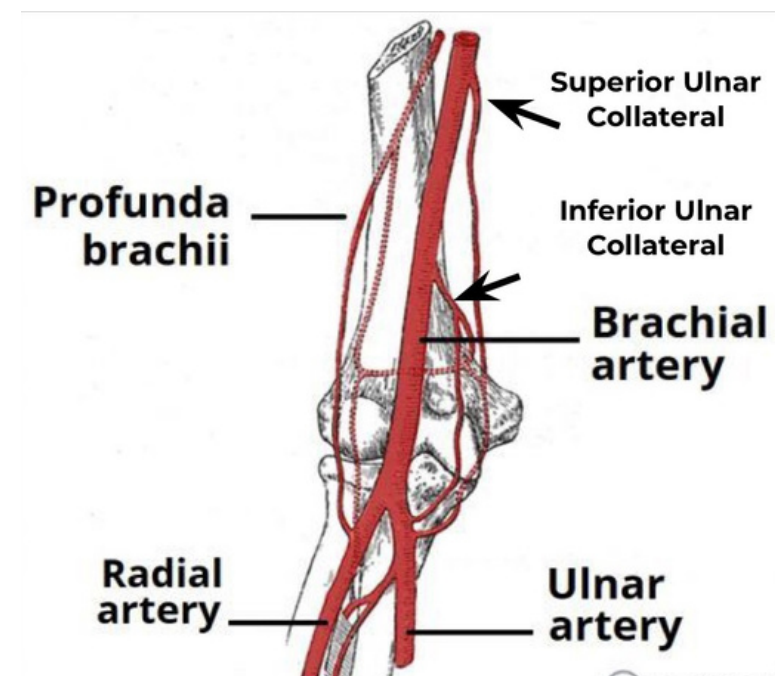
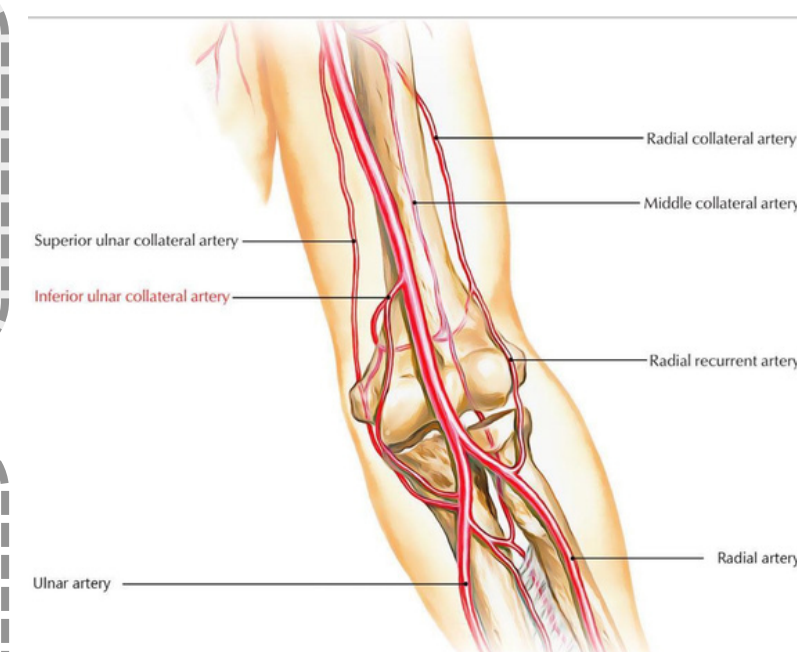
- Is a continuation of the **axillary artery** at the lower border of teres major muscle.
- Provides main arterial supply to the arm
- Terminates opposite of Neck of Radius by dividing into **Radial & Ulnar arteries**.

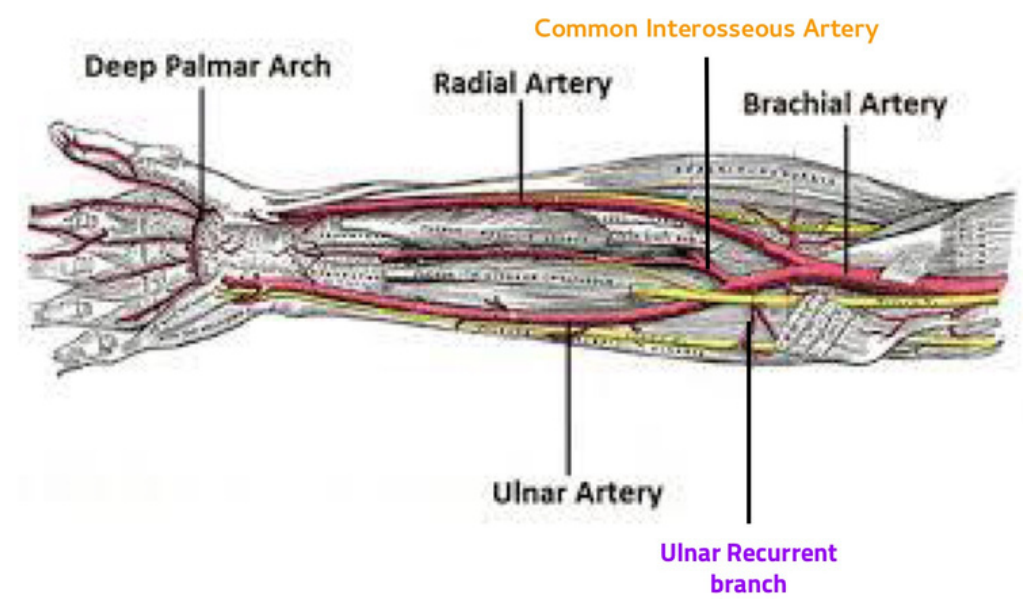
### Branches

- 1- Muscular.
- 2- Nutrient to humerus.
- 3- Profunda brachii: It arises from the brachial artery near its origin. It accompanies the radial nerve through the spiral groove, supplying the triceps muscle and sends anastomosis around the elbow joint
- 4- Superior ulnar collateral
- 5- Inferior ulnar collateral.

### Relations

- 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 muscles.

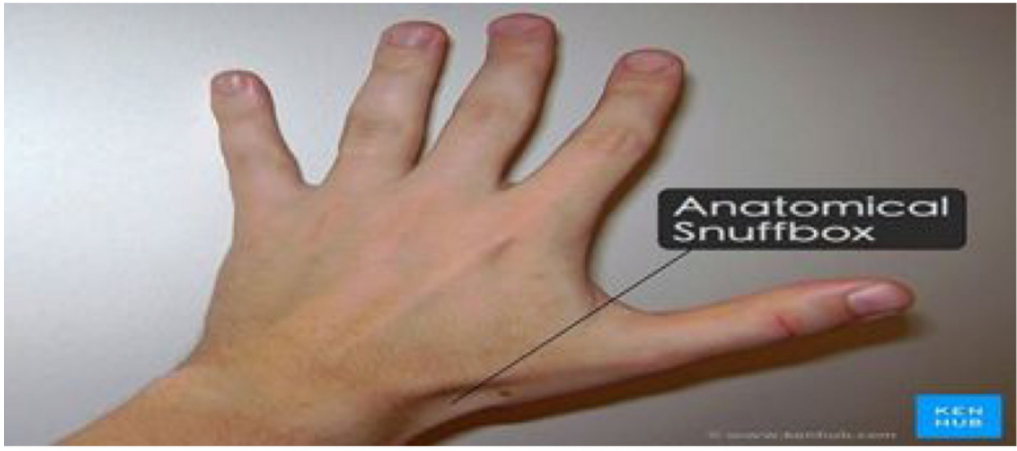
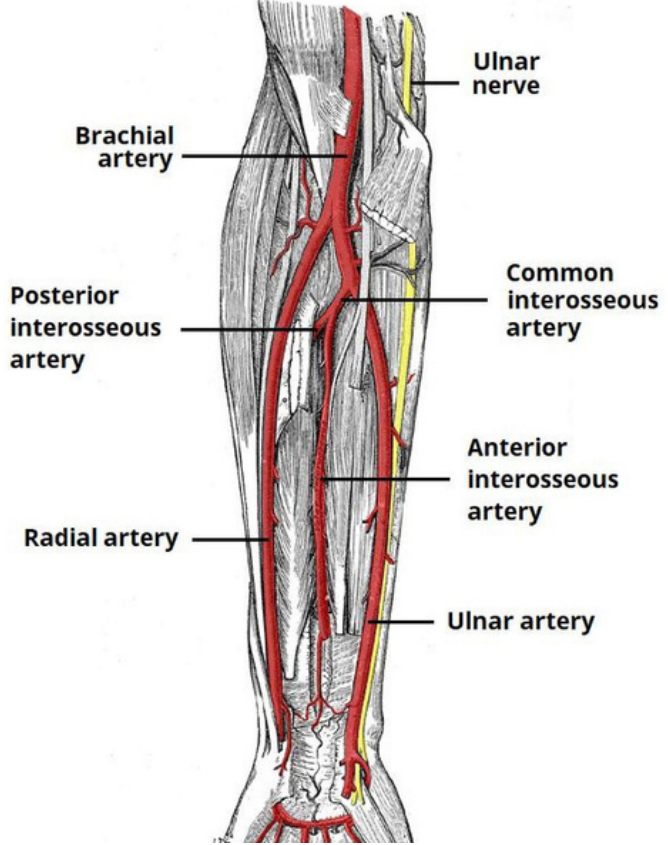




## 4 Ulnar Artery

Ulnar Artery	Branches
<p>The <b>larger</b> of the two terminal branches of the brachial artery.</p> <ul style="list-style-type: none"> <li>• Begins in the cubital fossa at the level of neck of radius</li> <li>• Descends through the anterior compartment of the forearm.</li> <li>• Enters the palm, in front of the flexor retinaculum, with the ulnar nerve.</li> <li>• Ends by forming the <b>superficial palmar arch</b>, by anastomosing with superficial palmar branch of radial artery.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Muscular</b> (Muscles of forearm)</li> <li>• <b>Recurrent branch</b> (for anastomosis around the elbow joint). (In front of the medial epicondyle where it meets the superior ulnar collateral)</li> <li>• <b>Common Interosseous artery</b>, which gives: <b>Anterior and Posterior Interosseous arteries.</b></li> <li>• Branch to anastomoses around the wrist joint.</li> </ul>

## 5 Radial Artery

Radial Artery	Branches
<p>The <b>smaller</b> of the two terminal branches of the brachial artery.</p> <ul style="list-style-type: none"> <li>• Begins in the cubital fossa at the level of neck of radius.</li> <li>• Descends downward and laterally.</li> <li>• Leaves the forearm by winding around the lateral aspect of the wrist to reach the dorsum of the hand.</li> </ul> <p>(In anatomical snuff box)</p> 	<ul style="list-style-type: none"> <li>• <b>-Muscular</b></li> <li>• <b>-Recurrent branch</b> (for anastomosis around the elbow joint).</li> <li>• <b>-Superficial palmar branch</b>, joins the ulnar artery to form the superficial palmar arch.</li> </ul> 

# Anastomosis of the elbow joint

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



where it branches from

branch

<u>Brachial artery</u>	Superior ulnar collateral. Inferior ulnar collateral.
<u>profunda brachii</u>	Middle collateral artery. Radial collateral artery.
<u>ulnar artery</u>	Anterior ulnar Recurrent. Posterior ulnar Recurrent.
<u>Posterior interosseous</u>	Interosseous recurrent.
<u>Radial Artery</u>	Radial Recurrent



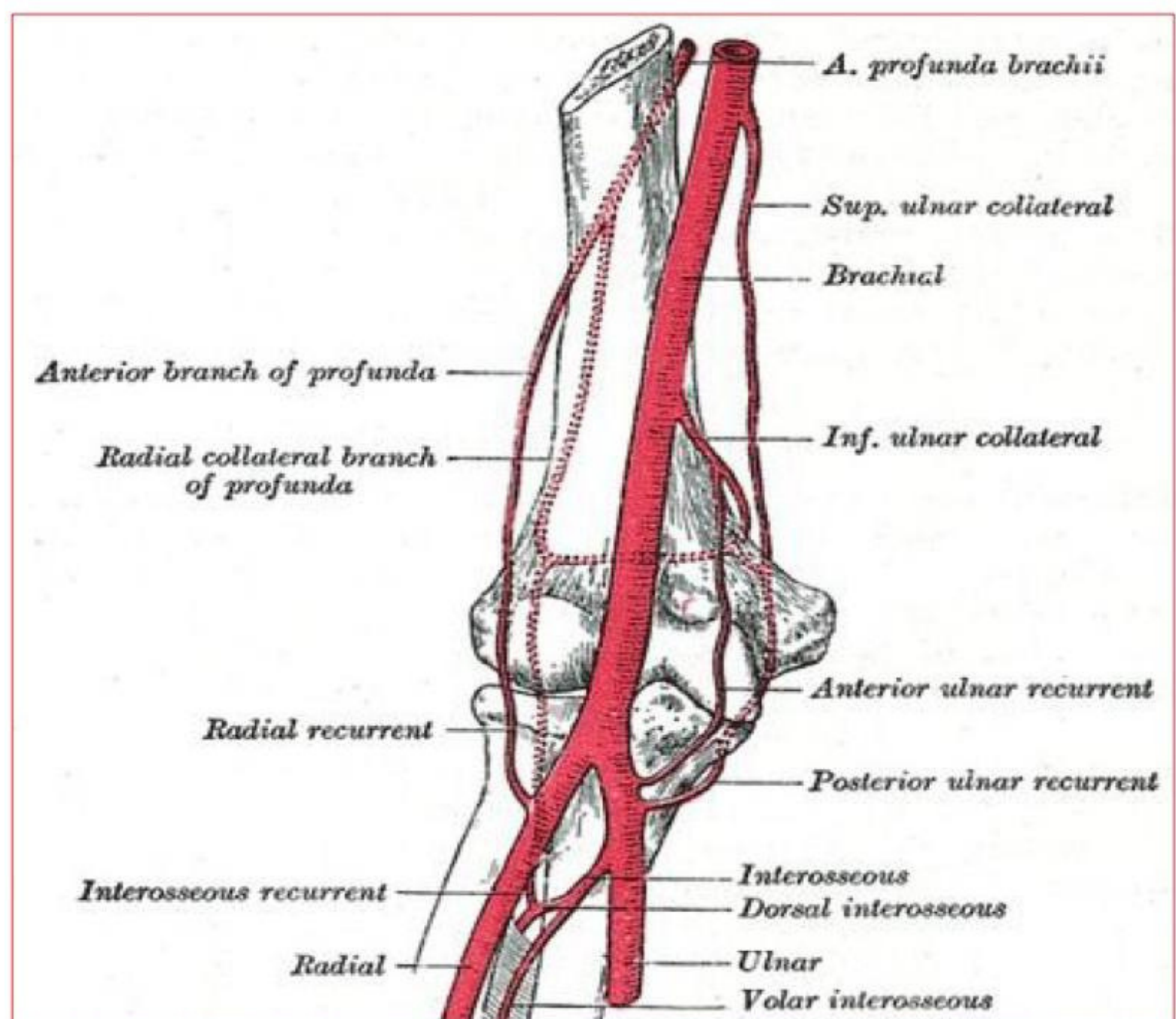
Extra:

Superior ulnar collateral anastomose with Posterior ulnar Recurrent.

Inferior ulnar collateral anastomose with Anterior ulnar Recurrent.

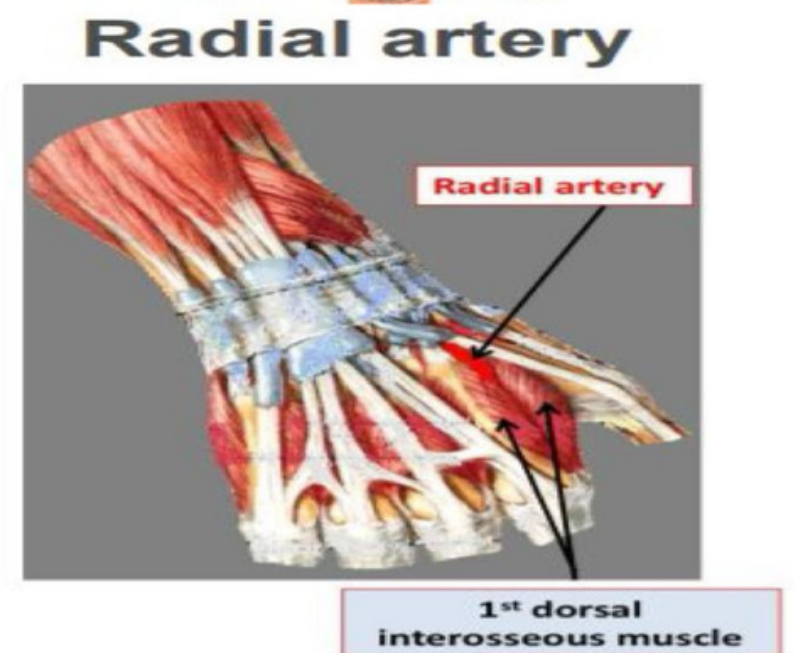
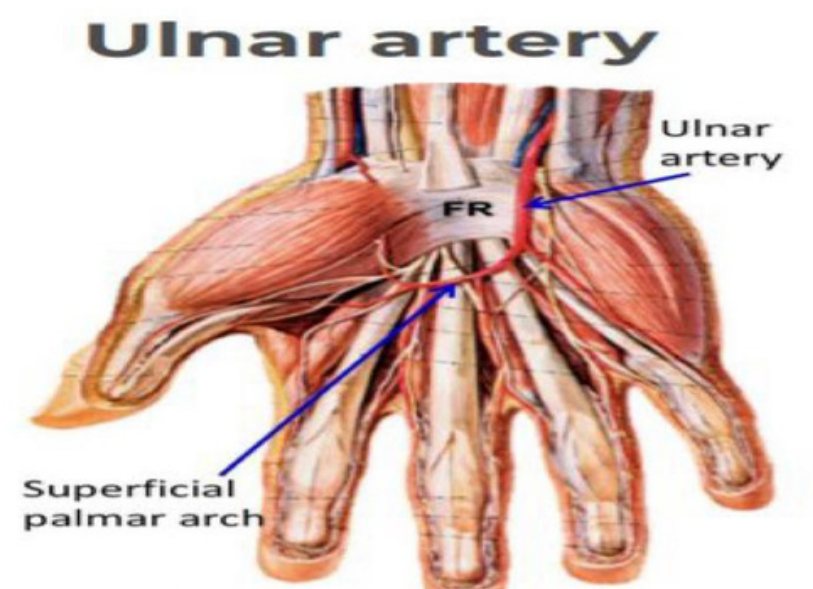
Middle collateral artery anastomose with Interosseous recurrent.

Radial collateral artery anastomose with Radial Recurrent

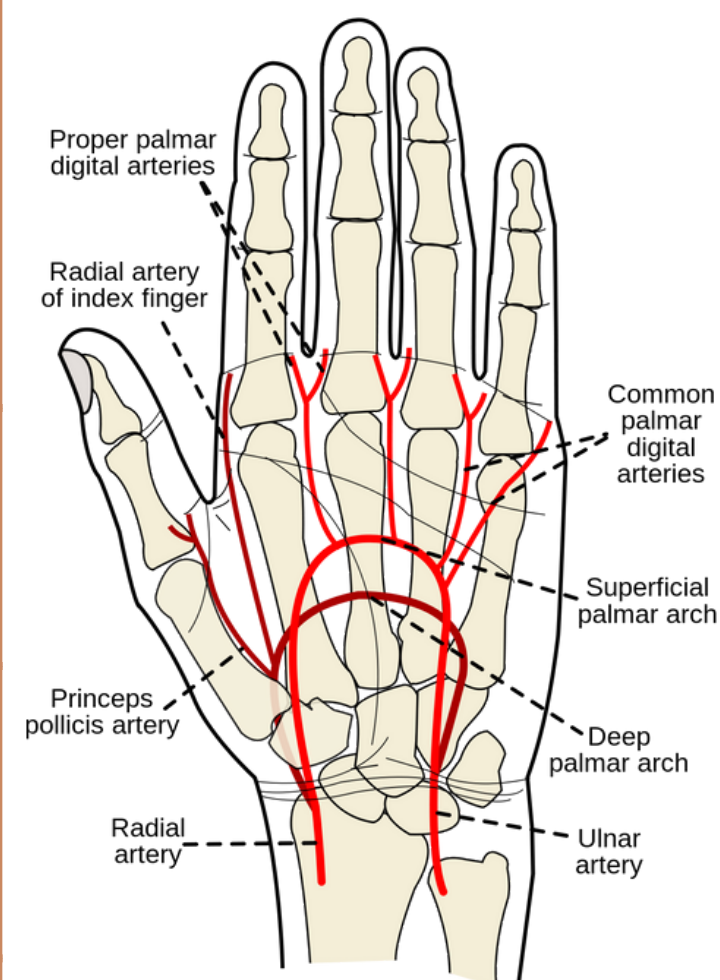


# 6 Arteries of the palm

<u>Ulnar artery</u>	Enters the hand: <b>Anterior</b> to the flexor retinaculum. On the lateral side of the ulnar nerve and pisiform bone.
	Gives a <u>deep branch</u> .
	Continue as the <b>superficial palmar arch</b> .
<u>Radial artery</u>	Leaves dorsum of the hand by turning forward <u>between the proximal ends</u> of the <b>1st and 2nd metacarpal bones</b> and two heads of the <b>1st dorsal interosseous muscle</b> .
	On entering the palm it continues as <b>deep palmar arch</b> .
	It gives: <u>arteria radialis indicis</u> and <u>arteria princeps pollicis</u> . <u>indicis</u> =index finger <u>pollicis</u> =thumb

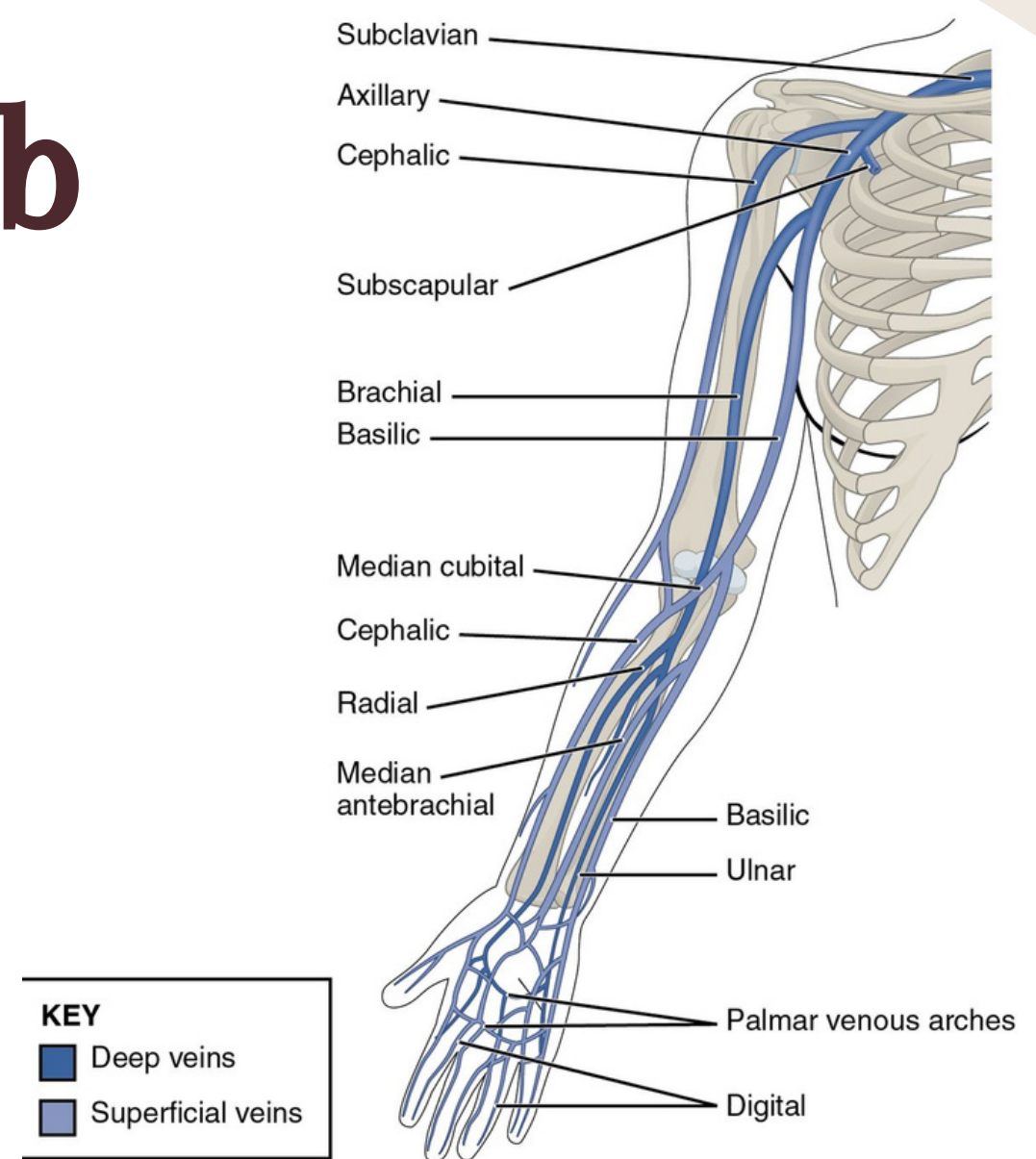


<u>The Superficial Palmar Arch</u>	<u>The Deep Palmar Arch</u>
Is the direct continuation of the <b>ulnar artery</b> , as it curves laterally <b>behind</b> the palmar aponeurosis. ( <b>U.S of America</b> - > <b>Ulnar</b> give <b>S</b> uperficial)	Is a continuation of the <b>radial artery</b> as it curves medially beneath long flexor tendons, in front of the metacarpal bones and interosseous muscles
Is completed by branch from the radial artery	Is completed on the medial side by deep branch of ulnar artery
Lies approximately at the level of the <b>Distal Border</b> of the <b>Extended Thumb</b>	Lies at a level of the <b>Proximal Border</b> of <b>Extended thumb</b>
Gives: digital arteries from its convexity to supply the fingers.	It sends branches: - <b>superiorly</b> : to share in anastomosis around the wrist joint - <b>inferiorly</b> : to join branches of the superficial palmar arch.



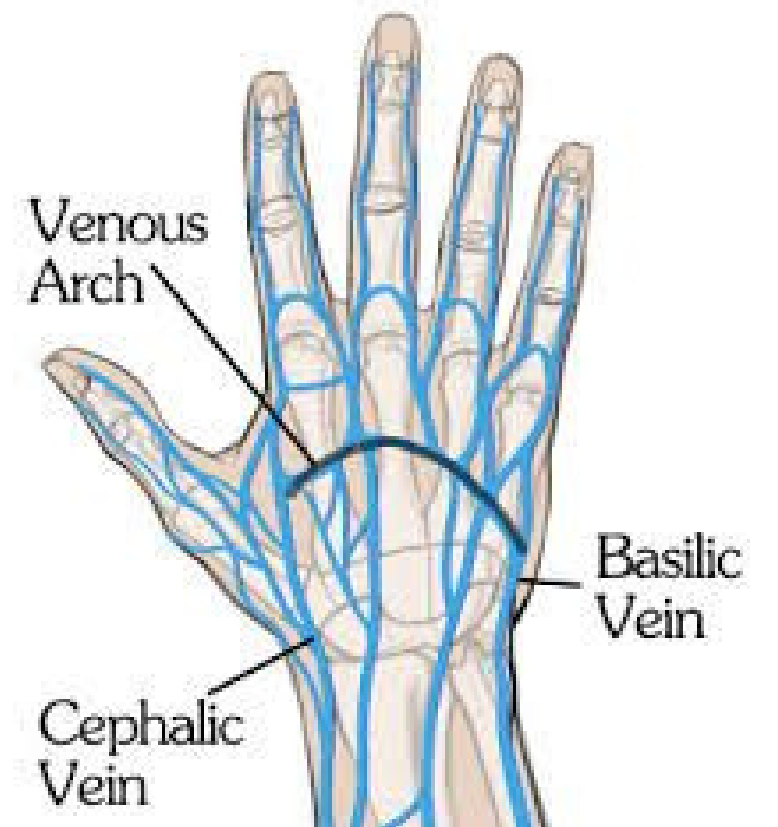
# Veins of the Upper Limb

- ◆ The veins of the upper limb are divided into two sets: **Superficial** and **Deep**.
- ◆ The two sets anastomose frequently with each other.
- ◆ The **superficial** veins are placed immediately beneath the skin, in the superficial fascia.
- ◆ The deep veins accompany the arteries, and constitute the **venae comitantes** of those vessels.



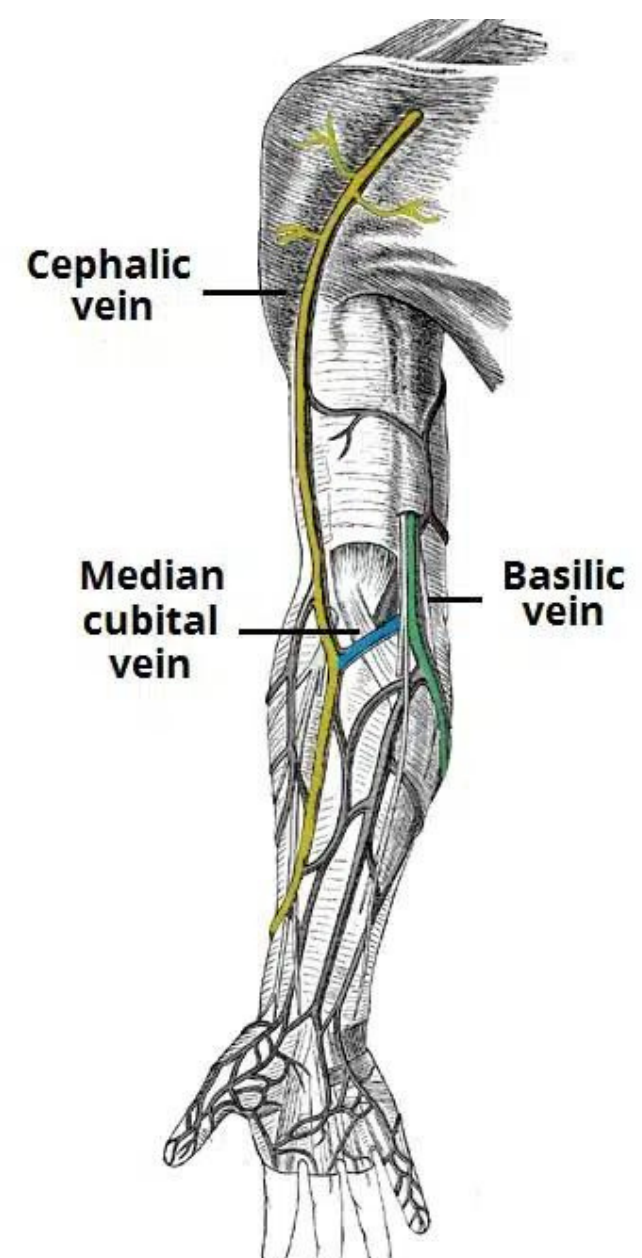
# Superficial Veins of the Upper Limb

- 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.



To know where the Basilic vein located, remember **BM**. 

<p><b><u>Cephalic Vein</u></b></p>	<ul style="list-style-type: none"> <li>• Arises from the lateral end of the dorsal venous arch of hand.</li> <li>• Ascends on radial side of the forearm to the elbow and continues up the arm in the deltopectoral groove.</li> <li>• Pierces clavipectoral fascia to drain into the axillary vein.</li> </ul>
<p><b><u>Basilic Vein</u></b></p>	<ul style="list-style-type: none"> <li>• Arises from the medial side of the dorsal venous arch of hand.</li> <li>• Ascends on the ulnar side of forearm to the elbow.</li> <li>• In the middle of the arm, it pierces the deep fascia and joins the brachial vein or axillary vein.</li> </ul>
<p><b><u>Median Cubital vein</u></b></p>	<ul style="list-style-type: none"> <li>• Links cephalic vein and basilic vein in the cubital fossa.</li> <li>• Is a frequent site for <b>venipuncture</b>.</li> </ul> <p>A procedure in which a needle is used to take blood from a vein.</p>



# Deep Veins of the Upper Limb

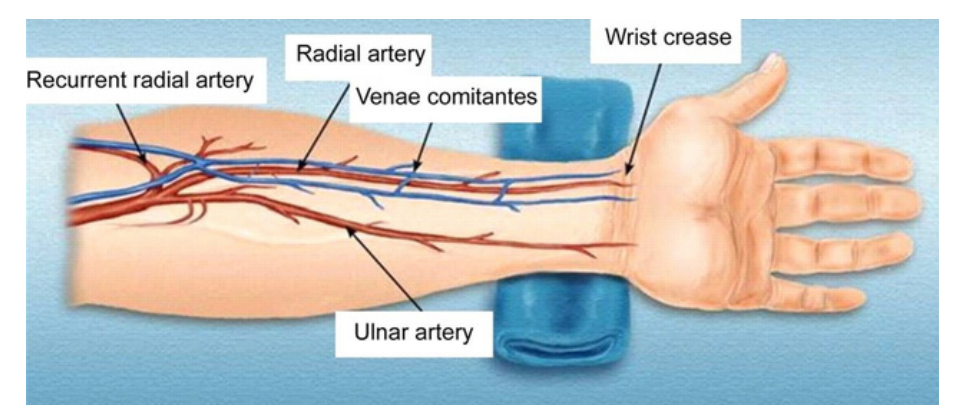
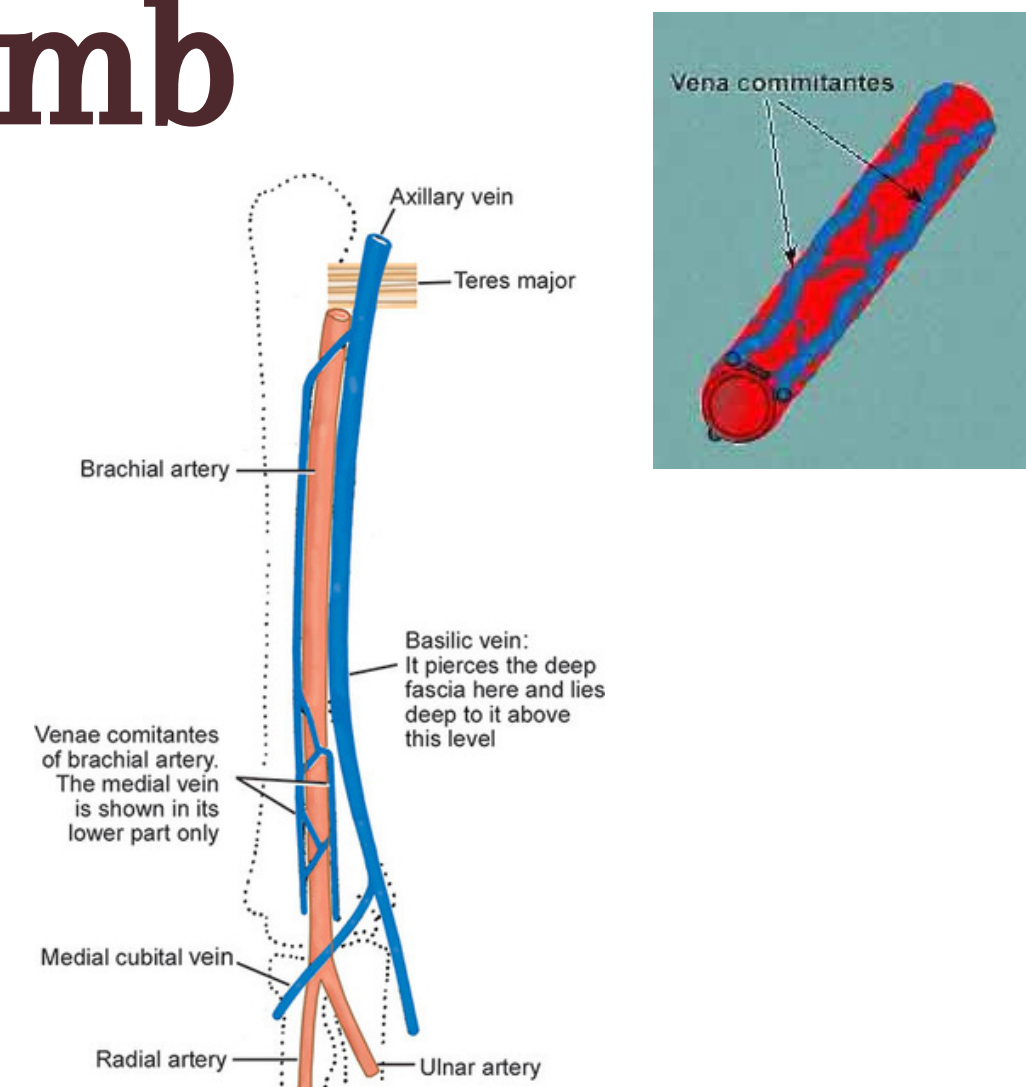
Accompany the arteries of the same region and bear similar names.

◆ **1-Venae comitantes:** They are generally arranged in pairs, and are situated one on either side of the corresponding artery, and connected at intervals by short transverse branches.

- The superficial and deep palmar arterial arches are each accompanied by a pair of venae comitantes which constitute the superficial and deep palmar venous arches, and receive the veins corresponding to the branches of the arterial arches.

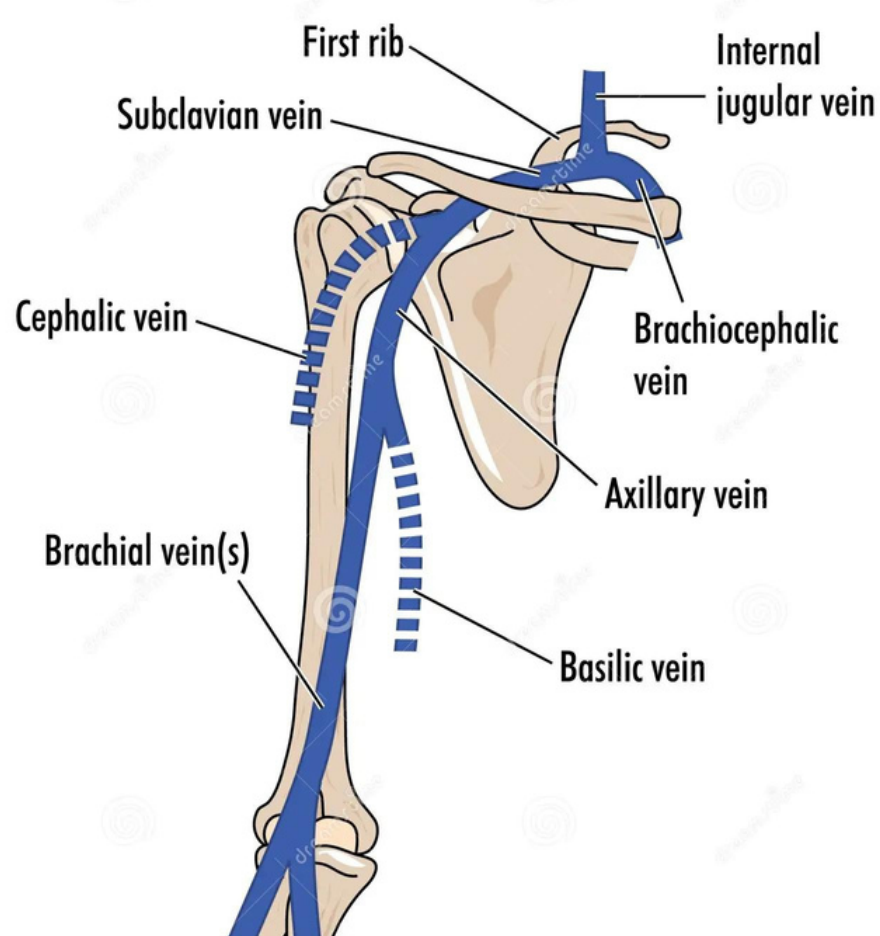
- The deep veins of the forearm are the venae comitantes of the radial and ulnar arteries.

◆ **2-The brachial veins:** are placed one on either side of the brachial artery.



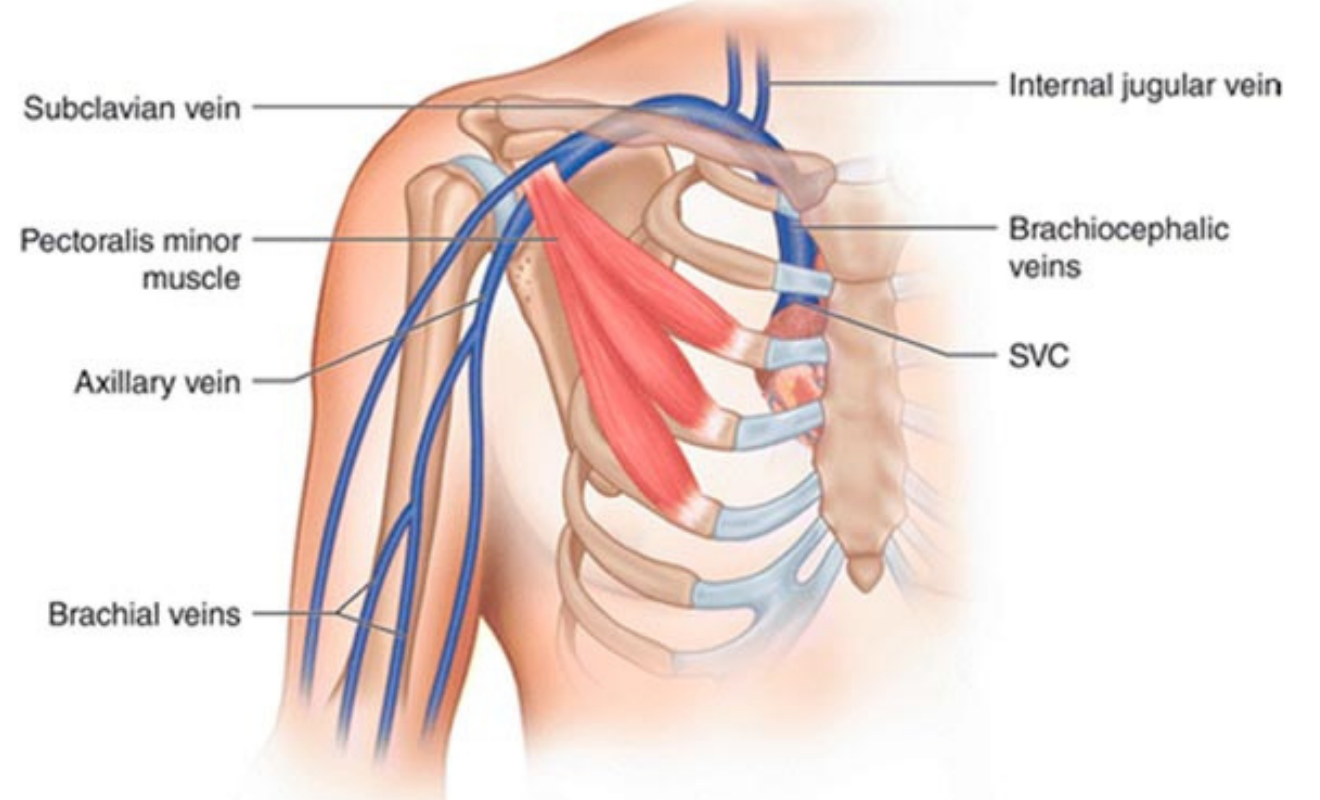
## 3-The Axillary Vein

- 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 the brachial veins and, close to its termination, the cephalic vein.



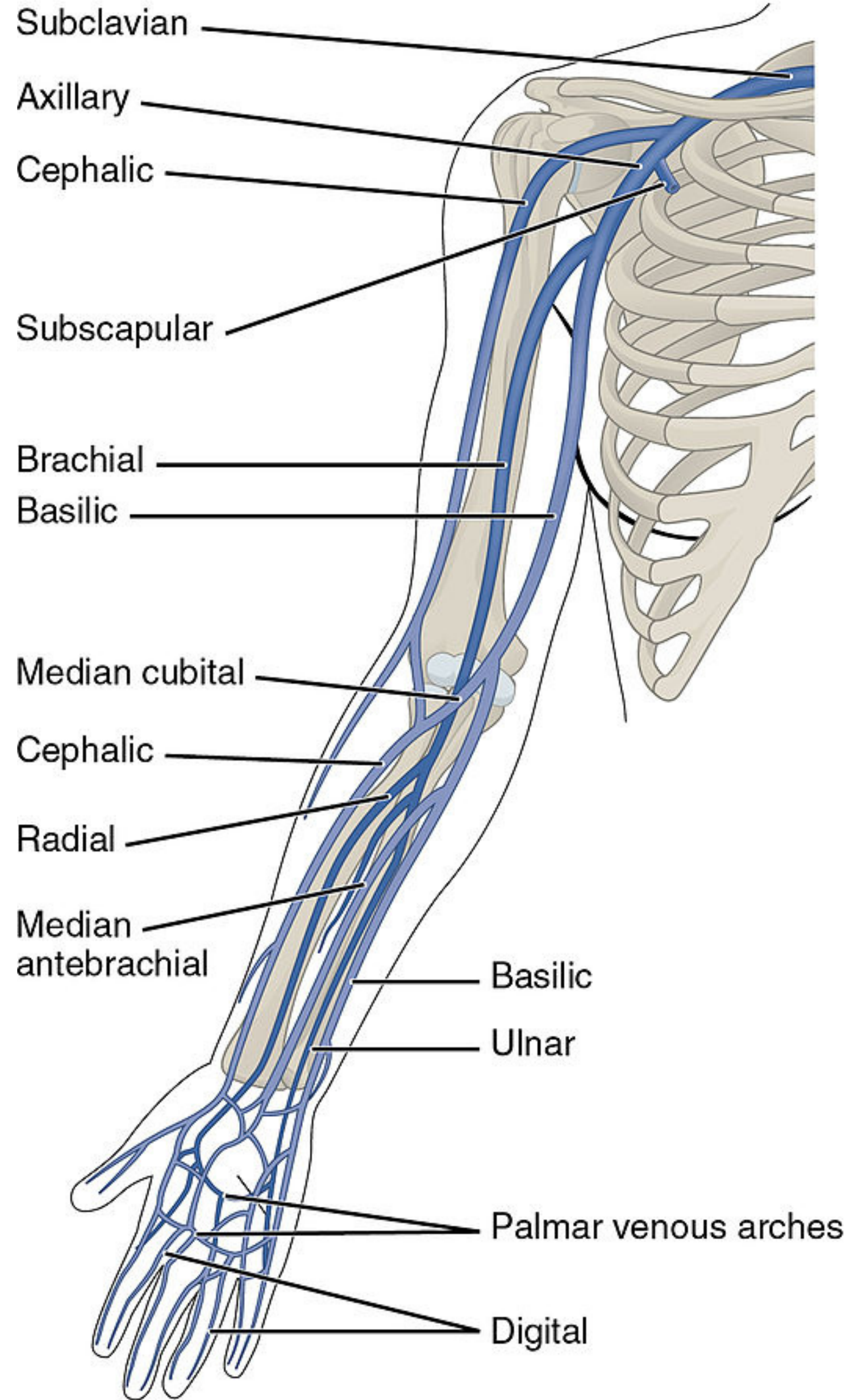
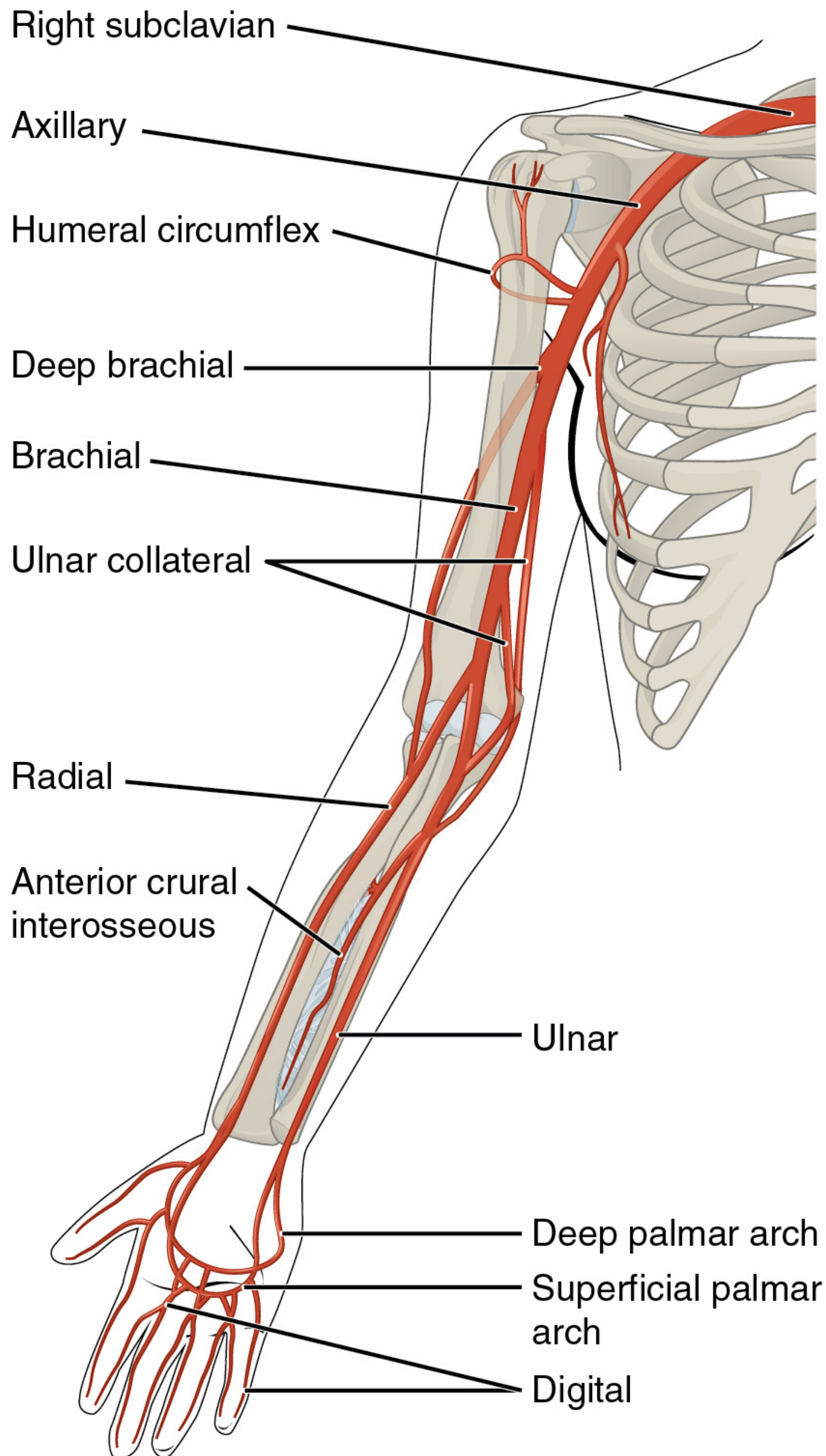
## 4-The Subclavian Vein

- Is the continuation of the axillary vein.
- Extends from the outer border of the first rib to the sternal end of the clavicle, where it unites with the internal jugular to form the Brachiocephalic (Innominate) vein





# Summary



KEY	
<span style="color: blue;">■</span>	Deep veins
<span style="color: lightblue;">■</span>	Superficial veins

# MCQs

1

where does the axillary artery begin ?

A. Medial border of the 1st rib

B. Lateral border of the 1st rib

C. Lateral border of the 2nd rib

D. Medial border of the 2nd rib

2

One of the branches of the 3rd part in axillary artery is?

A. Anterior circumflex humeral

B. Thoracoacromial

C. Highest thoracic Artery

D. Lateral thoracic.

3

One of the branches in the brachial artery is?

A. Highest thoracic Artery

B. Radial artery

C. Lateral thoracic

D. Profunda brachii

4

Which of the following is the frequent site of the venipuncture is?

A- Cephalic vein

B- Brachial vein

C- Median Cubital vein

D- Basilic vein

5

Which of The Following Is the direct continuation of the ulnar artery?

A- The Superficial Palmar Arch

B- Posterior ulnar Recurrent

C- Anterior ulnar Recurrent.

D- The Deep Palmar Arch



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

# SAQs

Q1: what's the branches of radial artery

1

- 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.

Q2: where does the dorsal venous arch or network drain into?

2

- Drains into the Cephalic vein laterally, and Basilic vein medially.

Q3: Anastomosis around Elbow joint occurs between branches of?

3

- Brachial, Radial and Ulnar arteries



# LECTURE DONE BY

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