

Axillary & Median Nerves

Lecture 9



Please check our [Editing File](#).

{وَمَنْ يَتَوَكَّلْ عَلَى اللَّهِ فَهُوَ حَسْبُهُ}

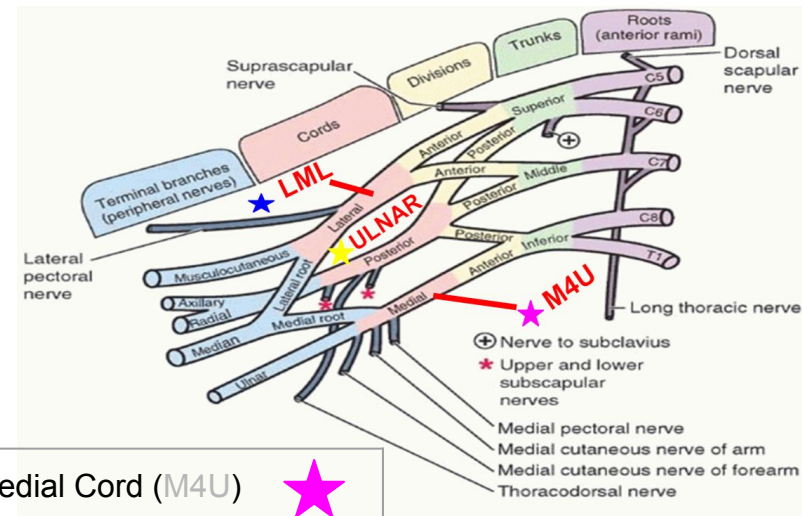
هذا العمل لا يغني عن المصدر الأساسي للمذاكرة

Objectives

- Describe the origin, course, relations, branches and distribution of the axillary and median nerves
- Describe the common causes and effects of injury to the axillary and median nerves

- Text in **BLUE** was found only in the boys' slides
- Text in **PINK** was found only in the girls' slides
- **Text in RED is considered important**
- Text in **GREY** is considered extra notes

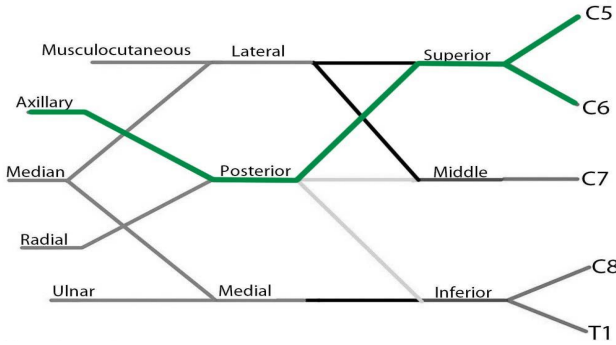
Brachial Plexus



From Lateral Cord (LML) ★	From Posterior Cord (ULNAR) ★	From Medial Cord (M4U) ★
Cords have C5, C6, C7 roots	ULNAR is just a mnemonic [^]	All cords have C8 + T1 roots*
Lateral Pectoral Nerve	Upper Subscapular Nerve	Medial Pectoral Nerve
Musculocutaneous Nerve	Lower Subscapular Nerve	Medial root of median Nerve
Lateral root of Median Nerve	Nerve to Latissimus Dorsi (Thoracodorsal nerve)	Medial Cutaneous nerve arm
	Axillary Nerve	Medial cutaneous nerve forearm
	Radial Nerve	Ulnar Nerve

*:Except Ulnar nerve which is **also** supplied by **C7**

Axillary Nerve



• **Origin:** (C5 & C6).

• Posterior cord of brachial plexus

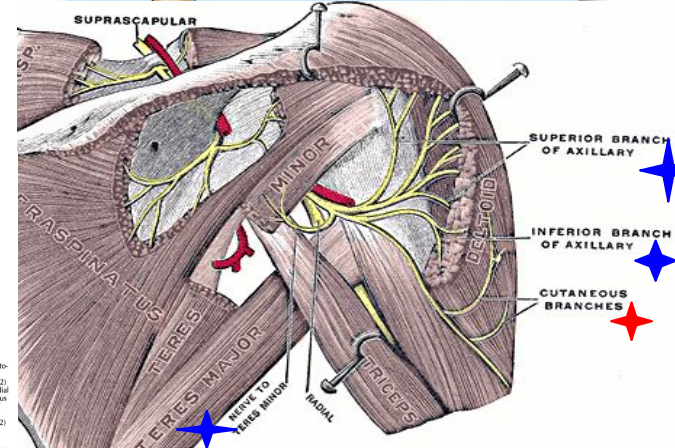
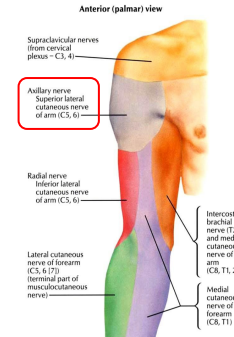
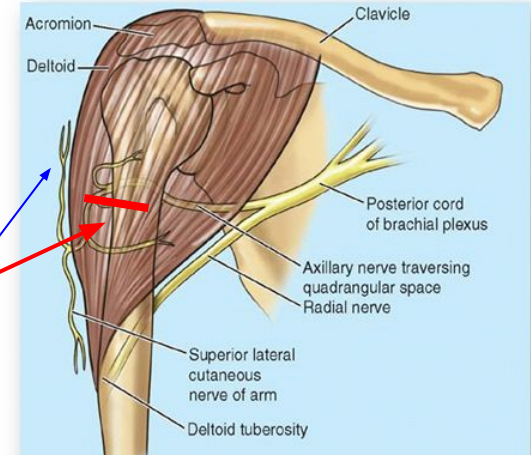
That means this nerve will be affected by any injury to C5 and C6 roots

• Course:

- It passes inferiorly and laterally along the posterior wall of the axilla to exit the axilla
- Then, it passes posteriorly around the surgical neck of the humerus.
- It is accompanied by the posterior circumflex humeral artery.

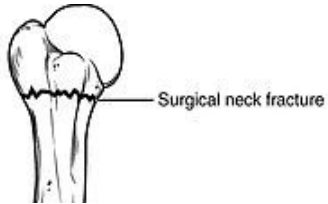
• Branches:

- ★ • **Motor** to the **deltoid and teres minor muscles.**
- ★ • **Sensory:** superior lateral cutaneous nerve of arm that loops around the posterior margin of the deltoid muscle to innervate skin in that region.



Axillary Nerve Lesion

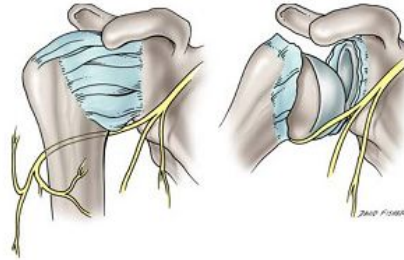
•The Axillary Nerve is usually injured due to:



Descend to the lower part of axilla which injures the axillary nerve

1. Fracture of surgical neck of the humerus.

Most common part to be fractured in the humerus.



The acromion and the coracoid process and the ligament, prevent the shoulder from dislocating upward and that is why it is most likely to dislocate the shoulder downward.

2. Downward dislocation of the shoulder joint

The head of humerus leaves its place

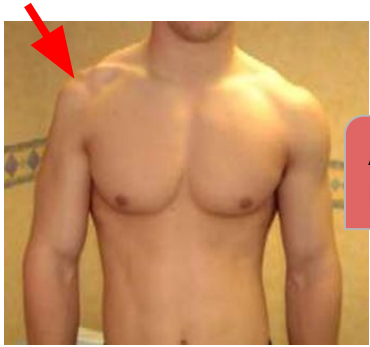


3. Compression from the incorrect use of crutches.

Compression on axilla

Axillary Nerve Lesion

Atrophy loss of rounded center



Affected muscles

deltoid

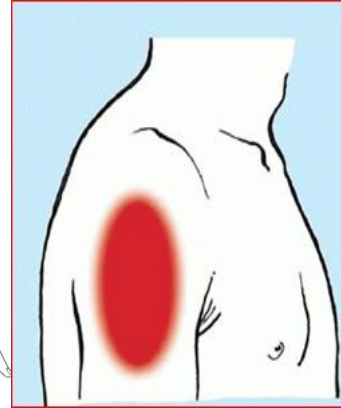
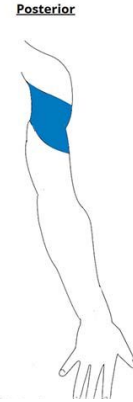
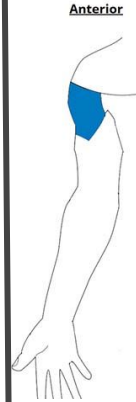
Abduction (15-90 degrees) (30-90 degrees) it is the only muscle with this action so it will be impaired after the injury

Teres minor

Lateral rotation - there are other muscles with the same action so the action won't be affected

• Motor:

- Paralysis of the deltoid and teres minor muscles.
- **Impaired abduction of the shoulder (30-90°).**
- The paralyzed deltoid wastes rapidly.
- As the deltoid atrophies, the rounded contour of the shoulder is flattened compared to the uninjured side.



- Sensory: Loss of sensation over the lateral side of the proximal part of the arm.

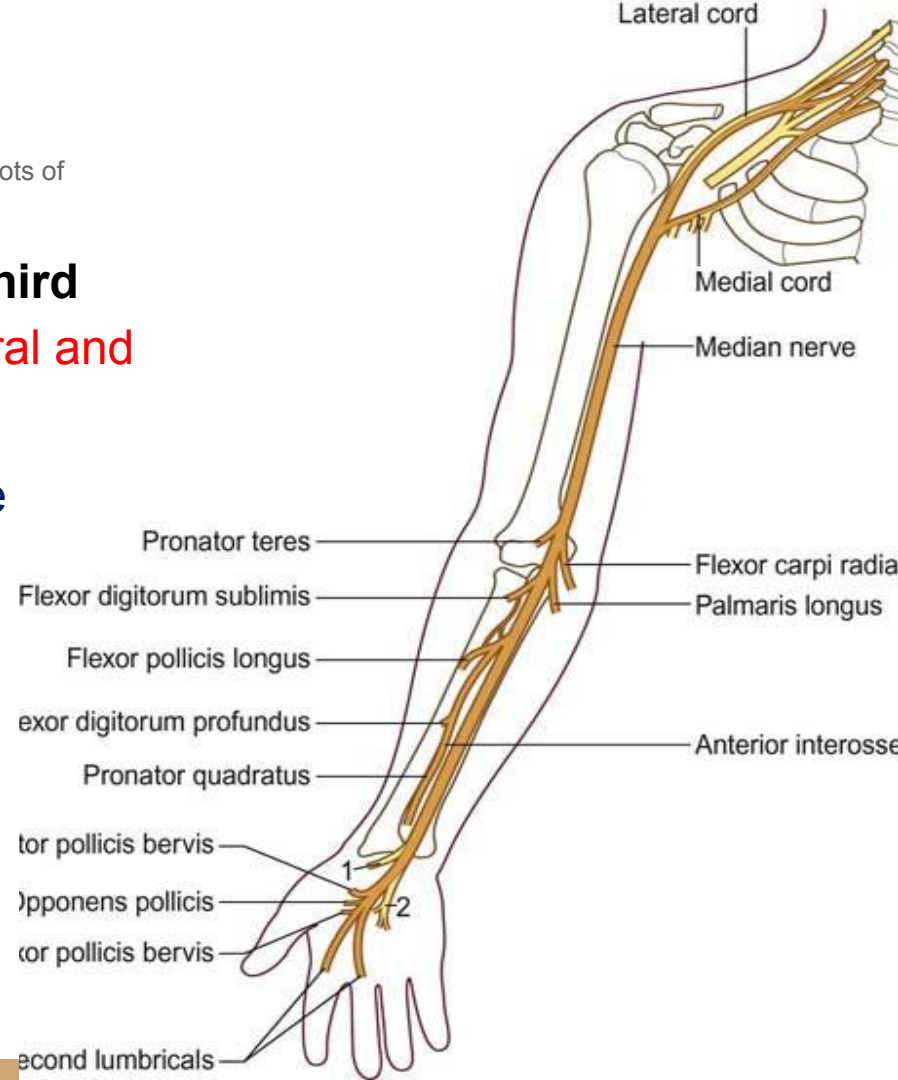
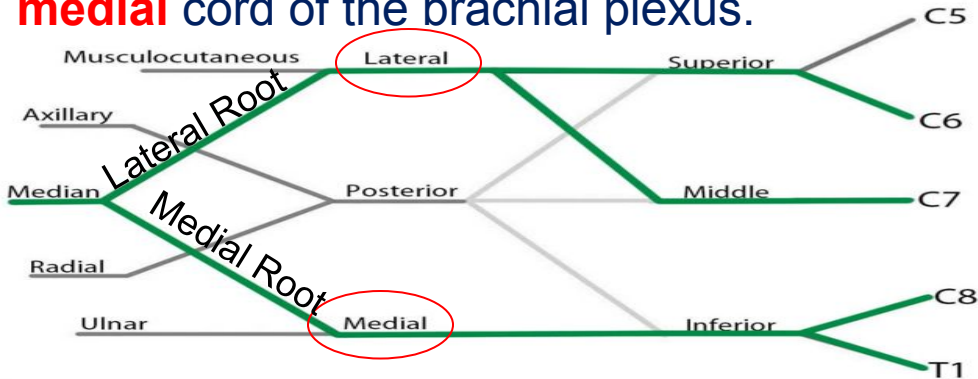
Median Nerve

•Nerve roots(Origin): (**C 5, 6, 7, 8, and T1**). (All roots of Brachial Plexus) - Sometimes (C6 to T1)

•The median nerve is formed **anterior to the third part of the axillary artery** by the **union of lateral and medial roots**.

•(1) **The lateral root (C5,6 & 7)**: arises from the **lateral** cord of the brachial plexus.

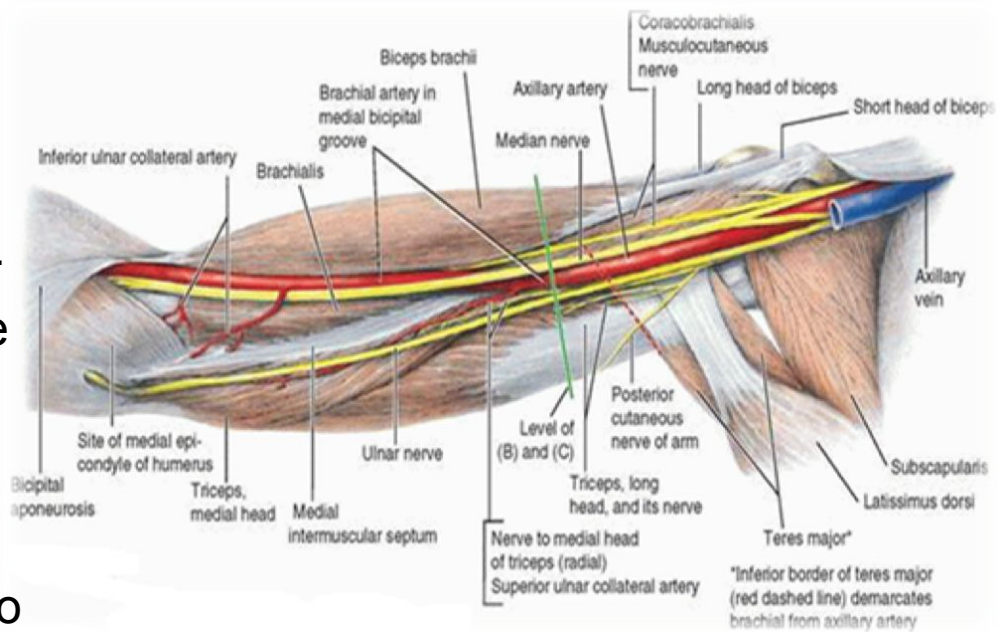
•(2) **The medial root (C8 & T1)**: arises from the **medial** cord of the brachial plexus.



Median Nerve in the Arm

- It enters the arm from the axilla at the inferior margin of the **teres major** muscle.
- It passes vertically along the medial side of the arm in the anterior compartment and is related to the **brachial artery** throughout its course:

1. In upper ½ of the arm, it lies **lateral** to the brachial artery;
2. In the middle of the arm, it crosses the artery and descends on its **medial** side, then descends **anterior** to the elbow joint.



- The median nerve has **no major branches in the arm**, but has a branch to one of the muscles of the forearm, the **pronator teres** muscle, this branch may originate from the nerve immediately proximal to the elbow joint

Median Nerve in the Forearm

★ Median nerve passes into the forearm anterior (in front of) elbow joint, between the 2 heads of the **pronator teres**.

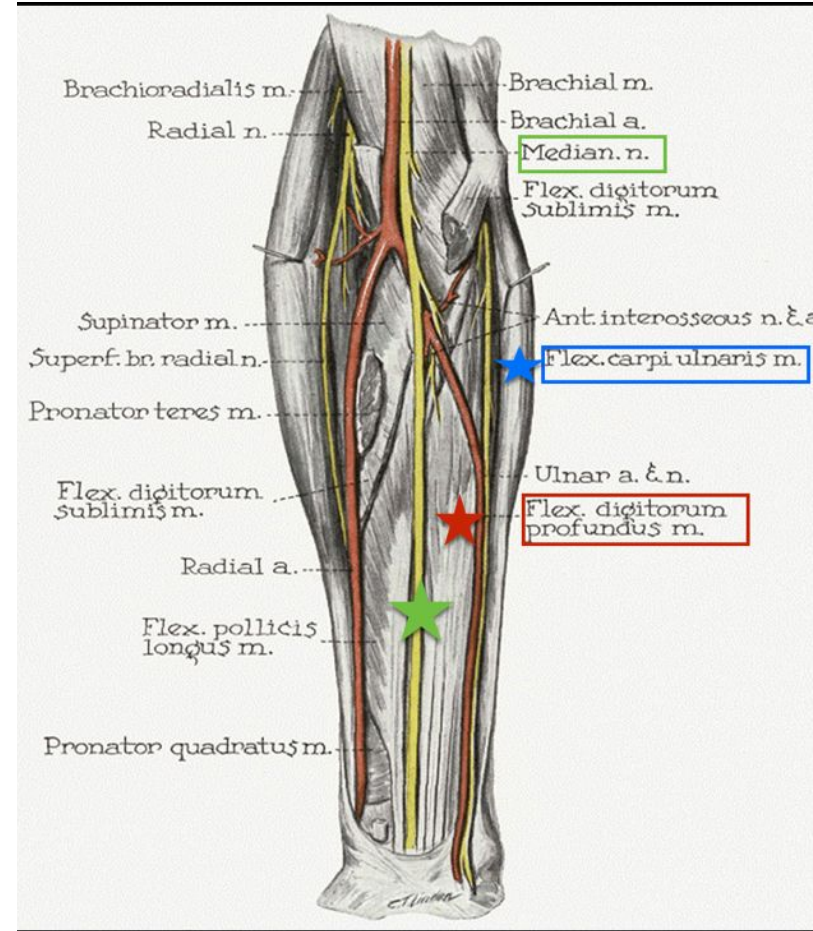
• Its branches innervate **most of the muscles** in the **anterior** compartment (Flexor muscles) of the forearm, (6.5 out of 8)

• **Except:** (1 and half muscles)

(1) the flexor carpi ulnaris. ★

(2) medial half of the flexor digitorum profundus. ★

which are supplied by the **ulnar nerve**.



Median Nerve in the hand

The median nerve continues into the hand by passing Deep to the **flexor retinaculum**.

It innervates: (5 muscles in the hand)

- The **3** thenar muscles:
Muscles associated with the thumb.

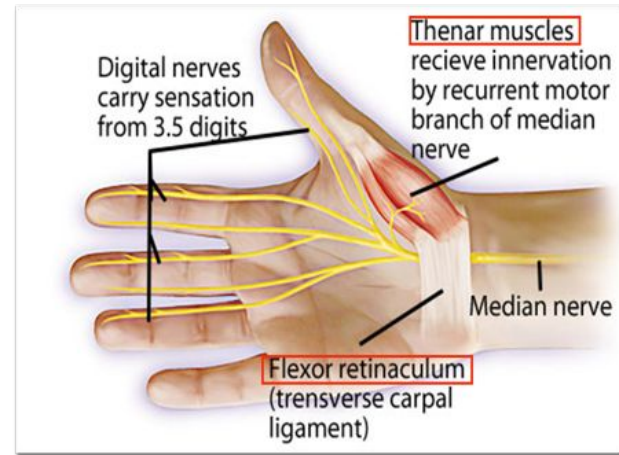
- Lateral **2** lumbricals:
Muscles associated with movement of the index and middle fingers.

- Skin over the palmar surface of the lateral three and one-half fingers.

(thumb , index , middle , ½ ring fingers)

- The lateral 2/3rd of the palm and **middle of the wrist**.

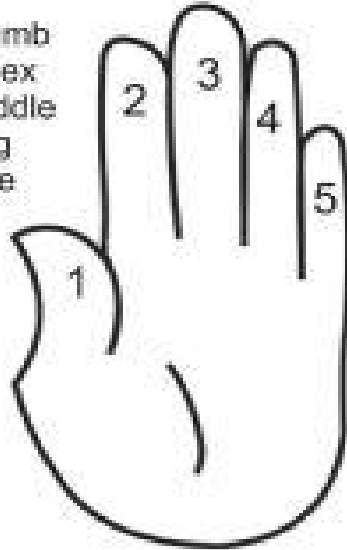
- Dorsal surface in the terminal phalanges (nails) of the lateral three and half digit.



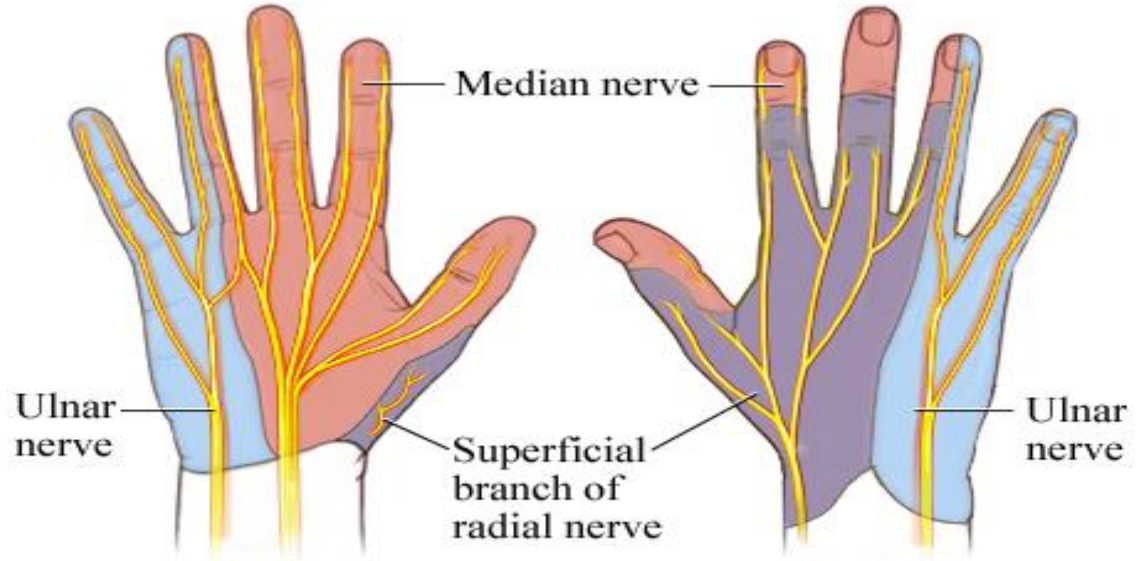
My Finger Names

paint the right color

- 1 thumb
- 2 index
- 3 middle
- 4 ring
- 5 little



Name of the fingers



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Median nerve supply to the hand

Median Nerve Lesion

Injury of the median nerve at different levels causes different syndromes.

In the **arm and forearm** the median nerve is usually not injured by trauma because of its relatively deep position.

Median nerve can be damaged in 3 areas:

- In the elbow region.
- At the wrist above the flexor retinaculum.

Flexor retinaculum: is a fibrous band on the palmar side of the hand near the wrist. It arches over the carpal bones of the hands, covering them and forming the carpal tunnel.

- In the carpal tunnel
(deep to the flexor retinaculum)

The most serious disability of median nerve injuries is:

- **Loss of opposition of the thumb.**

The delicate pincer-like action is not possible. All the muscles that perform the opposition movement are innervated by the median nerve, any lesion to the nerve will cause total loss of the movement.

- **Loss of sensation from:**
Lateral 3 ½ fingers
Lateral ⅔ of the palm



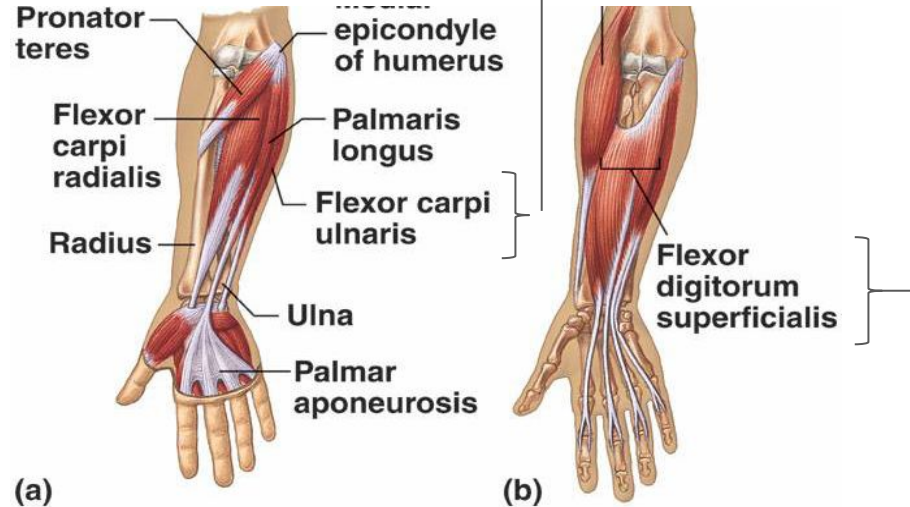
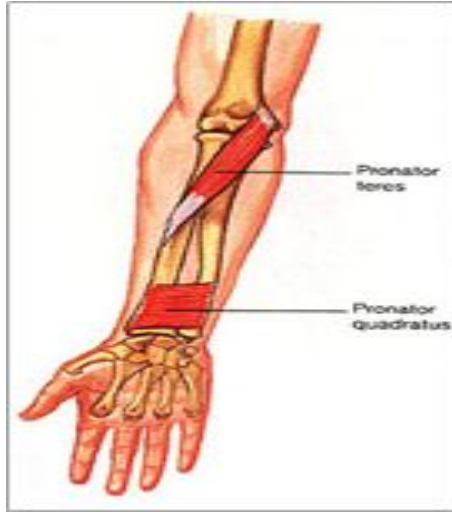
Median Nerve Lesion in the Elbow Region

Due to **supracondylar fracture** of humerus.

Affected Muscles:

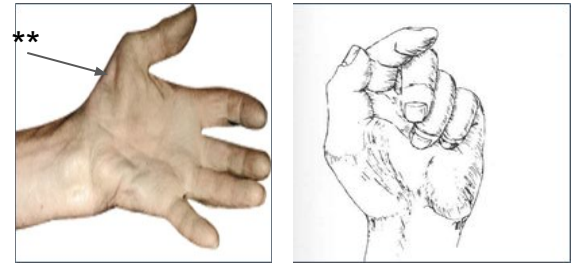
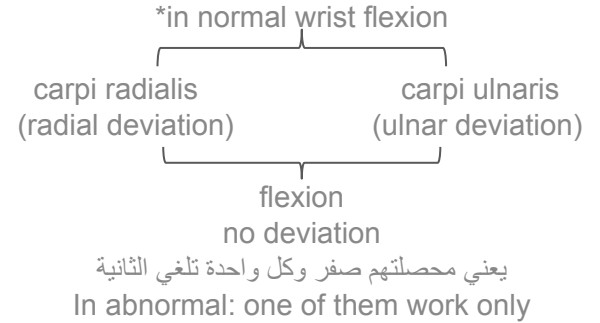
1. **Pronator muscles** of the forearm.
2. All **long flexors** of the wrist and fingers **except flexor carpi ulnaris** and medial 1/2 of **flexor digitorum profundus**.

The muscles that aren't affected are fed by the ulnar nerve



Motor:

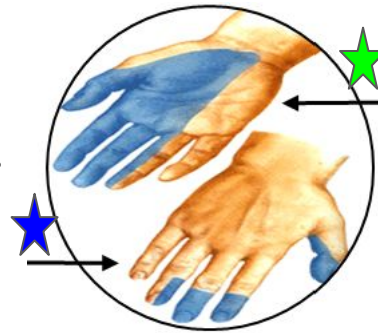
- **Loss of pronation.**(Hand is kept in supine position)
- **Weak flexion**, and ulnar deviation*.
- **Loss of flexion** of the interphalangeal joints of the index and middle fingers.
- **Weak flexion** of ring and little finger.
- **Loss of flexion** of terminal phalanx of thumb and **loss of opposition**, Thumb is adducted and laterally rotated.
- Wasting of thenar eminence**.
- Hand is flattened, “**apelike**” and unable to flex the three most radial digits when asked to make a fist.



Sensory:

Loss of sensation from:

1. **★** Lateral 2/3rd of the palm (radial side).
2. **★** Palmar aspect of the lateral 3½ fingers.
3. **★** Distal part of the dorsal surface of the lateral 3½ fingers.



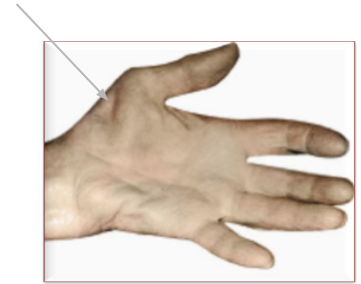
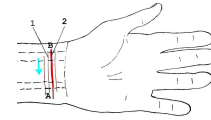
Trophic Changes:

1. Dry and scaly skin.
2. Easily cracking nails.
3. Atrophy of the pulp of the fingers.

←
The fleshy mass on the palmar aspect of the extremity of the finger.

Median Nerve Lesion at the Wrist

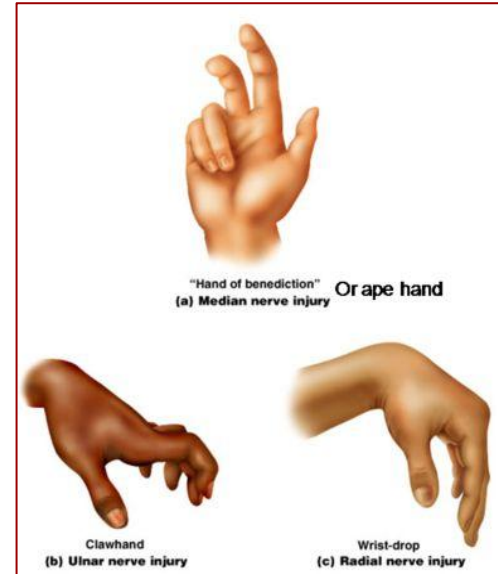
Often injured by **penetrating wounds** caused by stabs or glass penetrating the forearm.



Median nerve is nourishing the **3 lateral fingers**. So when it is affected it will:

1. Paralyze **Thenar muscles** (thumb muscles), the thenar muscles eventually atrophy and become flattened
2. Opposition & abduction of thumb are lost. Thumb and lateral two fingers (index & middle) are arrested in adduction and hyperextension position: **Apelike hand**

It will also result in sensory and trophic changes which are the same as in elbow region injuries, except pronation isn't affected.



Carpal Tunnel Syndrome (Thick retinaculum)

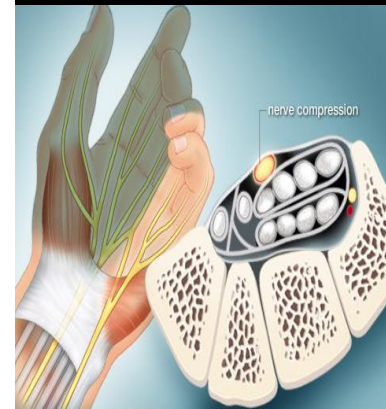
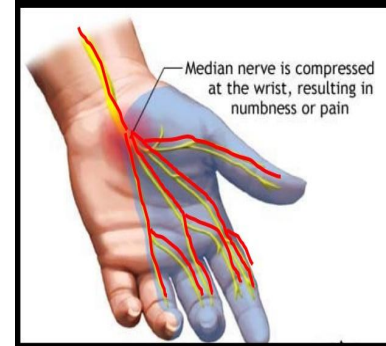
Compression of the **median** nerve beneath the flexor retinaculum at the wrist caused by the **thickening** of the flexor retinaculum. It is by far the most common neurological problem.

Effects:

Motor: Weak motor function of thumb, index & middle finger.

Sensory: Burning pain or 'pins and needles' (شكشكه ودبابيس) along the lateral **3½ fingers**.

- ❖ No sensory changes over the palm as the **palmar cutaneous branch** is given before the median nerve enters the carpal tunnel. (لأنه يمر من فوق ال Retinaculum)



(مقطع يساعد على الفهم)

We strongly recommend using Complete Anatomy or similar apps to gain a visualization of the topic

Summary:

Axillary Nerve

- Origin: Posterior cord.
- Spinal segments: C5, & C6

Function:

- Motor: Deltoid, teres minor.
- Sensory: Skin over/upper lateral part of arm.

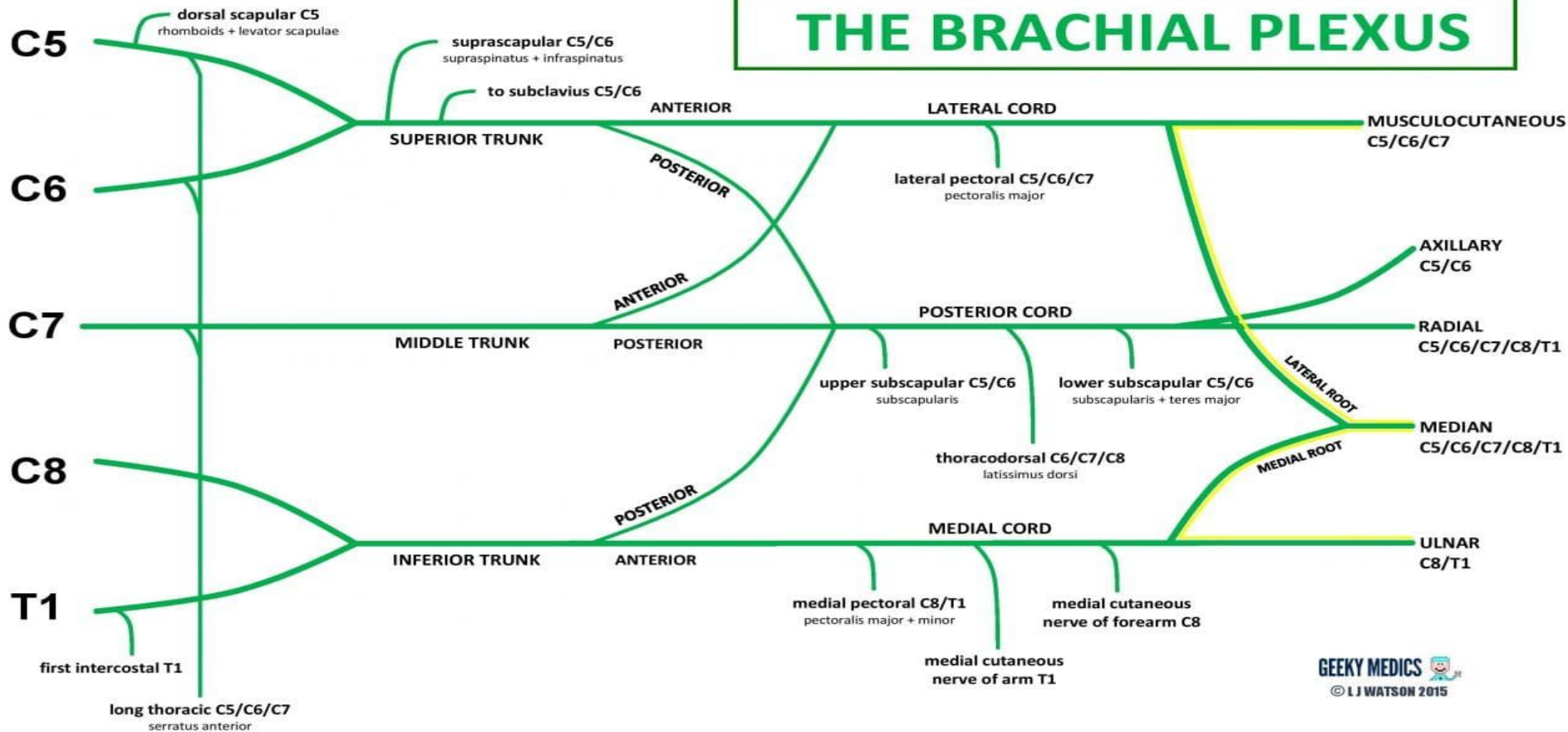
Median Nerve

- Origin: Medial and lateral cords.
- Spinal segments: (C5, C6, C7, C8 & T1).

Function:

- Motor: All muscles in the anterior compartment of the forearm (except FCU & medial ½ of FDP) and three thenar muscles of the thumb and two lateral lumbrical muscles.
- Sensory: Skin over the palmar surface of the lateral 3½ digits and over the lateral 2/3rd of the palm of the hand.

THE BRACHIAL PLEXUS



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NERVE ROOTS x 5

(C5, C6, C7, C8, T1)

exit vertebral foramina between anterior and medial scalene muscles in posterior triangle of neck

3 EXTRA BRANCHES

dorsal scapular, first intercostal, long thoracic

TRUNKS x 3

(superior, middle, inferior)

cross posterior triangle, over first rib, behind subclavian artery

2 EXTRA BRANCHES

suprascapular, n. to subclavius

DIVISIONS x 6

(3 x anterior, 3 x posterior)

located posterior to middle third of clavicle; anterior = flexors, posterior = extensors

NO EXTRA BRANCHES

CORDS x 3

(lateral, posterior, medial)

distributed around second part of axillary artery

7 EXTRA BRANCHES















medial + lateral pectoral, upper + lower subscapular, thoracodorsal, med. cut. n. of arm + forearm

TERMINAL BRANCHES x 5

(musculocutaneous, axillary, radial, median, ulnar)
origins are distributed around third part of axillary artery

ALWAYS FIND THE "M" SHAPE M → MEDIAN

NOW YOU CAN CONQUER THE BRACHIAL PLEXUS!

	MUSCULOCUTANEOUS	AXILLARY	RADIAL	MEDIAN	ULNAR
ORIGIN	<p>C5/C6/C7</p> <p>anterior divisions of superior and middle trunks</p> <p>↓</p> <p>lateral cord</p>	<p>C5/C6</p> <p>posterior division of superior trunk</p> <p>↓</p> <p>posterior cord</p>	<p>C5/C6/C7/C8/T1</p> <p>posterior divisions of superior, middle and inferior trunks</p> <p>↓</p> <p>posterior cord</p>	<p>C5/C6/C7/C8/T1</p> <p>lateral root from anterior divisions of superior and middle trunks → lateral cord</p> <p>medial root from anterior division of inferior trunk → medial cord</p>	<p>C8/T1</p> <p>anterior division of inferior trunk</p> <p>↓</p> <p>medial cord</p>
COURSE	pierces coracobrachialis and passes down anterior compartment of arm beneath biceps muscle, then becomes lateral cutaneous nerve of forearm	passes beneath shoulder joint into posterior compartment of arm and wraps around surgical neck of humerus	winds around spiral groove of humerus, passes through ACF into forearm then divides into two terminal branches (superficial and deep/posterior interosseous)	runs down arm with brachial artery, passes through ACF into forearm then divides into three terminal branches (anterior interosseous, deep and superficial/palmar cutaneous)	runs down arm with brachial artery, passes behind medial epicondyle into forearm, then travels down anterior compartment with ulnar artery to enter palm of hand via Guyon's canal
SUPPLIES	<p>SENSORY</p> <p>lateral forearm</p> 	<p>SENSORY</p> <p>"sergeant's patch" over lower deltoid</p>	<p>SENSORY</p> <p>lower posterior arm posterior forearm lateral 2/3 dorsum of hand proximal dorsal aspect of lateral 3% fingers</p>	<p>SENSORY</p> <p>thenar eminence lateral 2/3 palm of hand palmar aspect lateral 3% fingers distal dorsal aspect of lateral 3% fingers</p>	<p>SENSORY</p> <p>hypothenar eminence medial 1/3 palm of hand palmar aspect medial 1% fingers whole dorsal aspect of medial 1% fingers medial 1/3 dorsum of hand</p>
	<p>MOTOR</p> <p>anterior compartment of arm</p> <ul style="list-style-type: none"> B biceps brachii B brachialis C coracobrachialis 	<p>MOTOR</p> <ul style="list-style-type: none"> ◇ deltoid ◇ teres minor 	<p>MOTOR</p> <p>posterior compartment of arm</p> <ul style="list-style-type: none"> ◇ triceps brachii <p>posterior compartment of forearm</p> <ul style="list-style-type: none"> ◇ wrist extensors ◇ finger extensors ◇ brachioradialis ◇ supinator 	<p>MOTOR</p> <p>all muscles of anterior compartment of forearm EXCEPT flexor carpi ulnaris and medial two parts of flexor digitorum profundus</p> <ul style="list-style-type: none"> ◇ wrist flexors ◇ finger flexors ◇ pronator teres + quadratus <p>LOAF muscles of hand</p> <ul style="list-style-type: none"> L lateral two lumbricals O opponens pollicis A abductor pollicis brevis F flexor pollicis brevis 	<p>MOTOR</p> <p>two muscles of anterior compartment of forearm</p> <ul style="list-style-type: none"> ◇ flexor carpi ulnaris ◇ medial two parts of flexor digitorum profundus <p>HILA muscles of hand</p> <ul style="list-style-type: none"> H hypothenar eminence I interossei L lumbricals (medial two) A adductor pollicis
COMMON INJURIES	<p>NB// injuries are rare as protected by bulk of biceps muscle</p> <p>stab wounds to upper arm</p> 	<p>fracture of surgical neck of humerus</p> <p>stab wounds to posterior shoulder</p> <p>compression by shoulder dislocation or pressure of crutches on armpits</p>  	<p>fracture of proximal humerus, humeral shaft or proximal radius</p> <p>stab wounds to ACF/forearm/wrist</p> <p>compression by pressure of crutches on armpits, falling asleep/lying on arm, tight plaster cast or prolonged tourniquet use</p>  	<p>supracondylar fracture of humerus</p> <p>stab wounds to ACF/forearm/wrist, or wrist lacerations in deliberate self-harm</p> <p>compression at carpal tunnel in wrist</p>  	<p>supracondylar fracture of humerus, medial epicondylar fracture or injury</p> <p>stab wounds to forearm/wrist</p> <p>compression at cubital tunnel in elbow or Guyon's canal in wrist</p>  
RESULTS OF INJURY	<p>SENSORY LOSS</p> <p>numb lateral forearm</p>	<p>SENSORY LOSS</p> <p>numb sergeant's patch</p>	<p>SENSORY LOSS</p> <p>numb posterior arm and forearm numb radial distribution of hand</p>	<p>SENSORY LOSS</p> <p>numb thenar eminence numb median distribution of hand</p>	<p>SENSORY LOSS</p> <p>numb hypothenar eminence numb ulnar distribution of hand</p>
	<p>MOTOR DEFICIT</p> <p>weak elbow flexion weak forearm supination absent biceps reflex</p>	<p>MOTOR DEFICIT</p> <p>very weak shoulder abduction from 15-90° weak shoulder flexion weak shoulder extension weak shoulder external rotation</p>	<p>MOTOR DEFICIT</p> <p>weak elbow extension absent triceps reflex weak wrist extension weak finger MCPJ extension absent supinator reflex</p>	<p>MOTOR DEFICIT</p> <p>weak forearm pronation weak wrist flexion weak wrist abduction weak finger flexion; flexion of ring and little finger DIPJs preserved weak grip strength and opposition</p>	<p>MOTOR DEFICIT</p> <p>weak wrist flexion weak wrist adduction weak flexion of ring and little finger MCPJs and DIPJs, and weak extension at their IPJs weak finger abduction, adduction and opposition</p>
	<p>DEFORMITY</p> <p>wasting of biceps</p>	<p>DEFORMITY</p> <p>wasting of deltoid</p>	<p>DEFORMITY</p> <p>wasting of triceps and posterior compartment of forearm</p>  <p>WRIST DROP on attempted wrist extension</p>	<p>DEFORMITY</p> <p>wasting of anterior forearm and thenar eminence</p>  <p>HAND OF BENEDICTION on attempted finger flexion</p>	<p>DEFORMITY</p> <p>wasting of hypothenar eminence and intrinsic muscles of hand</p>  <p>CLAW HAND on attempted finger extension</p>
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Questions

1. What is the origin of the axillary nerve?

A. C5 & C6 B. C5, C6 & C7 C. C8+T1 D. C5-T1

2. Which action will be impaired after axillary nerve lesion?

A. Adduction B. Abduction C. Medial Rot. D. Lateral Rot.

3. The median nerve enters the arm at the inferior margin of:

A. Subscapularis B. Teres Major C. Teres Minor D. Deltoid

4. In the upper half of the arm the median nerve lies ___ to the brachial artery:

A. Anterior B. Posterior C. Medial D. Lateral

5. The median nerve enters the forearm between the heads of:

A. Flexor Carpi Ulnaris B. Flexor Digitorum Profundus
C. Pronator Teres D. Pronator Quadratus

6. If the median nerve is damaged which of the following will be affected but not fully:

A. Flexor Carpi Ulnaris B. Flexor Digitorum Profundus
C. Pronator Teres D. Pronator Quadratus

7. Lesion of median nerve at the elbow occurs due to:

A. Carpal tunnel syndrome B. Thickening of flexor retinaculum
C. Supracondylar fracture (humerus) D. Trauma to elbow joint

8. Axillary nerve lesion will lead to loss of sensory in:

A. Lateral $\frac{2}{3}$ of palm B. Anterior aspect of forearm
C. Lateral superior aspect of arm D. Anterior aspect of arm

9. Median nerve lesion will lead to:

A. Ape hand B. Claw hand
C. Wrist drop D. Tarsal Tunnel Syndrome

10. Which of the following is a symptom in carpal tunnel syndrome?

A. scaly skin B. Burning pain in lateral 3 & 1/2 fingers

Team Members

Lamia Abdullah Alkuwaiz (Team Leader)

Rawan Mohammad Alharbi

Abeer Alabduljabbar
Afnan Abdulaziz Almustafa
Ahad Algrain
Alanoud Almansour
Albandari Alshaye
AlFhadah abdullah alsaleem
Arwa Alzahrani
Dana Abdulaziz Alrasheed
Dimah Khalid Alaraifi
Ghada Alhaidari
Ghada Almuhananna
Ghaida Alsanad
Hadeel Khalid Awartani
Haifa Alessa
Khulood Alwehabi
Layan Hassan Alwatban
Lojain Azizalrahman
Lujain Tariq AlZaid

Maha Barakah
Majid Khalid AlBarrak
Norah Alharbi
Nouf Alotaibi
Noura Mohammed Alothaim
Rahaf Turki Alshammari
Reham Alhalabi
Rinad Musaed Alghoraiby
Sara Alsultan
Shahad Alzahrani
Wafa Alotaibi
Wejdan Fahad Albadrani
Wjdan AlShamry

Faisal Fahad Alsaif (Team Leader)

Abdulaziz Al dukhayel

Fahad Alfaiz
Akram Alfandi
Saad Aloqile
Saleh Almoaiqel
Abdulaziz Alabdulkareem
Abdullah Almeaither
Yazeed Aldossari
Muath Alhumood
Abdulrahman Almotairi

Abdulelah Aldossari
Abdulrahman Alduhayyim
Hamdan Aldossari
Abdullah Alqarni
Mohammed Alomar
Abdulrahman Aldawood
Saud Alghufaily
Hassan Aloraini
Khalid Almutairi

Abdulmajeed
Alwardi
Abdulrahman Alageel
Rayyan Almousa
Sultan Alfuhaid
Ali Alammari
Fahad Alshughaihthy
Fayez Ghiyath
Aldarsouni
Mohammed Alquwayfili

Abduljabbar Al-yamani
Sultan Al-nasser
Majed Aljohani
Zeyad Al-khenizan
Mohammed Nouri
Abdulaziz Al-drgam
Fahad Aldhowaihy
Omar alyabis