Nerves of the upper limb
Prof. Abdulameer Al-Nuaimi
E-mail: a.al-nuaimi@sheffield.ac.uk
E. mail: abdulameerh@yahoo.com
Brachial plexus
Relationship of the brachial plexus to the axillary artery

- Ventral rami (roots)
- Upper trunk
- Middle trunk
- Divisions
- Lateral cord
- Coracoid process
- C5
- C6
- C7
- C8
- Lower trunk
- Thoracic nerve
- Posterior cord
- Axillary artery
- Medial cord
- Pectoralis minor
- Axillary nerve
- Musculocutaneous nerve
- Ulnar nerve
- Median nerve
- Radial nerve

Posterior divisions and their branches dark green
Median nerve
After originating from the brachial plexus in the axilla, the median nerve descends down the arm, initially lateral to the brachial artery. Halfway down the arm, the nerve crosses over the brachial artery, and becomes situated medially. The median nerve enters the anterior compartment of the forearm between the two heads of pronator teres muscle via the cubital fossa.
In the forearm, the nerve travels between the flexor digitorum profundus and flexor digitorum superficialis muscles.
Major branches in the forearm:
1- Anterior interosseous nerve – supplies the deep muscles in the anterior forearm.
2- Palmar cutaneous nerve – innervates the skin of the lateral palm.
The median nerve enters the hand via the carpal tunnel—where it terminates by dividing into two branches:

1. **Recurrent branch** – innervates the thenar muscles.

2. **Palmar digital branch** – innervates the palmar surface and fingertips of the lateral three and half digits. Also innervates the lateral two lumbrical muscles.
Palmaris longus tendon
Flexor carpi radialis tendon
Flexor pollicis longus tendon
Common flexor synovial sheath
Trapezium
Trapezoid
Capitate
Hamate
Flexor retinaculum covering carpal tunnel
Ulnar artery
Ulnar nerve
Flexor digitorum superficialis tendons
Carpal tunnel
Flexor digitorum profundus tendons
Median nerve

Nerve roots: C6 – T1 (also contains fibres from C5 in some individuals).

Motor functions: Innervates the flexor and pronator muscles in the anterior compartment of the forearm (except the flexor carpi ulnaris and part of the flexor digitorum profundus, innervated by the ulnar nerve). Also supplies innervation to the thenar muscles and lateral two lumbricals in the hand.

Sensory functions: Gives rise to the palmar cutaneous branch, which innervates the lateral aspect of the palm, and the digital cutaneous branch, which innervates the lateral three and a half fingers on the anterior (palmar) surface of the hand.
Ulnar nerve

Spinal roots: C8-T1.

Motor functions: Innervates the intrinsic muscles of the hand (hypothenar muscles and two medial lumbricals), and two muscles in the forearm; flexor carpi ulnaris and medial half of flexor digitorum profundus.

Sensory functions: Innervates the anterior and posterior surfaces of the medial one and half fingers, and the associated palm area

Anatomical Course
After arising from the brachial plexus, the ulnar nerve descends down the medial aspect of the upper arm. At the elbow, it passes posterior to the medial epicondyle of the humerus and gives rise to an articular branch to the elbow joint. Ulnar nerve is palpable at the medial epicondyle
In the forearm, the ulnar nerve pierces the two heads of the *flexor carpi ulnaris*, and travels deep to the muscle, alongside the ulna. **Three main branches** arise in the forearm:

1- **Muscular branch** – innervates two muscles in the anterior compartment of the forearm.

2- **Palmar cutaneous branch** – innervates the medial half of the palm.

3- **Dorsal cutaneous branch** – innervates the **dorsal surface** of the **medial one and a half fingers**, and the associated dorsal hand area.

At the wrist, the ulnar nerve travels **superficially** to the *flexor retinaculum*, and is medial to the ulnar artery. It enters the hand via the ulnar canal. In the hand, the nerve terminates by giving rise to superficial and deep branches.
The Ulnar Nerve - Quick Review

In the forearm, the ulnar nerve divides into dorsal and palmar cutaneous branches.
In the hand, the nerve further divides into superficial and deep branches.
Motor Functions

The **ulnar nerve** innervates

**In the anterior compartment of the forearm**

Flexor carpi ulnaris —.

Flexor digitorum profundus (medial half)

**In the hand.**

The majority of the intrinsic hand muscles are innervated by the **deep branch** of the ulnar nerve:

- Hypothenar muscles
- Medial two lumbricals
- Adductor pollicis
- Palmar and dorsal interossei of the hand
Radial nerve
Anatomical Course: The radial nerve is the terminal continuation of the *posterior cord* of the brachial plexus. It therefore contains fibres from nerve roots C5 – T1. The nerve arises in the axilla region, where it is situated posteriorly to the *axillary artery*. It exits the axilla inferiorly (via the triangular interval), and supplies branches to the long and lateral heads of the triceps brachii.

The radial nerve then descends down the arm, travelling in a shallow depression within the *surface of the humerus, known as the radial groove.*

As it descends, the radial nerve wraps around the humerus laterally, and supplies a branch to the medial head of the triceps brachii. During much of its course within the arm, it is accompanied by the *profunda brachii* branch of the *brachial artery*.
To enter the forearm, the radial nerve travels anterior to the lateral epicondyle of the humerus (Radial nerve has motor and sensory parts). The radial nerve then divides into two branches, superficial and deep branches. The deep branch of the radial nerve winds to the back of the forearm around the lateral side of the radius between the two planes of fibers of the Supinator, and is prolonged downward between the superficial and deep layers of muscles, to the middle of the forearm. The deep branch continues as posterior interosseous nerve provides motor supply to the muscles in the posterior compartment of the forearm, which is mostly the extensor muscles of the hand. The radial nerve also innervates the triceps brachii
Radial Nerve Palsy
aka Saturday night palsy

1. Loss of extension of fingers, thumb, and wrist
2. Numbness over 1st dorsal interosseous muscles
Superficial branch (sensory) – The superficial branch of the radial nerve passes along the front of the radial side of the forearm. It lies at slightly lateral to the radial artery, beneath the Brachioradialis.
It leaves the artery about 7 cm. above the wrist, passes beneath the tendon of the Brachioradialis, and, piercing the deep fascia, divides into two branches: lateral and medial. Innervates most of the skin of the posterior side of forearm, the dorsal surface of the lateral side of the palm, and dorsal surface of the lateral three and a half fingers.
Superficial branch of radial nerve

Brachioradialis muscle
Radial nerve

Radial nerve (in the radial groove)

Deep branch of the radial nerve
Thank You