UPPER LIMB

• What is a limb?
• Sensory to upper limb
• Making it move
  – Bones and joints
  – Muscles and nerves
• Vascular supply
• Surface anatomy
• (muscle study hint)
What is a limb?

- Ventral somatic outgrowth of outer tube
  - Bones (with bone, cartilage, marrow, NAV, etc.)
  - Joints
  - Muscle
  - Nerves
  - Vascular supply
- No viscera--all innervation is somatic (motor or sensory) from ventral ramus of spinal nerve (except autonomies to blood vessels)
Sensory from limb (dermatomes/sensory skin segments from spine)

- Dermatomes extend over limbs
- Twisted orientation reflects twisting of limb during development
- Named nerves generally innervate skin over muscles that they innervate
Sensory territory of nerves

Brachial plexus serves to redirect spinal routes into named nerves covering certain territory.

Fig. 2: Sensory supply areas of the brachial plexus

- Axillary nerve
- Musculocutaneous nerve
- Radial nerve
- Medial cutaneous nerve of the arm
- Medial cutaneous nerve of the forearm
- Median nerve
- Ulnar nerve

Cutaneous branches of medial cord/ulnar nerve
Upper Limb Skeleton (old hat?)

- Scapula
- Humerus
- Radius, ulna
- Carpals--proximal, distal
- Digits
  - Metacarpals
  - Phalanges
<table>
<thead>
<tr>
<th>JOINT</th>
<th>BETWEEN</th>
<th>MOVEMENT</th>
<th>TYPE</th>
</tr>
</thead>
</table>

Frolich, Human Anatomy, Uppr Limb
Muscles of Scapula

- If INSERTION on scapula = Move scapula
  - Rhomboids
  - Trapezius
  - Pectoralis Minor
  - Serratus Ventralis
  - Levator Scapulae

- If ORIGIN on scapula = Move Arm
  - Subscapularis
  - Supraspinatus
  - Infraspinatus
  - Teres Minor
  - Teres Major
  - Latissimus Dorsi (partial O on scap)
  - Coracobrachialis

Use location of Insertion to determine exact movement!!
POSTERIOR AND ANTERIOR COMPARTMENTS

Key:
- Red = Flexors
- Brown = Extensors
- Others

(a)
- Lateral
- Long
- Medial

Triceps brachii

Humerus
Brachialis
Short head
Long head
Biceps brachii

Posterior compartment of arm (extends elbow)
Anterior compartment of arm (flexes elbow)

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**Brachial Plexus**

- Posterior Compartment—posterior cord
- Anterior compartment—medial, lateral cords
- Name of cord is relative to axillary artery
ANTERIOR MUSCLES
• M-C
  – Biceps
  – brachialis
• Median
  – Forearm flexors
  – Thumb intrinsics (1M$ nerve)
• Ulnar
  – Flexor carpi ulnaris
  – Hand intrinsics

POSTERIOR MUSCLES
• Muscles (radial nerve)
  – Triceps
  – Anconeus
  – Brachioradialis
  – Carpal, digit extensors
<table>
<thead>
<tr>
<th></th>
<th>ANTERIOR</th>
<th>POSTERIOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>NERVES</td>
<td>M-C, ulnar, median</td>
<td>Radial</td>
</tr>
<tr>
<td>MOVEMENT</td>
<td>Flexion</td>
<td>Extension</td>
</tr>
<tr>
<td>MUSCLES</td>
<td>Biceps, flexors</td>
<td>Triceps, extensors</td>
</tr>
<tr>
<td>TWIST</td>
<td>Flexors from medial</td>
<td>Extensors from lateral</td>
</tr>
<tr>
<td></td>
<td>epicondyle</td>
<td>epicondyle</td>
</tr>
</tbody>
</table>
Posterior Compartment of Forearm

- Lateral Epicondyle
- Extensor digitorum
- Extensor carpi ulnaris
- Brachioradialis
- Ext Carpi Radialis Longus
Anterior Compartment Forearm

- Brachioradialis
- Pronator Teres
- Flexor Carpi Radialis
- Flexor Carpi Ulnaris
- Flexor Retinaculum

Flexor Digitorum Superficialis is deep to other flexors.
Routes of nerves (in human)

- M-C: between biceps brachii and brachialis
- Median: medial/posterior to biceps, branches into forearm flexors at elbow then to hand through carpal tunnel
  - Recurrent median (1M$) superficial at wrist to thumb over thenar emminence) deficit - ape’s hand
- Ulnar: medial in arm, posterior to medial epicondyle of humerus (funny bone) down medial forearm medial to carpal tunnel into palm
- Radial: deep posterior arm around lateral epicondyle of humerus to forearm (deep and superficial branches)
Vascular supply

- Subclavian → axillary → radial (same street, new street sign every block)
- Collateral circulation
  - Posterior/anterior circumflex humeral
  - Deep brachial a.
- Radial a. (with median n.) → deep palmar arch
- Ulnar a. (with ulnar n.) → superficial palmar arch
Where’s Radial Nerve?

- Medial Nerve
- Brachial Artery
- Musculocutaneous Nerve
- Ulnar Nerve
- Radial Artery
- Median Nerve
Axilla = Armpit

- Region between arm and chest
- Boundaries
  - Ventral - pectoral muscles
  - Dorsal = latissimus dorsi, teres major subscapularis
  - Medial = serratus ventralis
  - Lateral = bicipital groove of humerus
- Contents
  - Axillary lymph nodes, Axillary vessels
    Brachial Plexus
Surface Anatomy of Upper Limb

- Biceps + Triceps brachii
- Olecrenon Process
- Medial Epicondyle
- Cubital Fossa
  - Anterior surface elbow
  - Contents
    - Median Cubital Vein
    - Brachial Artery
    - Median Nerve
  - Boundaries
    - Medial = Pronator teres
    - Lateral = Brachioradialis
    - Superior = Line between epicondyles
Surface Anatomy of Upper Limb

• Carpal Tunnel
  – Carpals concave anteriorly
  – Carpal ligament covers it
  – Contains: long tendons, Median nerve
  – Inflammation of tendons = compression of Median nerve

• Anatomical Snuffbox
  – Lateral = E.pollicis brevis
  – Medial = E. pollicis longus
  – Floor = scaphoid, styloid of radius
  – Contains Radial Artery (pulse)

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Suggestion: a muscle table organized by
- Joint crossed?
- Nerve innervating?
- Action?
- Compartments?
- All of the above?

<table>
<thead>
<tr>
<th>MUSCLE</th>
<th>ACTION</th>
<th>ORIGIN</th>
<th>INSERTION</th>
<th>INNERVATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biceps</td>
<td>Flex, sup.</td>
<td>Humerus, glenoid</td>
<td>Radial tuberosity</td>
<td>Medial cord—M-C.</td>
</tr>
</tbody>
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