

## Muscles of the Upper Extremity

### **1. Muscles acting on the Pectoral Girdle**

Trapezius  
Rhomboids  
Levator Scapulae  
Pectoralis Minor  
Subclavius  
Serratus Anterior

### **2. Axial Muscles acting on the Scapula**

Pectoralis Major  
Latissimus Dorsi

### **3. Scapula Muscles that act on the Humerus**

Deltoid  
Coracobrachialis  
Teres Major  
Biceps Brachii

### **4. Rotator Cuff Muscles**

Supraspinatus  
Infraspinatus  
Teres Minor  
Subscapularis

### **5. Muscles of the Brachium (Arm)**

Biceps Brachii  
Brachialis  
Brachioradialis  
Triceps Brachii  
Anconeus  
Pronator Teres  
Pronator Quadratus  
Supinator

### **A. Flexors of the Wrist and Fingers (medial epicondyle)**

Flexor Carpi Radialis  
Palmaris Longus  
Flexor Carpi Ulnaris  
Flexor Digitor. Superficialis

### **B. Extensors of the Wrist and Fingers (lateral epicondyle)**

Extensor Carpi Radialis  
Longus  
Extensor Carpi Radialis  
Brevis  
Extensor Digitorum  
Extensor Digiti Minimi  
Extensor Carpi Ulnaris

### **6. Muscles of the Forearm**

Flexor Digitorum Profundis  
Flexor Pollicis Longus  
Extensor Pollicis Longus  
Extensor Pollicis Brevis  
Abductor Pollicis Longus  
Extensor Indicis

### **7. Intrinsic Hand Muscles: Thenar Group**

Abductor Pollicis Brevis  
Opponens Pollicis  
Flexor Pollicis Brevis  
Adductor Pollicis

### **8. Intrinsic Muscles: Hypothenar Group**

Palmaris Brevis  
Opponens Digiti Minimi  
Flexor Digiti Minimi Brevis  
Abductor Digiti Minimi

### **9. Intrinsic Muscles: Midpalmar Group**

Lumbricals  
Palmar Interossei  
Dorsal Interossei

## Upper Extremity: Muscles Acting on the Pectoral Girdle

Muscle	Origin	Insertion	Nerve	Actions
<b>Trapezius</b>	EOP, Ligamentum nuchae, SPs of C7-T12	Clavicle (lateral 1/3), Acromion Spine of scapula	Spinal Accessory (XI) & C3-C4	<p><u>Upper fibers:</u> Elevates and upwardly rotates scapula Rotates head to <u>opposite</u> side Extends and laterally flexes head/neck to same side</p> <p><u>Middle fibers:</u> Retracts scapula</p> <p><u>Lower fibers:</u> Depresses scapula and upwardly rotates scapula</p> <p><u>Bilaterally:</u> assists extension of cervical spine (head/neck ) &amp; thoracic spine</p>
<b>Rhomboid Minor</b>	SPs of C7-T1	Medial border of <b>Scapula</b> at root of and below the spine	Dorsal Scapular (C4-C5)	<ul style="list-style-type: none"> <li>Retracts (adducts) scapula</li> <li>Downward rotation of scapula (elevates medial border)</li> </ul> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 5px auto;">Weakness = <b>Flaring</b> of the scapula; Coexists with tight pec. minor</div>
<b>Rhomboid Major</b>	SPs of T2-T5			
<b>Levator Scapulae</b>	TPs of C1-C4	Superior Angle of the Scapula	Dorsal Scapular (C3-C5)	<ul style="list-style-type: none"> <li>Elevates scapula &amp; downward rotation</li> <li>Ipsilateral rotation of neck (<u>same side</u>)</li> <li>Laterally bends neck (reverse action)</li> <li>Bilaterally extends head/neck</li> </ul> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-left: 10px;"><b>Stiff Neck muscle</b></div>
<b>Pectoralis Minor</b>	<b>Ribs 3-5</b>	<b>Coracoid Process</b> of Scapula (medial part)	Medial Pectoral (C8-T1)	<ul style="list-style-type: none"> <li>Protracts scapula</li> <li>pulls scapula downward (depresses)</li> <li>Raises ribs in forced inspiration</li> </ul> <p><b><i>Pec minor syndrome the "backpack" muscle</i></b></p>
<b>Subclavius</b>	<b>1<sup>st</sup> Rib</b> (at costocartilage junction)	Under surface of <b>Clavicle</b>	Nerve to Subclavius (C5-C6)	<ul style="list-style-type: none"> <li>draws clavicle downward</li> <li>stabilizes clavicle with shoulder girdle movements</li> </ul>
<b>Serratus Anterior</b>	Upper <b>8 or 9 Ribs</b>	<u>Anterior</u> surface of <b>medial border of Scapula</b>	Long Thoracic (C5-C7)	<ul style="list-style-type: none"> <li>Protracts and depresses scapula</li> <li>Assists in upward rotation of scapula for arm abduction</li> <li>Assists with inspiration</li> </ul> <p style="text-align: right;"><b>weakness = winging</b></p>

These structures attach to the coracoid process:

1. pectoralis minor
2. biceps brachii (short head)
3. coracobrachialis

**Note:** humerus = shoulder = arm  
elbow = forearm  
wrist = hand

ipsilateral - same side  
contralateral = opposite

## Upper Extremity: Axial Muscles acting on the Humerus

Muscle	Origin	Insertion	Nerve	Actions
<b>Pectoralis Major</b>	Clavicle (medial 1/2), Sternum, upper 6 ribs	Intertubercular (bicipital) groove – lateral lip	<u>Clav:</u> Lateral Pectoral (C5-C7) <u>Scap:</u> Medial Pectoral (C8-T1)	<ul style="list-style-type: none"> <li>• Adducts humerus</li> <li>• Medially rotates humerus</li> <li>• Horizontally adducts humerus</li> <li>• Flexion of the extended arm (clavic. portion)</li> <li>• Lower fibers: extend the humerus!</li> </ul>
<b>Latissimus Dorsi</b>	SP's T7-sacrum, Lower 3-4 ribs, T-L fascia & Iliac crest. Inferior angle of scapula	Intertubercular (bicipital) groove – floor	Thoracodorsal (C6-C8)	<ul style="list-style-type: none"> <li>• Adducts humerus</li> <li>• Medially rotates humerus</li> <li>• Extends a flexed arm</li> <li>• Downward rotation of scapula (shoulder depression)</li> </ul> <p><i>has similar actions to Teres Major handcuff or swimmer's muscle</i></p>

## Upper Extremity: Scapula muscles acting on the Humerus

Muscle	Origin	Insertion	Nerve	Actions
<b>Deltoid</b>	Clavicle (lateral 1/3) Spine of scapula Acromion	Deltoid Tuberosity of Humerus	Axillary (C5-C6)	<p><b>Ant. fibers:</b> Flexion Medial rotation Horizontal Adduction</p> <p><b>Mid. fibers:</b> Abducts Humerus</p> <p><b>Post fibers:</b> Extension Lateral rotation, Horizontal abduction</p>
<b>Coracobrachialis</b>	Coracoid Process of Scapula	Middle Humerus	Musculocutaneous (C6-C7)	<ul style="list-style-type: none"> <li>• weak flexion of the humerus</li> <li>• weak adduction of humerus</li> </ul> <p><i>deep to short head of biceps</i></p>
<b>Teres Major</b>	Lateral border of Scapula (lower 1/3 <sup>rd</sup> )	Intertubercular (bicipital) groove – medial lip)	Lower Subscapular (C5-C6)	<ul style="list-style-type: none"> <li>• Medial rotation of humerus</li> <li>• Adduction of the humerus</li> <li>• Extension of a flexed humerus</li> </ul> <p><i>mini-Latissimus (same actions)</i></p>
<b>Biceps Brachii</b>	<u>SH:</u> Coracoid process <u>LH:</u> Supraglenoid tubercle of Scapula	Radias: bicipital tuberosity & Bicipital Aponeurosis (Ulna)	Musculocutaneous (C5-C6)	<ul style="list-style-type: none"> <li>• Weak shoulder flexion (7%)</li> <li>• Forearm flexion and supination</li> </ul> <p>- <b>crosses 2 joints</b></p>

### Note: “the lady walking between 2 majors”

This might help you remember the insertions of the Pectoralis Major and Teres Major surrounding the Latissimus Dorsi insertion at the bicipital groove area of the humerus.

Also, these muscles have very similar actions (all adduct and internally rotate the humerus)

## Upper Extremity: Rotator Cuff Muscles “SITS”

Muscle	Origin	Insertion	Nerve	Actions
<b>Supraspinatus</b>	Supraspinous Fossa of scapula	Greater Tubercle Of Humerus	Suprascapular (C5-C6)	<ul style="list-style-type: none"> <li>Initiates abduction of the humerus <i>the “suitcase muscle”</i></li> </ul>
<b>Infraspinatus</b>	Infraspinatus Fossa of scapula		Axillary (C5)	<ul style="list-style-type: none"> <li>Lateral rotation of humerus</li> <li>Depresses humerus during abduction to prevent impingement (force couple)</li> </ul>
<b>Teres Minor</b>	Lateral border of scapula (upper 2/3 <sup>rd</sup> )			
<b>Subscapularis</b>	Subscapular Fossa ( <u>anterior</u> scapula)	Lesser Tubercle Of Humerus	Upper & Lower Subscapular (C5-C6)	<ul style="list-style-type: none"> <li>Medial Rotation of humerus</li> <li>Adduction of humerus</li> <li>Stabilizes humerus during abduction <i>pseudo-Frozen shoulder</i></li> </ul>

A pro baseball pitcher injures his rotator cuff muscles. As a result, he **SITS** out for the rest of the game and then gets sent down to the **MINOR** leagues.

## Upper Extremity: Muscles of the Brachium (Arm)

Muscle	Origin	Insertion	Nerve	Actions
<b>Biceps Brachii</b>	<u>SH</u> : Coracoid process <u>LH</u> : Supraglenoid tubercle of Scapula	Radius: bicipital tuberosity & Bicipital Aponeurosis (Ulna)	Musculocutaneous (C5-C6)	<ul style="list-style-type: none"> <li>Shoulder / humerus flexion (7%)</li> <li>Forearm flexion and supination <i>crosses 2 joints</i></li> </ul>
<b>Brachialis</b>	<b>Humerus</b> (anterior lower ½)	<b>Ulna</b> (coranoid process)	Musculocutaneous (C5-C6)	<ul style="list-style-type: none"> <li>Flexion of the elbow (forearm) <i>deep to Biceps brachii</i></li> </ul>
<b>Brachioradialis</b>	<b>Humerus</b> (just above lateral epicondyle)	<b>Radius</b> (styloid process)	Radial (C5-C6)	<ul style="list-style-type: none"> <li>Flexes the forearm (elbow)</li> <li>Supinates the forearm when pronated</li> <li>Pronates the forearm when supinated <i>the “handshake” muscle the beer drinkers muscle</i></li> <li><i>“so-so” attaches distal to distal</i></li> </ul>
<b>Triceps Brachii</b>	<u>LH</u> : Infraglenoid tubercle of Scapula <u>Lat</u> : Upr. ½ of post humerus <u>Med</u> : Lower ½ of post. Humerus	Olecranon Process of Ulna	Radial (C6-C7)	<ul style="list-style-type: none"> <li>Extension of elbow (forearm)</li> <li>aids extension of arm / humerus</li> <li>aids adduction of arm / humerus <i>crosses 2 joints tendon of long head passes betw. 2 teres muscles</i></li> </ul>
<b>Anconeus</b>	Lateral Epicondyle of <b>Humerus</b>		Radial (C7-C8)	<ul style="list-style-type: none"> <li>Extends the elbow (assists Triceps)</li> <li>Supports the elbow in full extension</li> </ul>
<b>Pronator Teres</b>	<u>Humeral head</u> : medial epicondyle & CFT <u>Ulnar head</u> : Coranoid process	middle <b>Radius</b> (lateral side)	Median (C8-T1)	<ul style="list-style-type: none"> <li>Pronates forearm (elbow) during rapid or forced pronation <i>involved in Pronator Teres Syndrome (median nerve entrapment)</i></li> <li>Assists forearm flexion</li> </ul>
<b>Pronator Quadratus</b>	Distal ¼ of anterior <b>Ulna</b>	Middle anterior <b>Radius</b>	Median (C8-T1)	<ul style="list-style-type: none"> <li>Pronates the forearm <i>the deepest forearm muscle</i></li> </ul>
<b>Supinator</b>	<b>Humerus</b> : Lateral epicondyle Annular ligament Crest of <b>Ulna</b>	<b>Radius</b> lateral proximal surface	Radial (C6)	<ul style="list-style-type: none"> <li>Supinates the forearm (at superior radioulnar joint)</li> </ul>

The 3 “B’s” and Pronator Teres bend (flex) the forearm and all have the root “brachi” in their name.

Note: forearm = elbow arm = humerus

## Upper Extremity: Flexors of the Wrist and Fingers

*All originate from the Medial Epicondyle of the Humerus*

Muscle	Origin	Insertion	Nerve	Actions
<b>Flexor Carpi Radialis</b>	<b>CFT @ Medial Epicondyle</b>	2 <sup>nd</sup> & 3 <sup>rd</sup> metacarpals	Median (C6-C7)	<ul style="list-style-type: none"> <li>• Wrist (and elbow) flexion</li> <li>• Wrist abduction (radial deviation)</li> </ul>
<b>Palmaris Longus</b>	<b>CFT @ Medial Epicondyle</b>	Flexor retinaculum & Palmar Aponeurosis		<ul style="list-style-type: none"> <li>• Assists wrist (and elbow) flexion</li> <li>• Tenses fascia of palm for gripping                             <ul style="list-style-type: none"> <li>- associated with <b>Palmar Fasciitis</b></li> <li>- sometimes used for tendon repair</li> </ul> </li> </ul>
<b>Flexor Carpi Ulnaris</b>	<b>CFT @ Medial Epicondyle &amp; Proximal Ulna</b>	Pisiform, Hamate & 5 <sup>th</sup> metacarpal	Ulnar (C8-T1)	<ul style="list-style-type: none"> <li>• Wrist (and elbow) flexion</li> <li>• Wrist adduction (ulnar deviation)</li> </ul> <p><i>May entrap the Ulnar nerve !</i></p>
<b>Flexor Digitorum Superficialis</b>	<b>Medial Epicondyle (CFT), Ulna - coronoid process Radius (ant shaft)</b>	4 medial fingers	Median (C7-T1)	<ul style="list-style-type: none"> <li>• Flexes middle phalanges of 4 fingers @ PIP joint (4 tendons divide into 2 slips each); Wrist flexion</li> </ul>

Muscles on the anterior forearm: **PASS/FAIL/PASS/FAIL** Pronator Teres, Flex. Carpi Radialis, Palmaris Longus, Flex. Carpi Ulnaris

## Upper Extremity: Extensors of the Wrist and Fingers

*All originate from the Lateral Epicondyle of the Humerus*

Muscle	Origin	Insertion	Nerve	Actions
<b>Extensor Carpi Radialis Longus</b>	<b>Humerus</b> (lateral supra-condylar ridge)	2 <sup>nd</sup> metacarpal (base)	Radial (C6-C7)	<ul style="list-style-type: none"> <li>• Extends the wrist</li> <li>• Abducts (radially deviates) wrist</li> <li>• Weak <u>flexion</u> of elbow</li> </ul>
<b>Extensor Carpi Radialis Brevis</b>	Lateral Epicondyle of <b>Humerus</b> via common extensor tendon ( <b>CET</b> )	3 <sup>rd</sup> metacarpal (base)		<ul style="list-style-type: none"> <li>• Wrist extension</li> <li>• Radial deviation of wrist</li> </ul> <p><i>Tennis Elbow</i></p>
<b>Extensor Digitorum</b>	Lateral Epicondyle via the <b>CET</b> & Upper aspect of Ext. Digitorum	4 fingers (middle & distal phalanx)	Radial (C6-C8)	<ul style="list-style-type: none"> <li>• Extends the 4 fingers</li> <li>• Extends the wrist (if fingers flexed)</li> <li>• Assists wrist flexion</li> </ul>
<b>Extensor Digiti Minimi</b>		Little finger (middle & distal phalanx)		<ul style="list-style-type: none"> <li>• Extends the little finger</li> </ul>
<b>Extensor Carpi Ulnaris</b>	1 <sup>st</sup> head: <b>Lateral Epicondyle</b> via the <b>CET</b> 2 <sup>nd</sup> head: Ulnar aspect of Ext. Digitorum	5 <sup>th</sup> metacarpal	Radial (C7-C8)	<ul style="list-style-type: none"> <li>• Extends the wrist</li> <li>• Ulnar deviation (adduction) of wrist</li> </ul>

*remember "carpi" means wrist*

## Upper Extremity: Muscles of the Forearm

Muscle	Origin	Insertion	Nerve	Actions
<b>Flexor Digitorum Profundus</b>	upper ¾ of <b>Ulna</b> , IO membrane	Medial 4 fingers (distal phalanx)	Ulnar & Median (C8-T1)	<ul style="list-style-type: none"> <li>Flexes distal IP joints of 4 fingers</li> <li>Flexes proximal &amp; middle IP joints</li> <li>Flexes wrist if fingers extended -- deep to flexor digitorum superficialis</li> </ul>
<b>Flexor Pollicis Longus</b>	Middle anterior <b>Radius</b> , IO membrane; <b>Ulna</b> 's coronoid process	Thumb (distal phalanx)	Median (C-T1)	<ul style="list-style-type: none"> <li>Flexes IP joint of thumb</li> <li>Flexes MCP and CMC of wrist</li> </ul>
<b>Extensor Pollicis Longus</b>	posterior (mid 1/3) <b>Ulna</b> & IO membrane	Thumb (distal phalanx)	Radial (C6-C7)	<ul style="list-style-type: none"> <li>Extension of thumb (IP joint)</li> </ul>
<b>Extensor Pollicis Brevis</b>	posterior <b>Radius</b> & IO membrane	Thumb (proximal phalanx)		<ul style="list-style-type: none"> <li>Extension of thumb (at MP joint)</li> <li>Wrist abduction (radial deviation)</li> </ul>
<b>Abductor Pollicis Longus</b>	Posterior <b>Radius</b> , <b>Ulna</b> & IO membrane	Base of 1 <sup>st</sup> metacarpal (thumb)		<ul style="list-style-type: none"> <li>Abduction and extends 1<sup>st</sup> CMC joint</li> <li>Wrist abduction (radial deviation)</li> </ul>
<b>Extensor Indicis</b>	Posterior <b>Ulna</b> & IO membrane	Index (2 <sup>nd</sup> ) finger	Radial (C6-C8)	<ul style="list-style-type: none"> <li>Extension of index finger (at MP joint)</li> </ul>

The anatomical snuffbox consists of the tendons of 3 muscles: **EPL EPB APL**

## Upper Extremity: Intrinsic Hand Muscles (Thenar Group) "OAF"

Muscle	Origin	Insertion	Nerve	Actions
<b>Abductor Pollicis Brevis</b>	Tubercles of trapezium & scaphoid; Flexor retinaculum	Thumb (lateral aspect)	Medial (C8-T1)	<ul style="list-style-type: none"> <li>Abducts thumb (at MCP joint)</li> <li>Assists thumb flexion (MCP joint)</li> </ul>
<b>Opponens Pollicis</b>	Tubercle of Trapezium Flexor retinaculum	Thumb (lateral aspect)		<ul style="list-style-type: none"> <li>Rotates the thumb into opposition</li> </ul>
<b>Flexor Pollicis Brevis</b>	Trapezium; Flexor retinaculum	Thumb (base of prox. Phalanx)	Medial & Ulnar (C8-T1)	<ul style="list-style-type: none"> <li>Flexes thumb (at MCP joint)</li> </ul>
<b>Adductor Pollicis</b>	Trans: 3 <sup>rd</sup> metacarpal Obliq: Base of 2 <sup>nd</sup> + 3 <sup>rd</sup> Metacarpal; Trapezoid; Capitate	Thumb (medial aspect of base of prox. Phalanx)	Ulnar (C8-T1)	<ul style="list-style-type: none"> <li>Adducts Thumb</li> <li>Assists thumb flexion (MCP joint)</li> </ul>

## Upper Extremity: Intrinsic Hand Muscles (Hypothenar Group) "OAF"

Muscle	Origin	Insertion	Nerve	Actions
<b>Palmaris Brevis</b>	Palmar Aponeurosis & Flexor Retinaculum	Skin of palm's ulnar border; Pisiform	Ulnar (C8-T1)	<ul style="list-style-type: none"> <li>Aids in grip (tenses the palmar skin)</li> </ul>
<b>Abductor Digiti Minimi</b>	<b>Pisiform</b> & tendon of Flexor Carpi Ulnaris	<b>5<sup>th</sup> finger</b> (medial base of proximal Phalanx)		<ul style="list-style-type: none"> <li>Abducts the little finger</li> </ul>
<b>Flexor Digiti Minimi</b>	Flexor Retinaculum & Hook of the <b>Hamate</b>	Base of prox. Phalanx of <b>5<sup>th</sup> finger</b>		<ul style="list-style-type: none"> <li>Flexes the 5<sup>th</sup> finger (at the MCP joint)</li> </ul>
<b>Opponens Digiti Minimi</b>	Flexor Retinaculum & Hook of the <b>Hamate</b>	Proximal phalanx of <b>5<sup>th</sup> finger</b>		<ul style="list-style-type: none"> <li>Opposition of the 5<sup>th</sup> finger (at the CM joint)</li> </ul>

## Upper Extremity: Intrinsic Hand Muscles (Midpalmar Group)

Muscle	Origin	Insertion	Nerve	Actions
<b>Lumbricals</b>	Tendons of Flex. Dig. Profundis: #1&2 have a single head of origin (radial side of tendon), #3&4 have two heads of origin (from adjacent tendon)	Extensor hood of fingers 2-5	Median & Ulnar (C6-C8)	<ul style="list-style-type: none"> <li>• Extends the fingers at the IP joints</li> <li>• weakly flexes the fingers (at MCP joints)</li> </ul> (assists Extensor Digitorum in finger extension w/o hyperextension at MCP joints)
<b>Palmar Interossei</b>	From the side of the metacarpal that faces the midline (to abduct them)	Base of proximal phalanx of the digit of origin (same side toward midline)	Ulnar (C8-T1)	<ul style="list-style-type: none"> <li>• <u>A</u>dducts the fingers (hint: PAD)</li> <li>• Flexes the fingers at the MCP while the IP joints are extended</li> </ul>
<b>Dorsal Interossei</b>	Between each metacarpal	Directly distal to the origin on the base of the proximal phalanx closest to the midline (to abduct them)		<ul style="list-style-type: none"> <li>• <u>A</u>dducts the fingers (hint: DAB)</li> <li>• Flexes the fingers at the MCP while the IP joints are extended</li> </ul>

“Pad Dab” = actions of the palmar and dorsal interossei [palmar **adduct**; dorsal **abduct**]

### Useful Web Sites:

<http://www.ptcentral.com/muscles/>

### Abbreviations Used:

LH	Long head	SH	short head
IT	intertubercular	I-T	iliotibial
EOP	external occipital protuberance	IO	interosseous
SPs	spinous processes	TPs	transverse processes
MP	metacarpophalangeal	IP	interphalangeal
DIP =	distal interphalangeal joint	PIP	proximal interphalangeal joint
CM =	carpometacarpal	T-L fascia =	thoracolumbar fascia
L1-L5	Lumbar vertebrae 1 through 5	C1-C4	cervical vertebrae 1 through 4

### Notes:

Medial rotation = internal rotation  
 Lateral rotation = external rotation  
 Carpi = wrist pollicis = thumb  
 Digitorum = 4 digits/fingers/toes  
 CMC = carpometacarpal joint  
 CFT = common flexor tendon  
 CET = common extensor tendon