

VISIBLE BODY®

The Muscular System: Shoulder and Arm

A muscular system lab activity using Visible Body Suite

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## PRE-LAB EXERCISES

Before coming to lab, get familiar with a few muscle groups we'll be exploring during lab. Open Visible Body Suite. Search for and select the Muscular System View "Shoulder" and find the following muscles. When you select a muscle, you can use the book icon in the content box to read the muscle's definition.

- 1. Pectoralis major
- 2. Latissimus dorsi

Define the following terms:

1. Extension

- 2. Flexion
- 3. Abduction
- 4. Adduction
- 5. Rotation

## **IN-LAB EXERCISES**

Use the following modules to guide your exploration of the shoulder and arm regions of the muscular system. As you explore the modules, locate the muscles on any charts, models, or specimen available. These muscles are located in and act on the shoulder and arm regions. Because the glenoid cavity of the scapula is shallow and does not snugly fit the head of the humerus, the tendons of multiple muscles are involved in securing and stabilizing the humerus at the shoulder to prevent dislocation. Other muscles will cross the shoulder (glenohumeral) joint and insert on the arm, causing the arm to move when they contract.

Movement of the brachium, or upper arm, depends on the fixators of the shoulder to keep the scapula in place so the arm can move freely. Once we move down into the antebrachium (forearm) and hand, the muscles begin to get smaller and more numerous, which grants us our fine motor skills when we write or play the piano. Pay attention to whether the muscle is on the anterior or posterior side of the arm—muscles on the anterior side will flex, while muscles on the posterior side will extend. The long names of some of these muscles can be daunting, but they are often very descriptive. You can find origins, insertions, actions, and/or locations of these muscles simply in the names.

When reviewing the action of a muscle, it will be helpful to think about where the muscle is located and where the insertion is. Muscle physiology requires that a muscle will "pull" instead of "push" during contraction, and the insertion is the part that will move. Imagine that the muscle is "pulling" on the bone or tissue it is attached to at the insertion.

Access 3D views and animated muscle actions in Visible Body Suite, which will be especially helpful to visualize muscle actions. When you select a structure in Visible Body Suite, you'll see options to read the definition and hear the pronunciation in the content box. This will give you the option to view origins and insertions as visible pins on the muscle (select Attachments), view the blood supply, and/or the nerve supply.

In each module below, identify the following:

- Muscle location
- Origin(s) and insertion(s)
- Muscle action
- Nerve supply

## A. Muscles of the Shoulder

Muscles of the Shoulder

#### Search for and select each of the following Muscle Actions:

Shoulder flexion	Shoulder lateral rotation
Shoulder extension	Scapula elevation
Shoulder horizontal abduction	Scapula depression
Shoulder horizontal adduction	Scapula abduction
Shoulder abduction	Scapula adduction
Shoulder adduction	Scapula upward rotation
Shoulder medial rotation	Scapula downward rotation

Try performing these actions yourself and feel which muscles contract.

These muscles primarily act to stabilize the scapula and move the arm. Since the scapula is a moveable bone, it must be stabilized in order for the arm to be able to move.

Some of these muscles are prime movers of the arm. They all cross the shoulder joint to insert on the humerus. Remember that muscles pull, and imagine how the muscle will pull on the humerus as it contracts.

Muscular System View "Shoulder"



# Muscular System View "Shoulder"



Shoulder				
Muscle	Origin	Insertion	Action	Innervation
Pectoralis major				
Pectoralis minor				
Deltoid				
Latissimus dorsi				
Infraspinatus				
Supraspinatus				
Subscapularis				
Coracobrachialis				

Shoulder (continued)					
Muscle	Origin	Insertion	Action	Innervation	
Teres major					
Teres minor					

## **B. Muscles of the Torso that Act on the Scapulae**

#### Open the Muscular System View "Muscular System View."

- Rotate the model so you see the posterior side.
- Select the left side of the trapezius and hide it.
- Observe the following deep muscles that act on the scapulae.

## Muscular System View "Muscular System View"



Torso Muscles that Act on the Scapulae					
Muscle	Origin	Insertion	Action	Innervation	
Rhomboideus major					
Rhomboideus minor					
Levator scapulae					

## C. Muscles of the Elbow

#### Open the Muscular System View "Elbow."

These muscles are all located on the anterior side of the humerus and cross the elbow to insert on the radius or ulna. When these muscles contract, the arm will flex at the elbow. Biceps brachii is named for its "two heads;" note the two different origins of this muscle.



Forearm: Elbow Flexors					
Muscle	Origin	Insertion	Action	Innervation	
Biceps brachii (long and short heads)					
Brachialis					
Brachioradialis					

These muscles are located on the posterior side of the forearm, and will cross the elbow joint to cause extension of the arm at the elbow when they contract. Note the three different origins of the three heads of the triceps brachii.

#### Search for and open the Muscle Action "Elbow extension."

#### Muscle Action "Elbow Extension"



Forearm: Elbow Extensors				
Muscle	Origin	Insertion	Action	Innervation
Triceps brachii (medial head)				
Anconeus				

These muscles either pronate the forearm (turn the palm down), or supinate it (turn the palm up).

Search for and open the Muscle Actions "Forearm pronation" and "Forearm supination."

## **Muscle Action: Forearm Pronation**



## Muscle Action "Forearm Supination"



Forearm: Pronation and Supination					
Muscle	Origin	Insertion	Action	Innervation	
Pronator teres					
Pronator quadratus					
Supinator					

These muscles make up the anterior compartment of the forearm, and cross the wrist to insert on the hand. They all function to flex the wrist and/or the fingers when they contract. These muscles have long names, but the names are very descriptive of where the muscle is located and its action.

Search for and open each of the following Muscle Actions:

Wrist flexion Wrist abduction Wrist adduction

Muscle Action "Wrist Flexion"



## Muscle Action "Wrist Abduction"



## Muscle Action "Wrist Adduction"



Hand: Superficial Flexors				
Muscle	Origin	Insertion	Action	Innervation
Flexor carpi radialis				
Palmaris longus				
Flexor carpi ulnaris				
Flexor digitorum superficialis				

These muscles also flex the hand, and are located deep to the hand flexors above.

Hand: Deep Flexors				
Muscle	Origin	Insertion	Action	Innervation
Flexor pollicis longus				
Flexor digitorum profundus				

These muscles are located on the posterior side of the forearm and cross the wrist to insert on the hand. When these muscles contract, the wrist and/or fingers will extend.

## Search for and open each of the following Muscle Actions:

Wrist extension Wrist abduction Wrist adduction

Muscle Action "Wrist Extension"



Hand: Superficial Extensors				
Muscle	Origin	Insertion	Action	Innervation
Extensor carpi radialis longus				
Extensor carpi radialis brevis				
Extensor digitorum				
Extensor digiti minimi				
Extensor carpi ulnaris				

#### D. Muscles of the Wrist and Hand

#### Open the Muscular System View "Wrist and Hand."

#### Search for and select the Muscle Action "Thumb extension."

These muscles are also located on the posterior compartment of the forearm, but are located deep to the muscles in the previous section. They will also cross the wrist to insert on the hand, functioning to move the first or second digit when contracted. It will be helpful to remember that "pollicis" is referring to the thumb and "indicis" to the index finger.

#### **Muscle Action "Thumb Extension"**



Hand: Deep Extensors				
Muscle	Origin	Insertion	Action	Innervation
Abductor pollicis longus				
Extensor pollicis longus				
Extensor pollicis brevis				
Extensor indicis				

These muscles move the first digit – the thumb. Earlier sections have included muscles that move the thumb, but are primarily located in the forearm. Thenar muscles are entirely located within the hand and form the thenar eminence – the fleshy protrusion in the hand at the base of the thumb.

#### Search for and open the Muscle Actions "Thumb flexion" and "Hand digits opposition."

#### Muscle Action "Thumb Flexion"



# Muscle Action "Hand Digits Opposition"



Finger: Thenar				
Muscle	Origin	Insertion	Action	Innervation
Abductor pollicis brevis				
Opponens pollicis				
Flexor pollicis brevis				
Adductor pollicis				

These muscles all function to move digit 5, the little finger. These muscles are also entirely located within the hand.

Finger: Hypothenar						
Muscle	Origin	Insertion	Action	Innervation		
Abductor digiti minimi						
Flexor digiti minimi brevis						
Opponens digiti minimi						

These muscles are located within the hand and are responsible for the fine movements of the fingers. The muscles listed in the chart below are actually groups of muscles. The number of muscles normally found in each group is in parentheses after the name.

#### Search for and open the Muscle Actions "Hand digits 2-5 flexion" and "Hand digits 2-5 extension."

## Muscle Action "Hand Digits 2-5 Flexion"



# Muscle Action "Hand Digits 2-5 Extension"



Fingers: Midpalmar						
Muscle	Origin	Insertion	Action	Innervation		
Lumbricals (4)						
Palmar interossei (3)						
Dorsal interossei (4)						

### **PUTTING IT ALL TOGETHER**

1. Based on what you've learned about the muscles in this exercise, what do you think the following terms mean?

a. Major

b. Minor

c. Extensor

d. Flexor

e. Longus

f. Brevis

g. Spinatus

h. Pollicis

i. Carpi

- 2. Which muscles are part of the rotator cuff that serves to stabilize the shoulder joint?
- 3. Which muscles are used when performing the following actions?
  - a. Raising your hand high over your head during class
  - b. Rowing a boat
  - c. Reaching behind you, arm extended and pronated
  - d. Reaching in front of you, arm extended and supinated
  - e. Bringing your hand to your heart
  - f. Holding a pencil

4. Carpal tunnel syndrome can result from repetitive motions in the fingers causing inflammation in the carpal tunnel – a space covered by the flexor retinaculum where tendons and nerves pass through the wrist. In this syndrome, the median nerve is compressed, which can lead to tingling, numbness, and muscle weakness. Which muscles are most likely to be affected by carpal tunnel syndrome?



# **Student Practice**

Label the muscles in the following figures

Muscular System View "Shoulder"



# Muscular System View "Shoulder"



# Muscular System View "Muscular System View"



## Muscular System View "Elbow"



# Muscle Action "Elbow Extension"



Muscle Action "Forearm Pronation"



Muscle Action "Forearm Supination"



Muscle Action "Wrist Flexion"



## Muscle Action "Wrist Abduction"



Muscle Action "Wrist Adduction"



# Muscle Action "Wrist Extension"



## Muscle Action "Thumb Extension"



# Muscle Action "Thumb Flexion"



# Muscle Action "Hand Digits Opposition"



# Muscle Action "Hand Digits 2-5 Flexion"



# Muscle Action "Hand Digits 2-5 Extension"

