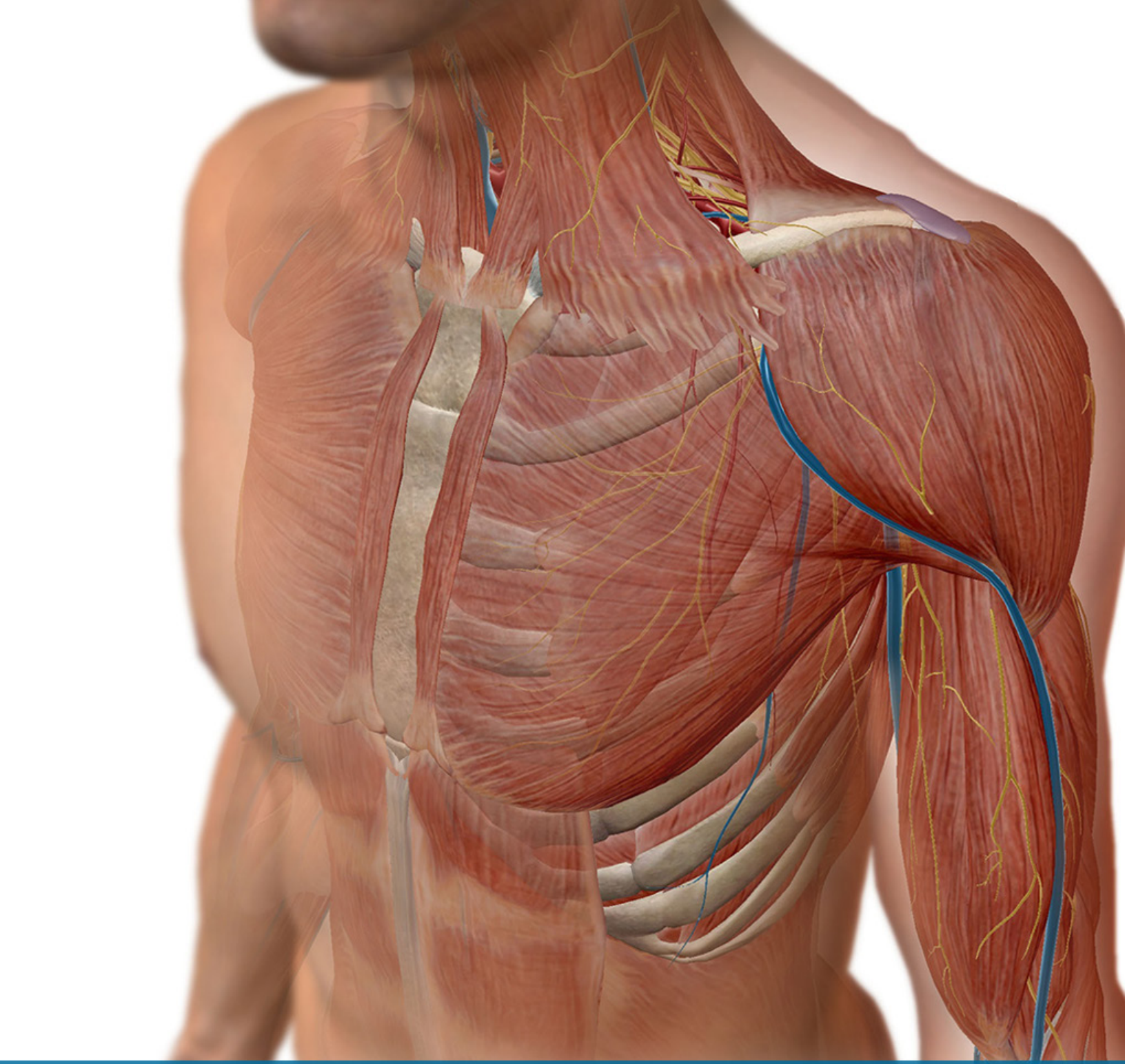

The Muscular System: Shoulder and Arm

A muscular system lab activity using Visible Body's Human Anatomy Atlas

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PRE-LAB EXERCISES

Before coming to lab, get familiar with a few muscle groups we'll be exploring during lab. Using Visible Body's Human Anatomy Atlas, go to the Views section. Under Systems, scroll down to the Muscular System views. Select View 11. Shoulder, and find the following muscles. When you select a muscle, note the book icon in the content box. Selecting this icon allows you 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’s Human Anatomy Atlas, which will be especially helpful to visualize muscle actions. When you select a structure in the Atlas app, you’ll see options to read the definition and hear the pronunciation in the content box. When you select a muscle, be sure to select the blue pin icon 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

View the following Muscle Actions:

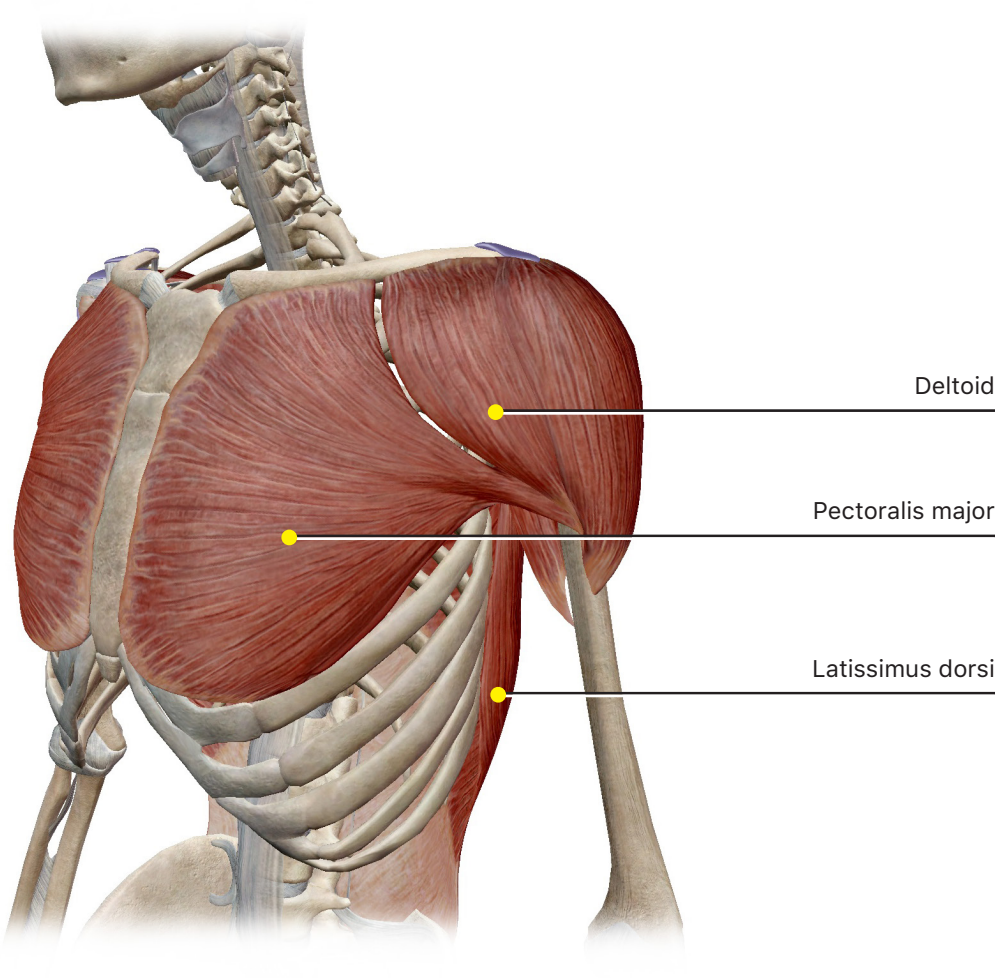
Shoulder flexion	Shoulder lateral rotation
Shoulder extension	Scapula elevation
Shoulder horizontal abduction	Scapula depression
Shoulder horizontal adduction	Scapula abduction
Shoulder abduction	Scapula adduction
Shoulder adduction	Scapula upward rotation
Shoulder medial rotation	Scapula downward rotation

Try performing these actions yourself and feel which muscles contract.

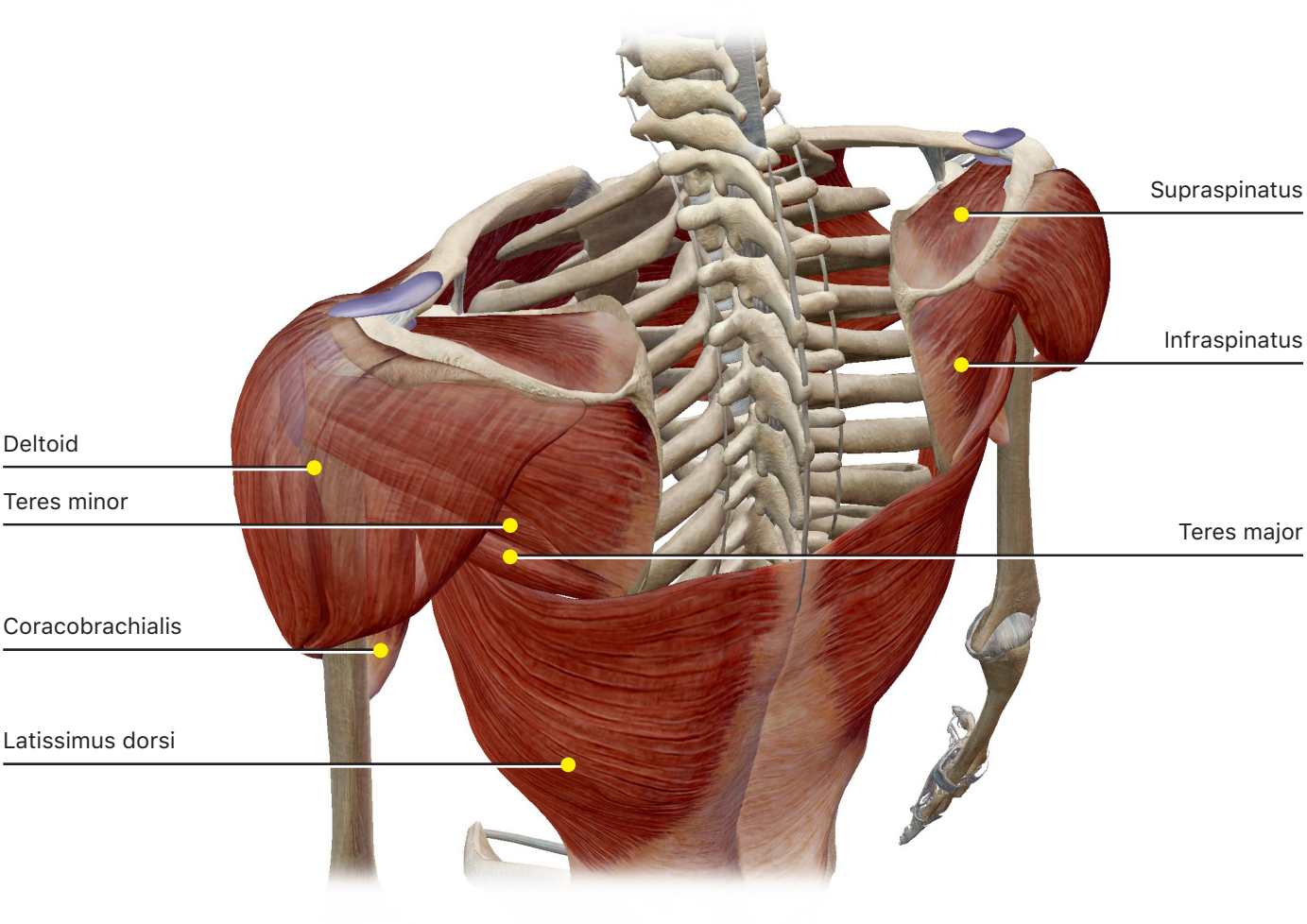
These muscles primarily act to stabilize the scapula and move the arm. Since the scapula is a moveable bone, it must be stabilized in order for the arm to be able to move.

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.

View 11. Shoulder



View 11. Shoulder



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

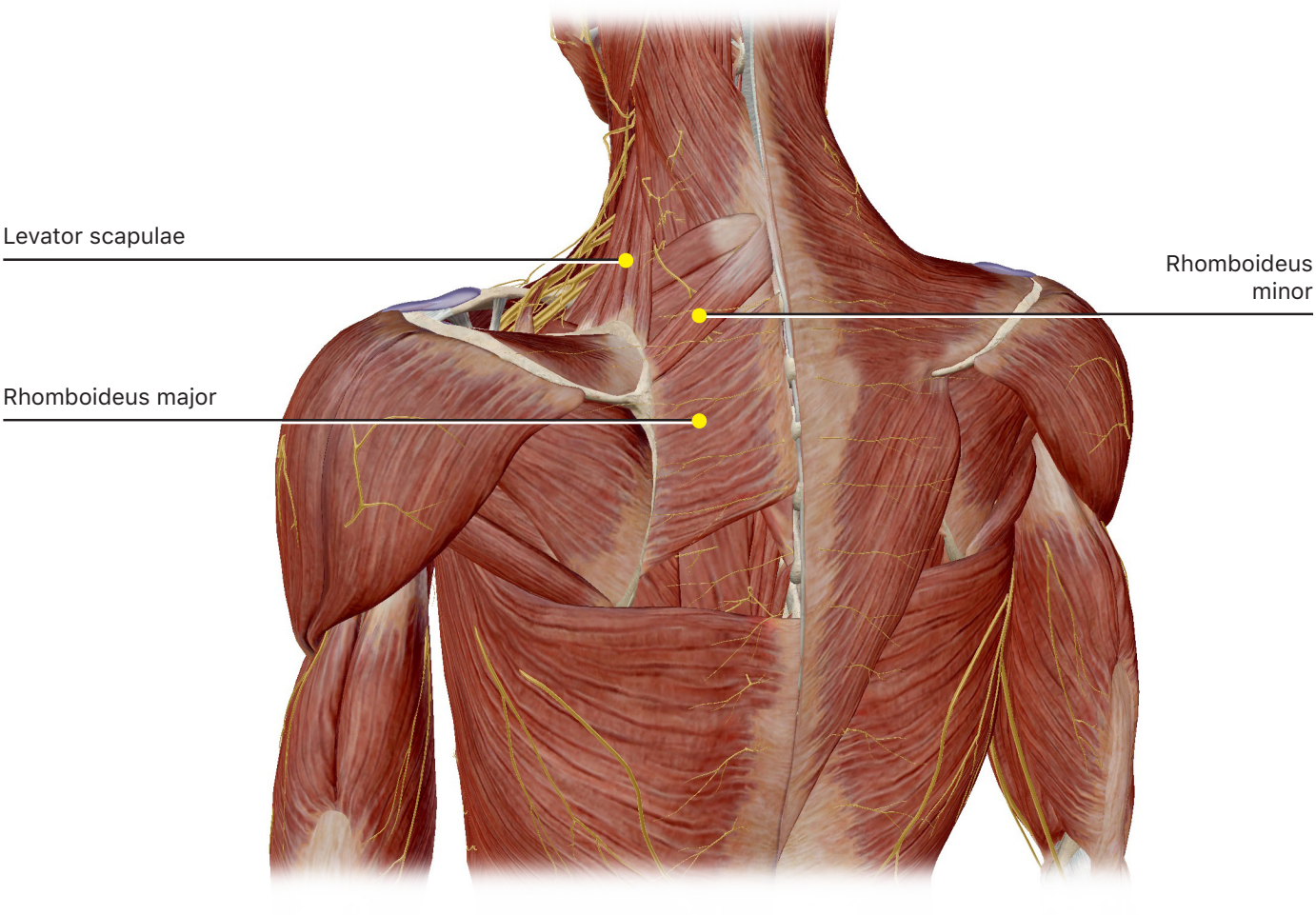
Shoulder (continued)				
Muscle	**Origin**	**Insertion**	**Action**	**Innervation**
Teres major				
Teres minor				

B. Muscles of the Torso that Act on the Scapulae

Under the Views section, go to Systems: Muscular System Views and select 20. 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.

View 20. Muscular System View



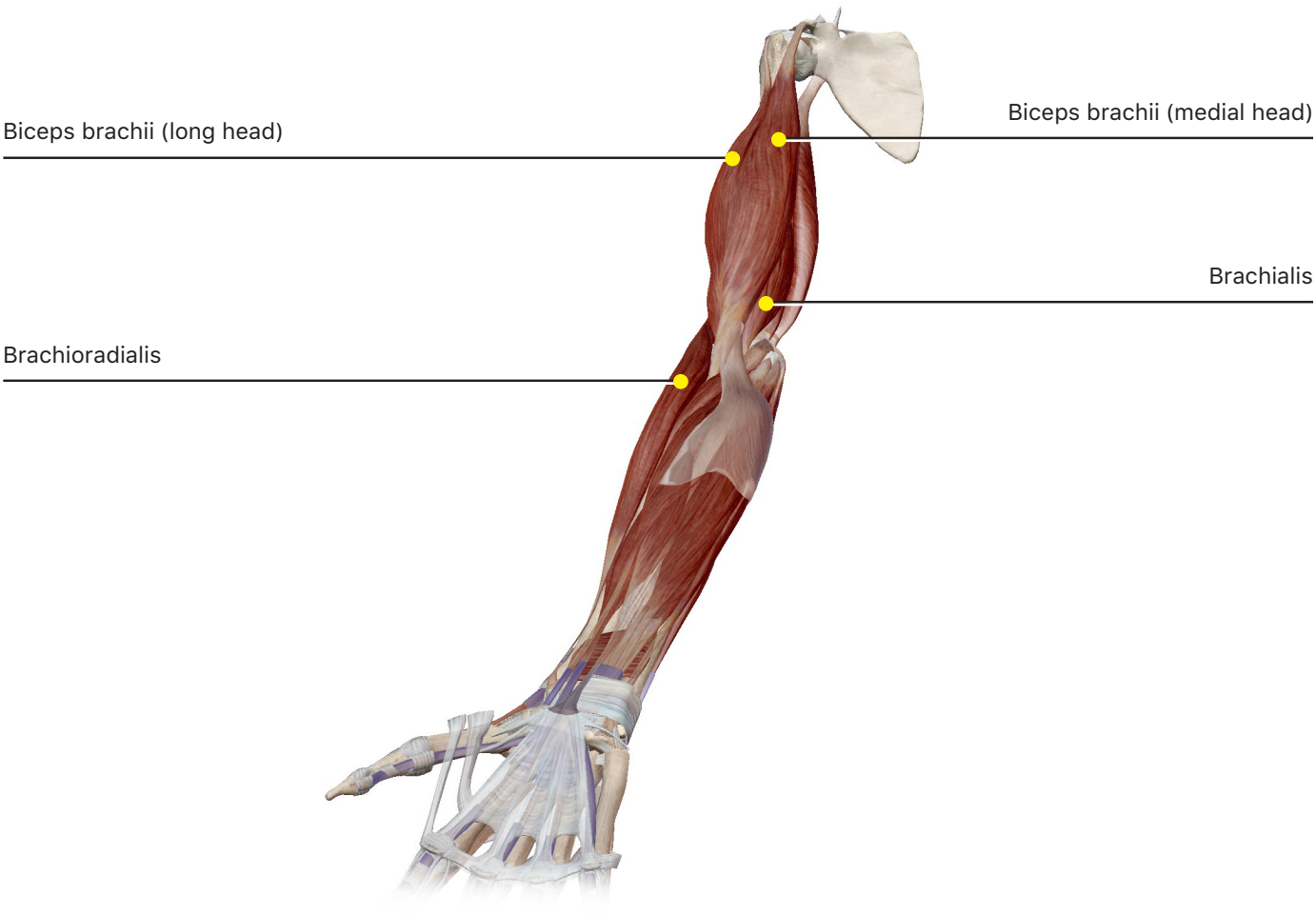
Torso Muscles that Act on the Scapulae				
Muscle	**Origin**	**Insertion**	**Action**	**Innervation**
Rhomboideus major				
Rhomboideus minor				
Levator scapulae				

C. Muscles of the Elbow

Under the Views section, go to Systems: Muscular System Views and select 12. 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.

View 12. Elbow

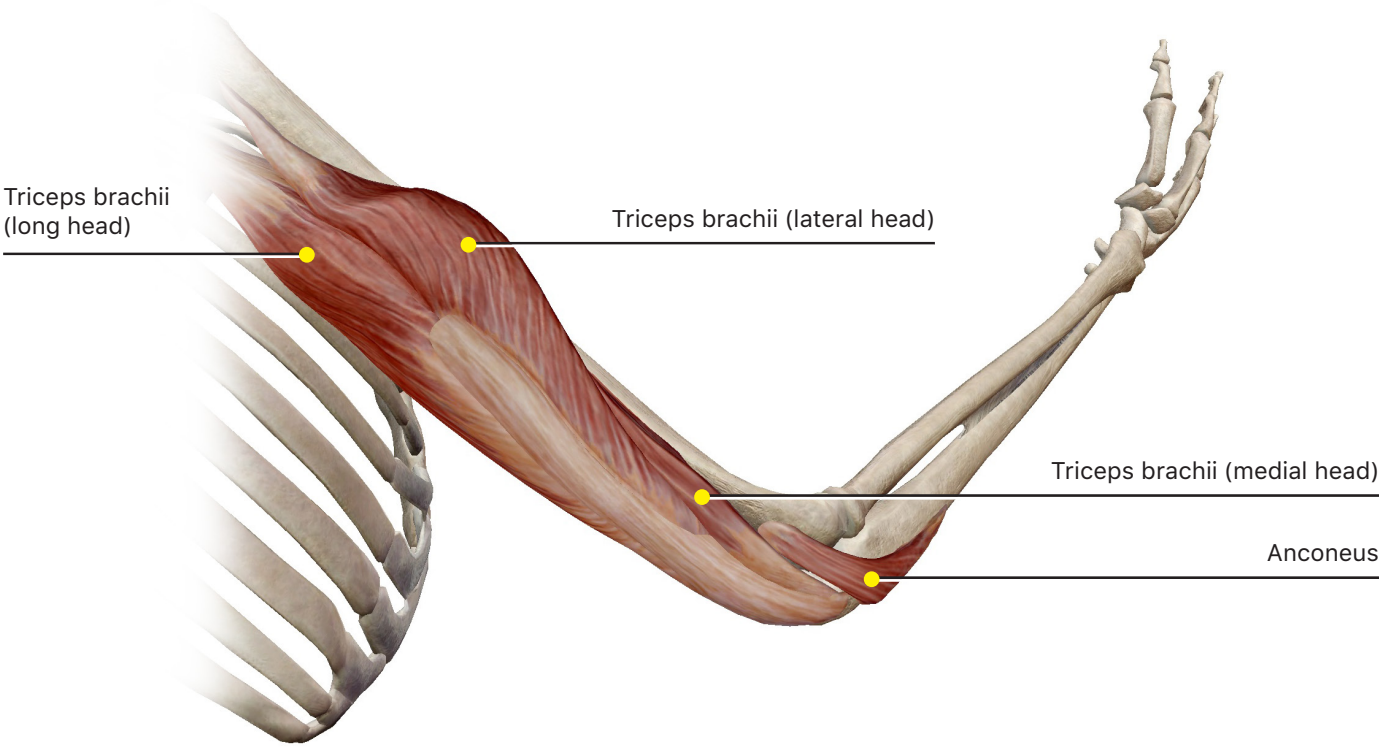


Forearm: Elbow Flexors				
Muscle	**Origin**	**Insertion**	**Action**	**Innervation**
Biceps brachii (long and short heads)				
Brachialis				
Brachioradialis				

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.

View Muscle Action: Elbow extension

Muscle Action: Elbow Extension

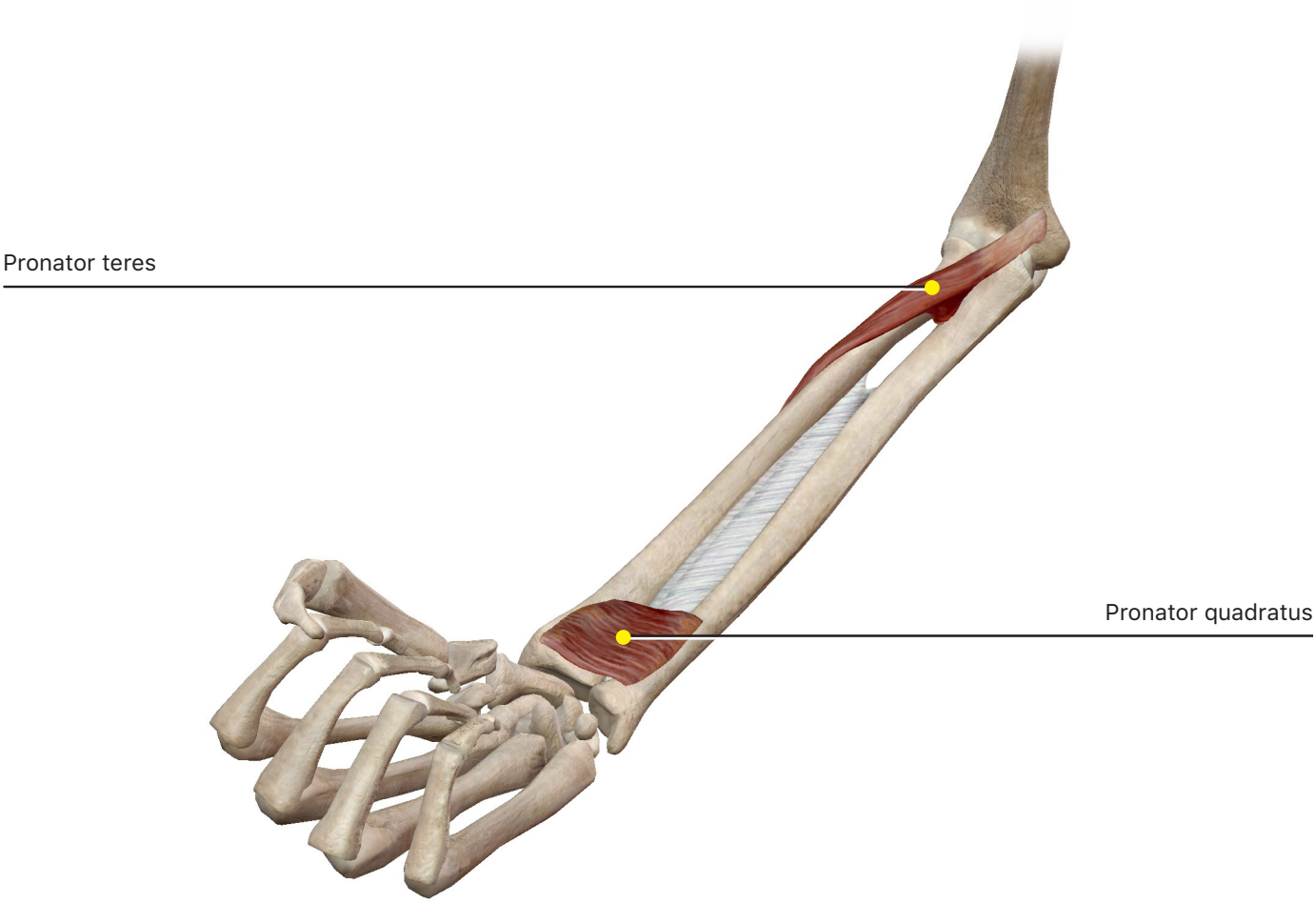


Forearm: Elbow Extensors				
Muscle	**Origin**	**Insertion**	**Action**	**Innervation**
Triceps brachii (medial head)				
Anconeus				

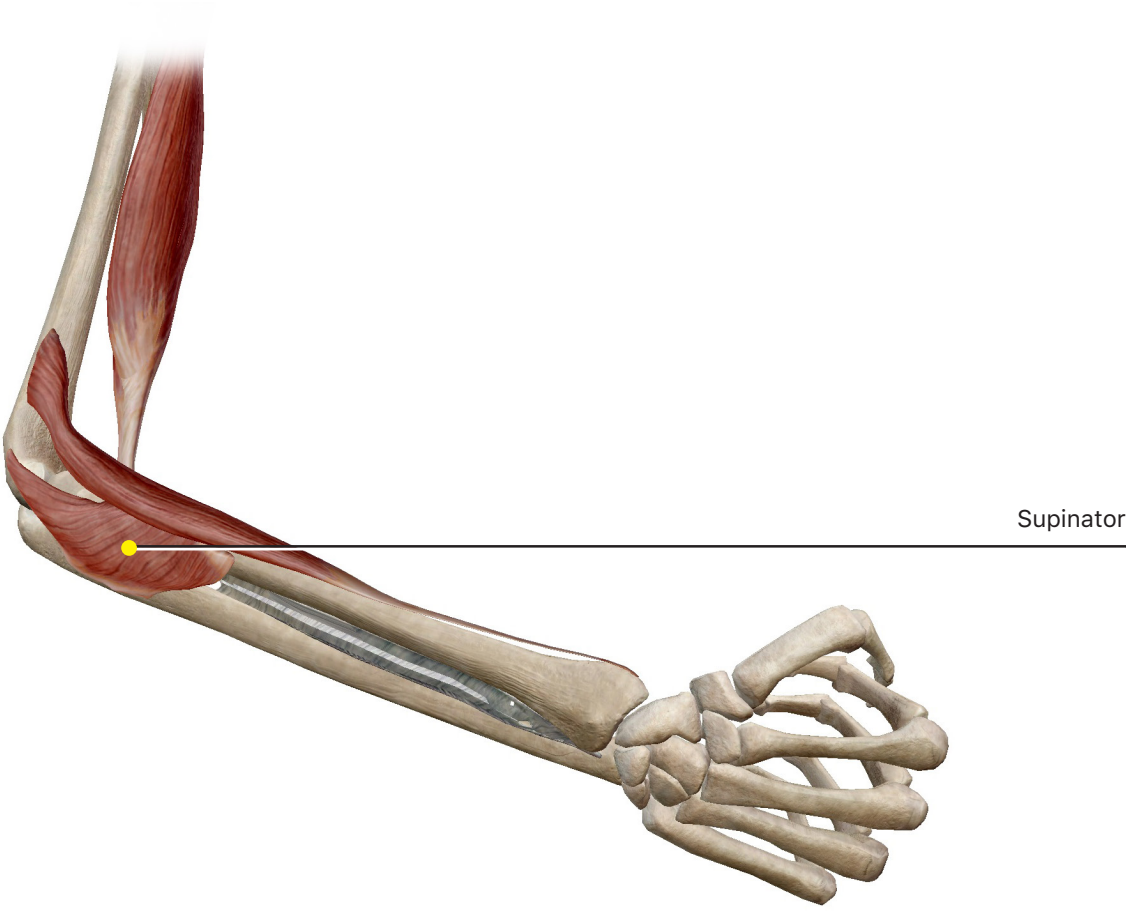
These muscles either pronate the forearm (turn the palm down), or supinate it (turn the palm up).

View Muscle Actions: Forearm pronation and Forearm supination

Muscle Action: Forearm Pronation



Muscle Action: 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.

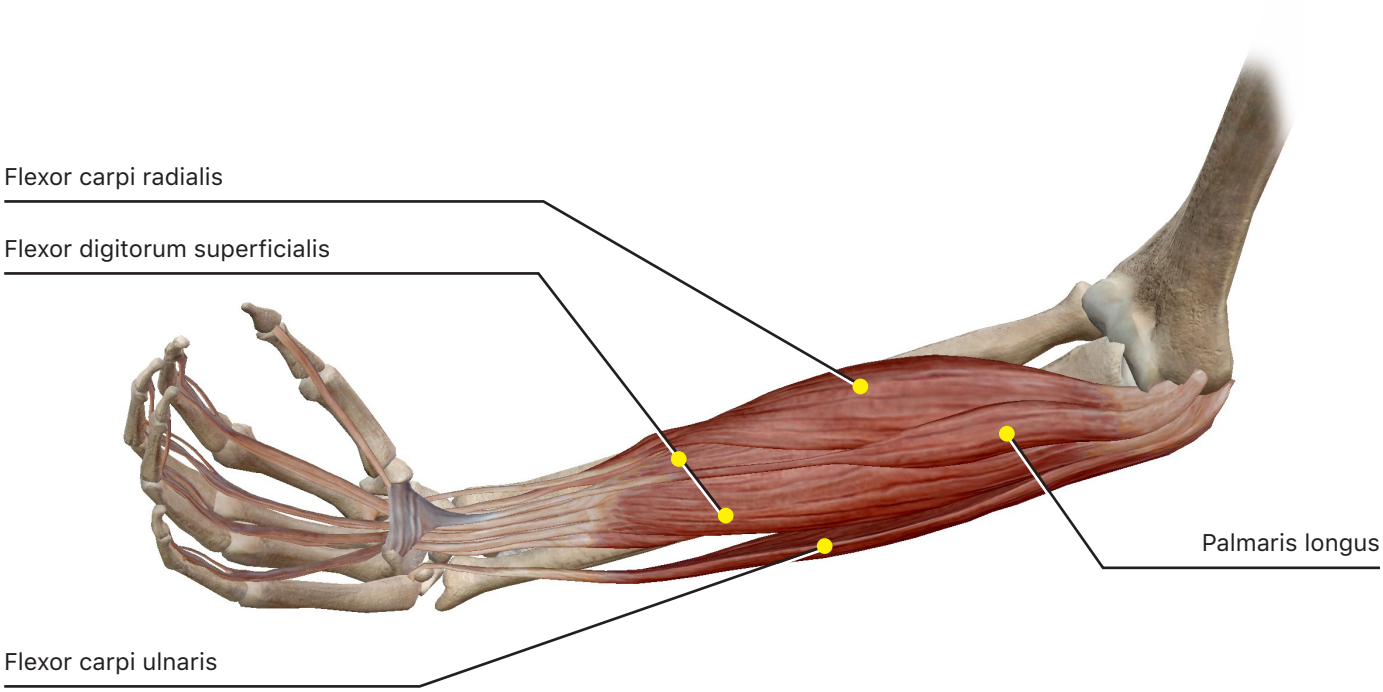
View Muscle Actions:

Wrist flexion

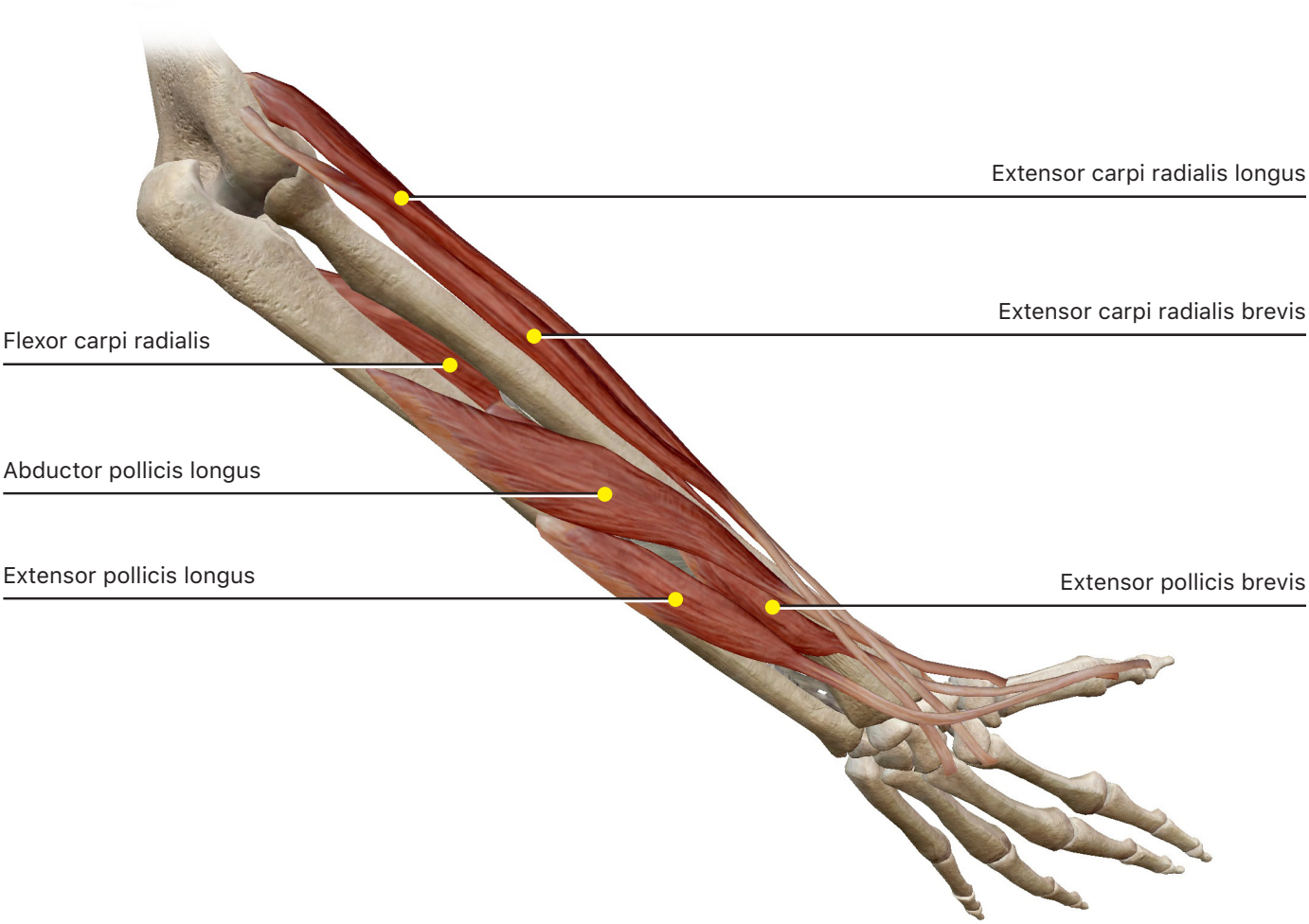
Wrist abduction

Wrist adduction

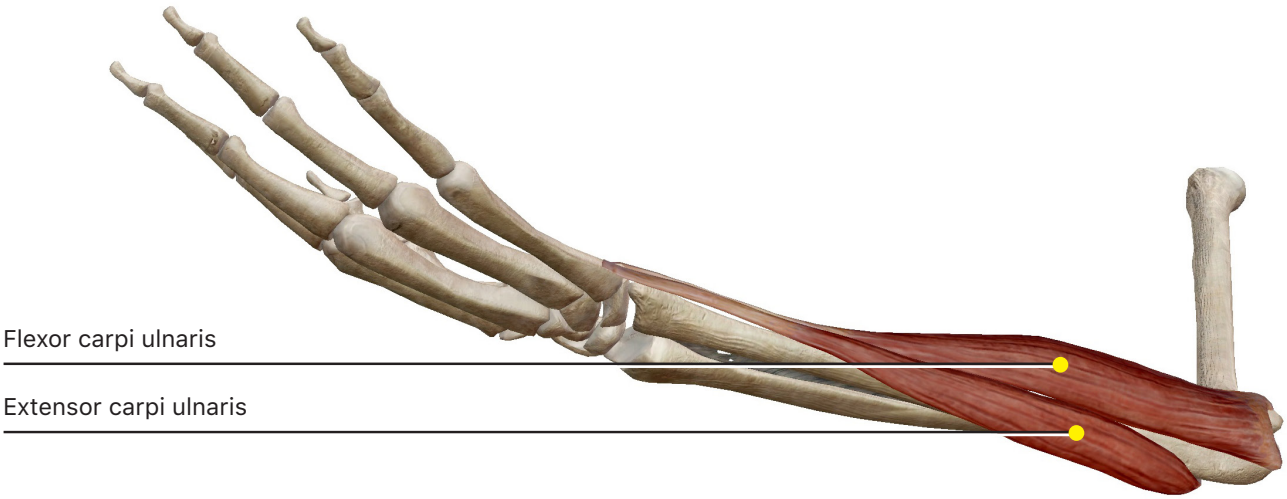
Muscle Action: Wrist Flexion



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.

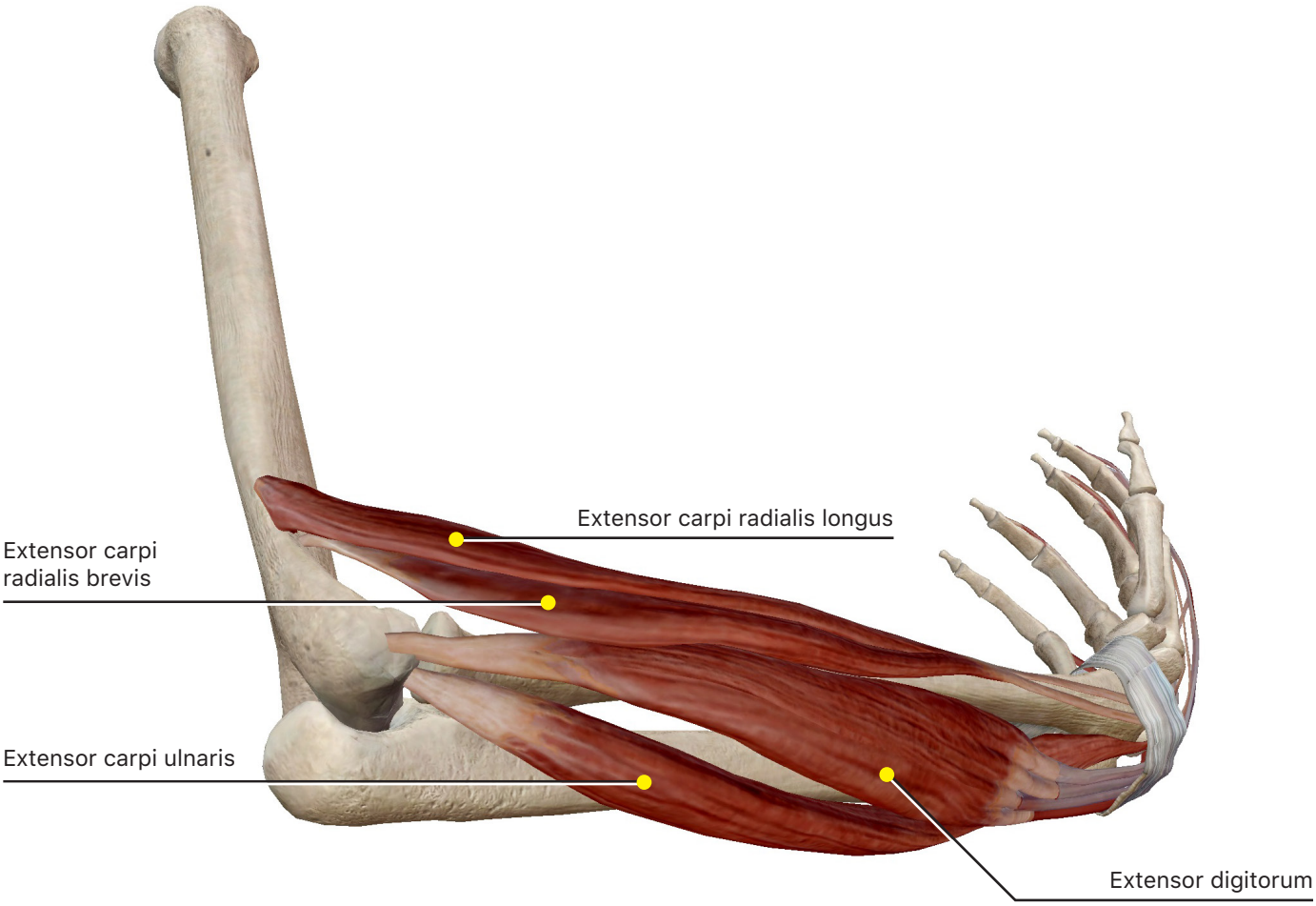
View Muscle Actions:

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				

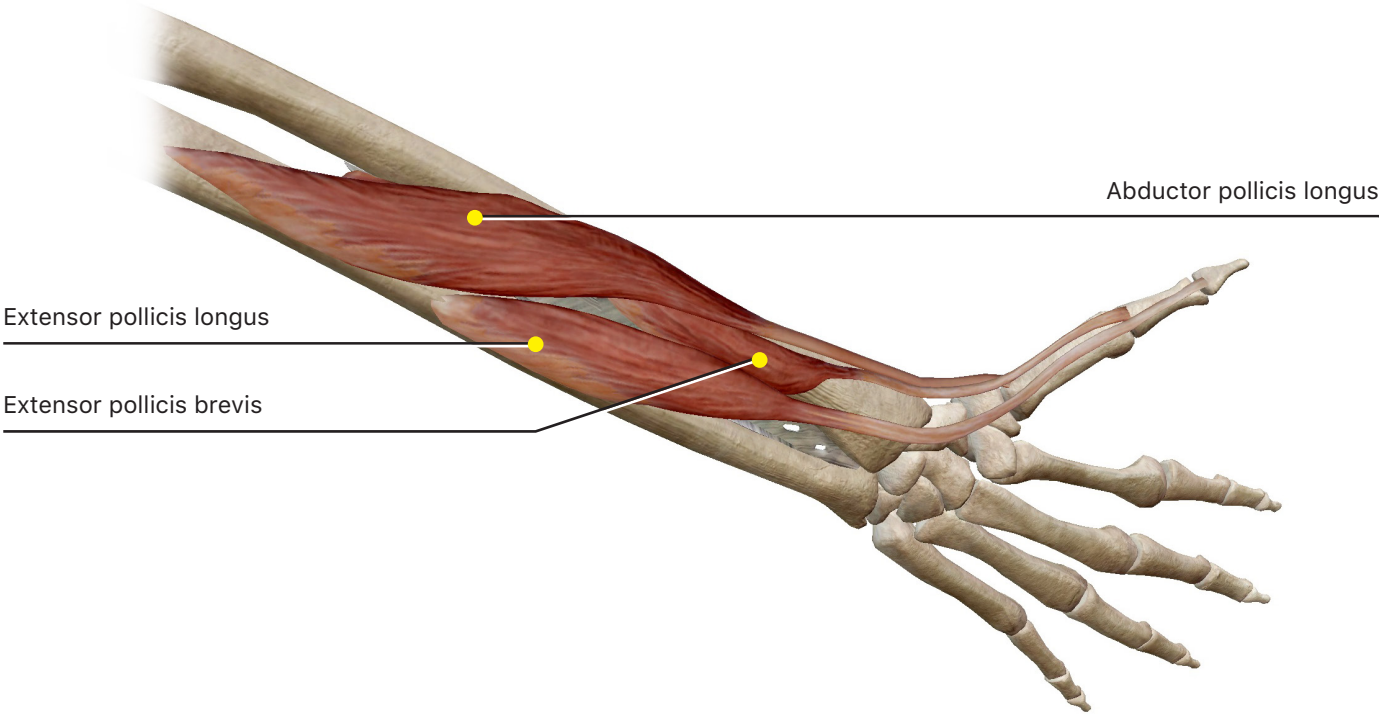
D. Muscles of the Wrist and Hand

Under the Views section, go to Systems: Muscular System Views and select 13. Wrist and Hand.

View Muscle Actions: 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

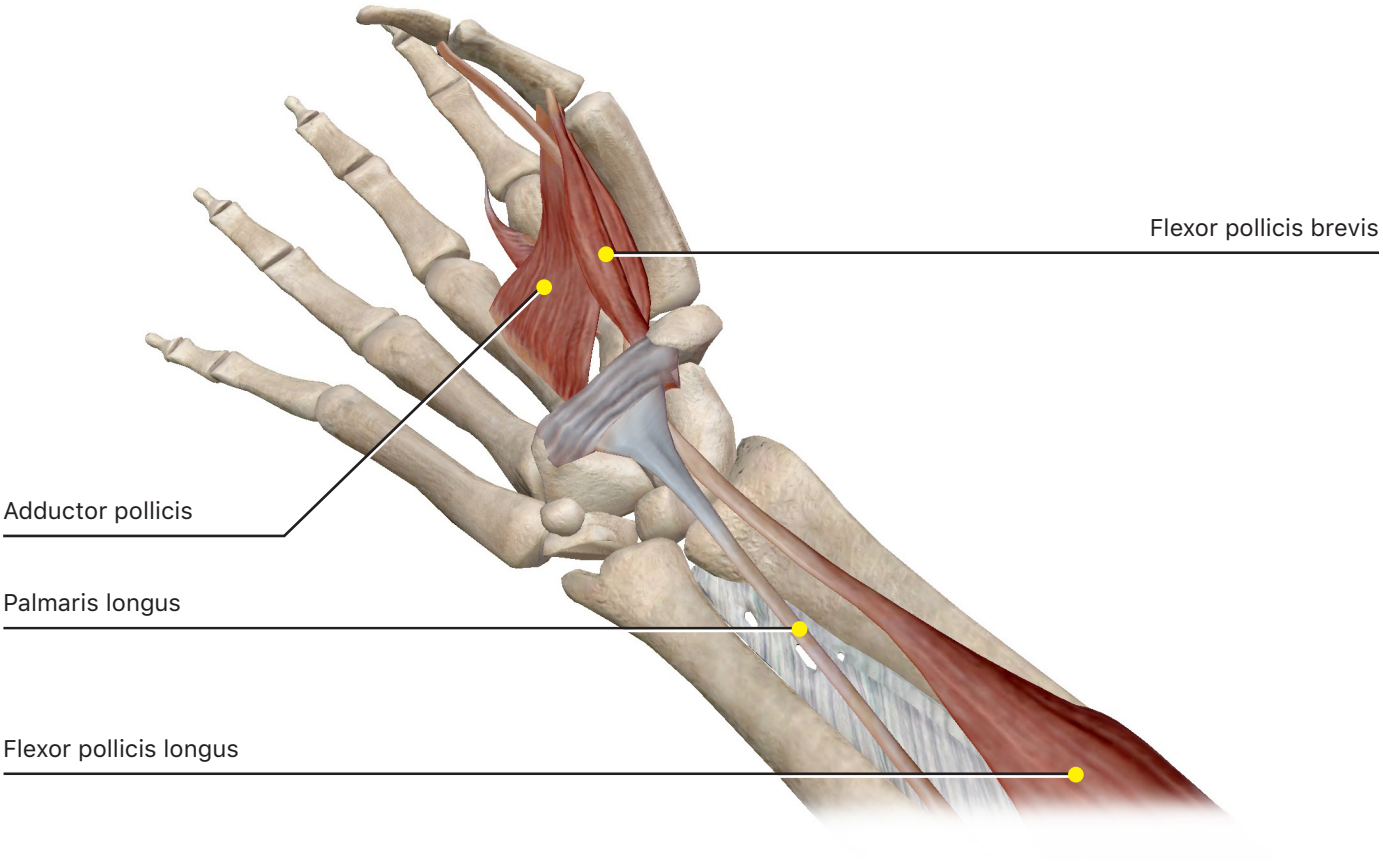


Hand: Deep Extensors				
Muscle	**Origin**	**Insertion**	**Action**	**Innervation**
Abductor pollicis longus				
Extensor pollicis longus				
Extensor pollicis brevis				
Extensor indicis				

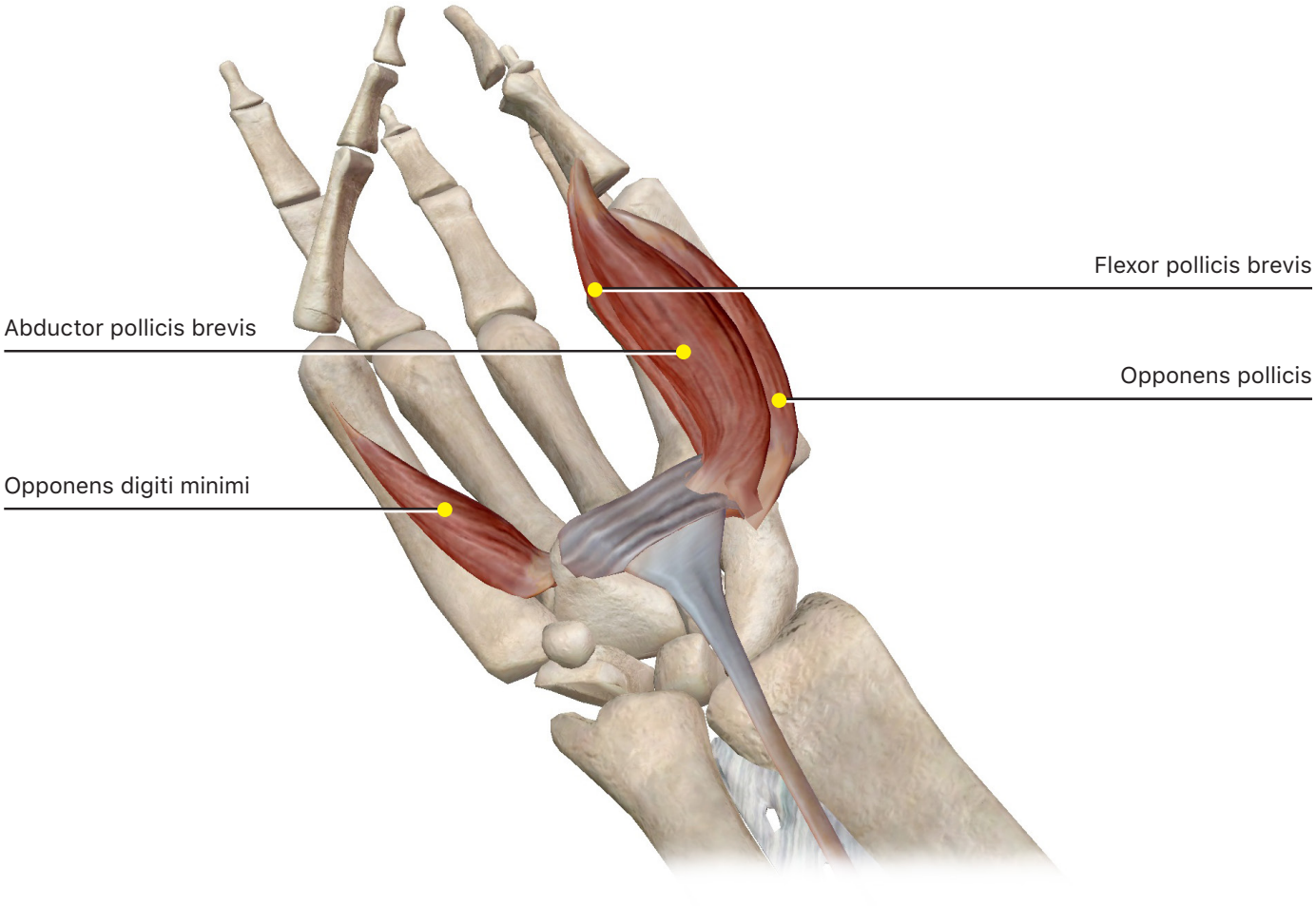
These muscles move the first digit – the thumb. Earlier sections have included muscles that move the thumb, but are primarily located in the forearm. Thenar muscles are entirely located within the hand and form the thenar eminence – the fleshy protrusion in the hand at the base of the thumb.

View 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				

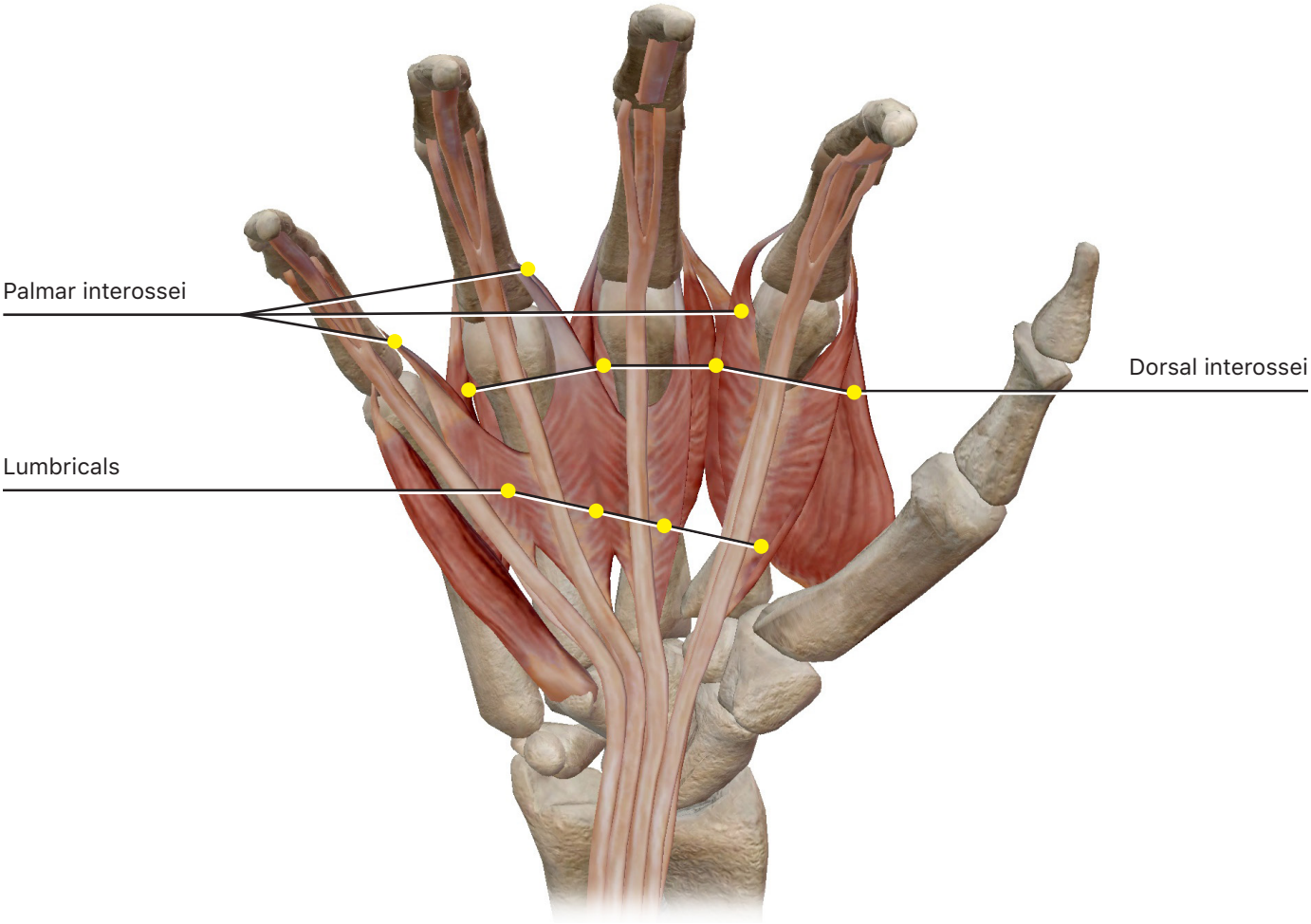
These muscles all function to move digit 5, the little finger. These muscles are also entirely located within the hand.

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

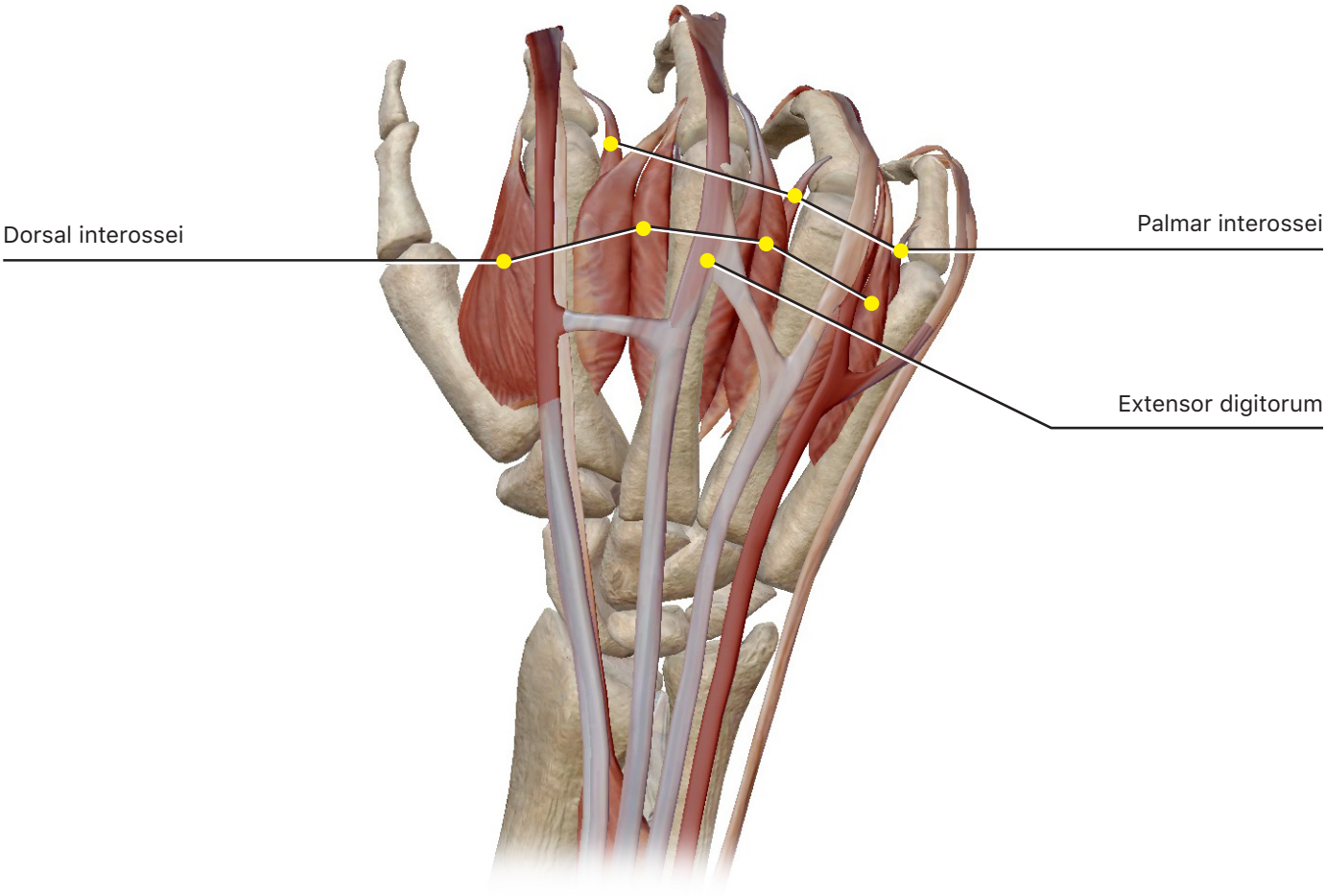
These muscles are located within the hand and are responsible for the fine movements of the fingers. The muscles listed in the chart below are actually groups of muscles. The number of muscles normally found in each group is in parentheses after the name.

View 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

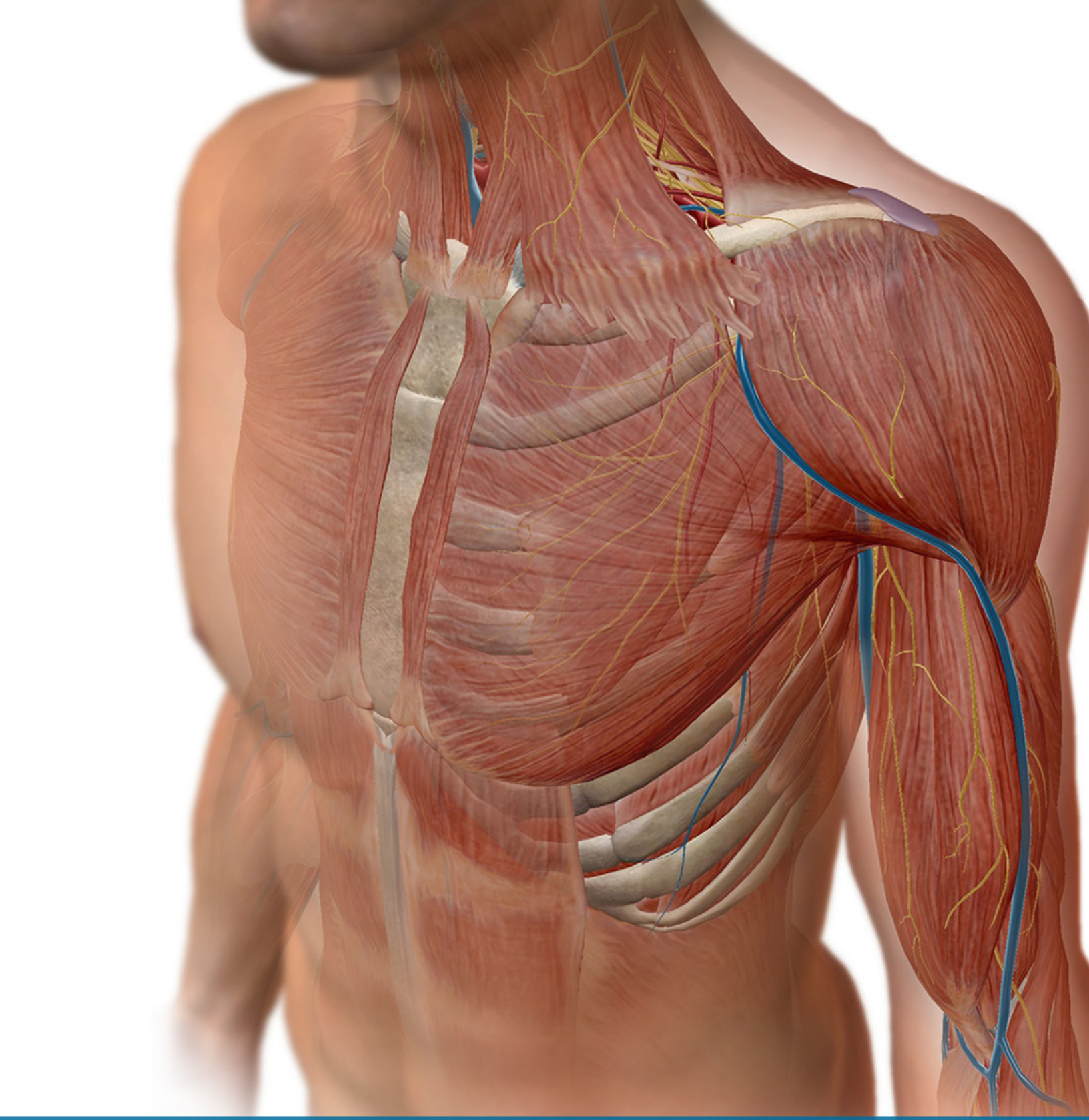
c. Reaching behind you, arm extended and pronated

d. Reaching in front of you, arm extended and supinated

e. Bringing your hand to your heart

f. Holding a pencil

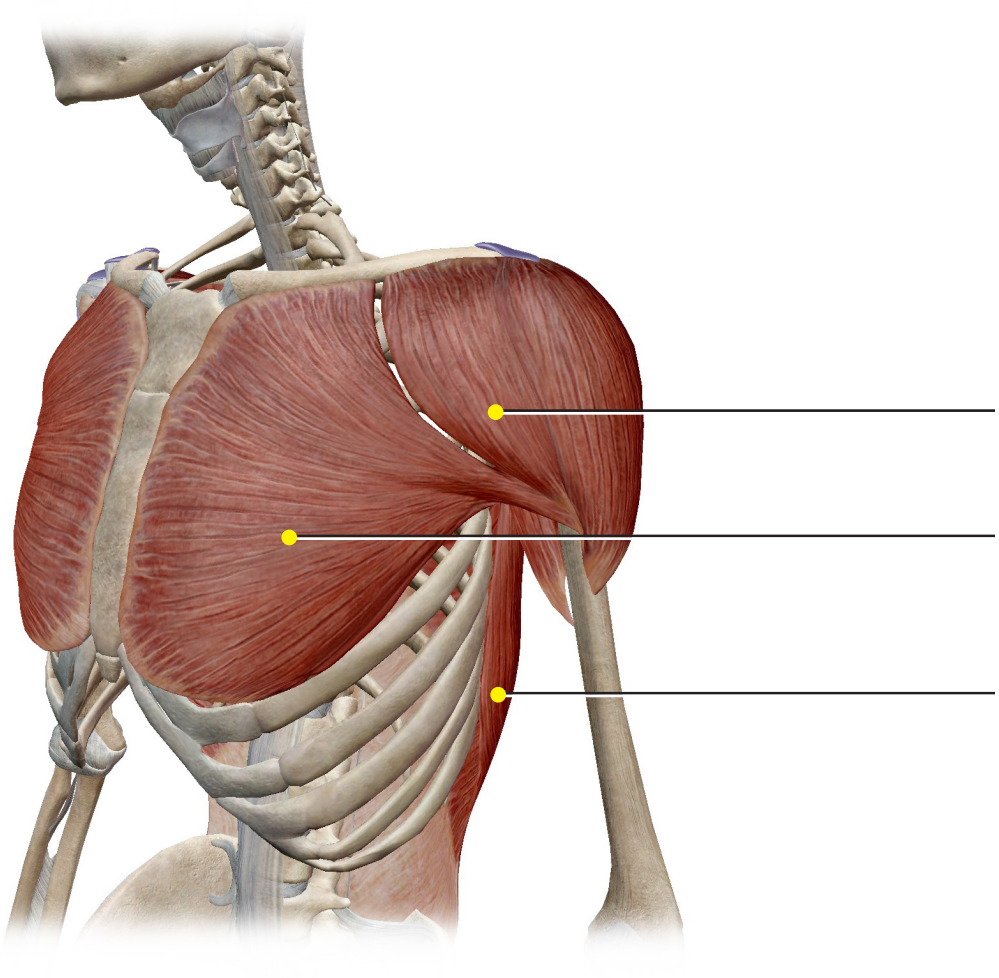
4. Carpal tunnel syndrome can result from repetitive motions in the fingers causing inflammation in the carpal tunnel – a space covered by the flexor retinaculum where tendons and nerves pass through the wrist. In this syndrome, the median nerve is compressed, which can lead to tingling, numbness, and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



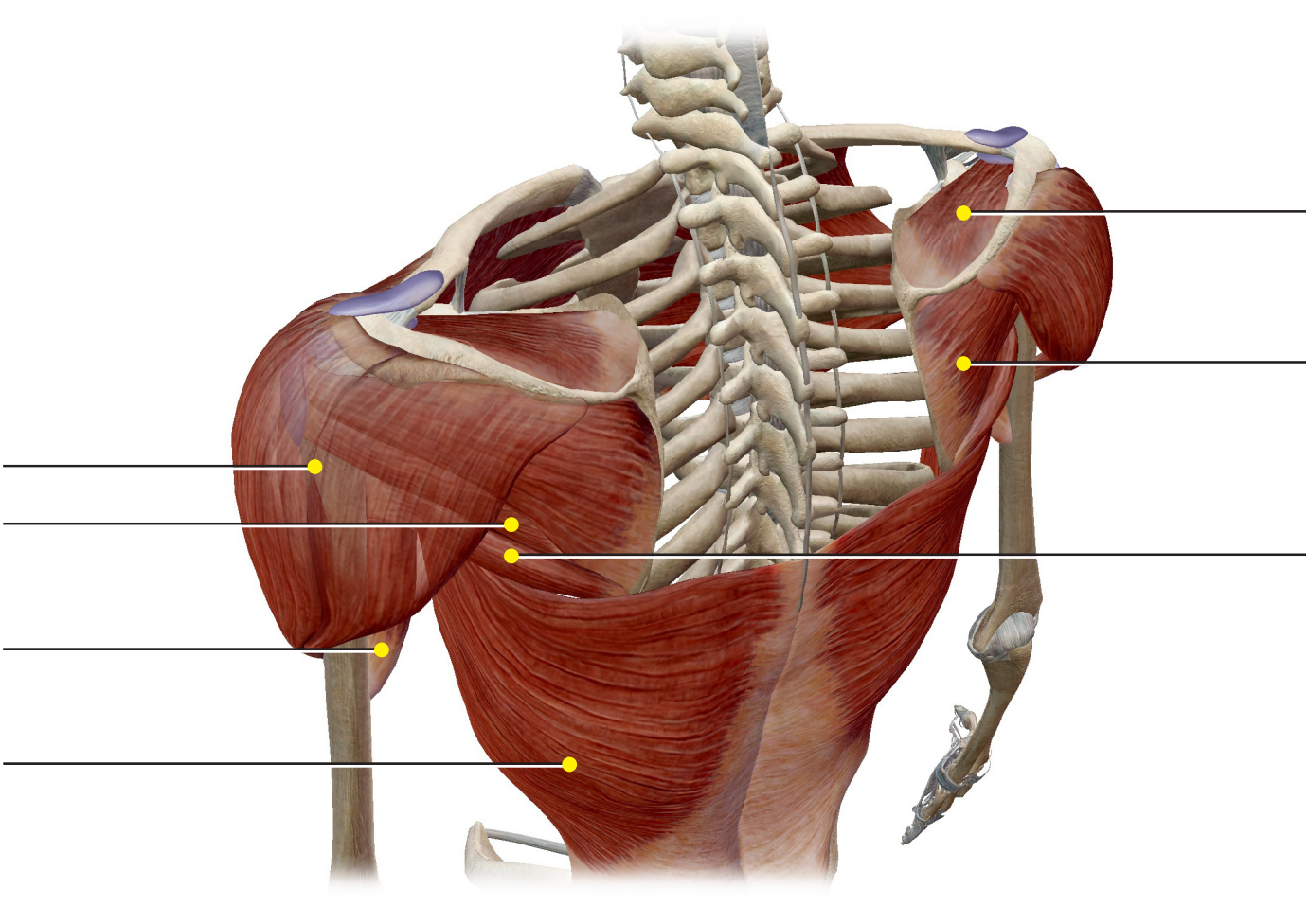
Student Practice

Label the muscles in the following figures

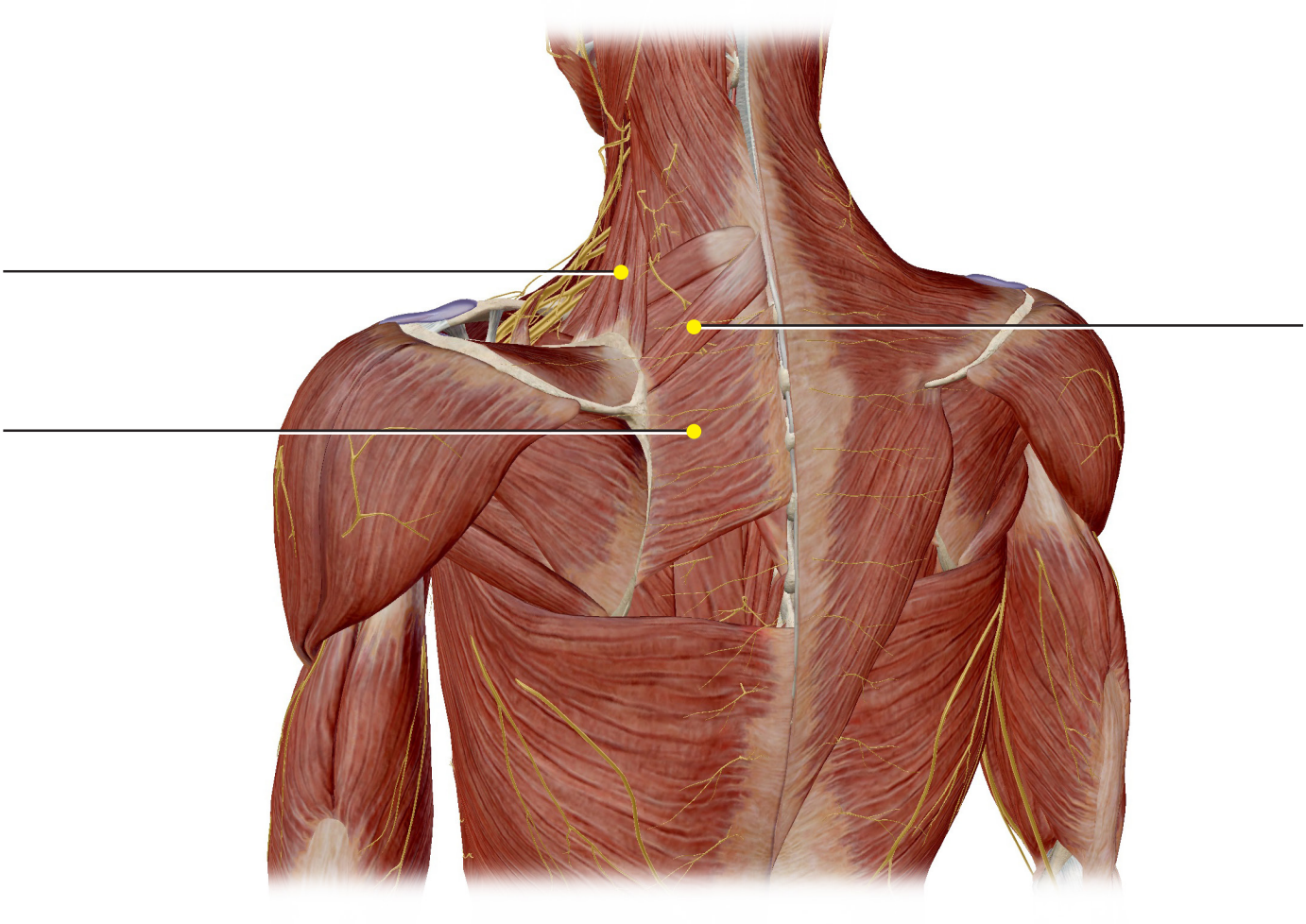
View 11. Shoulder



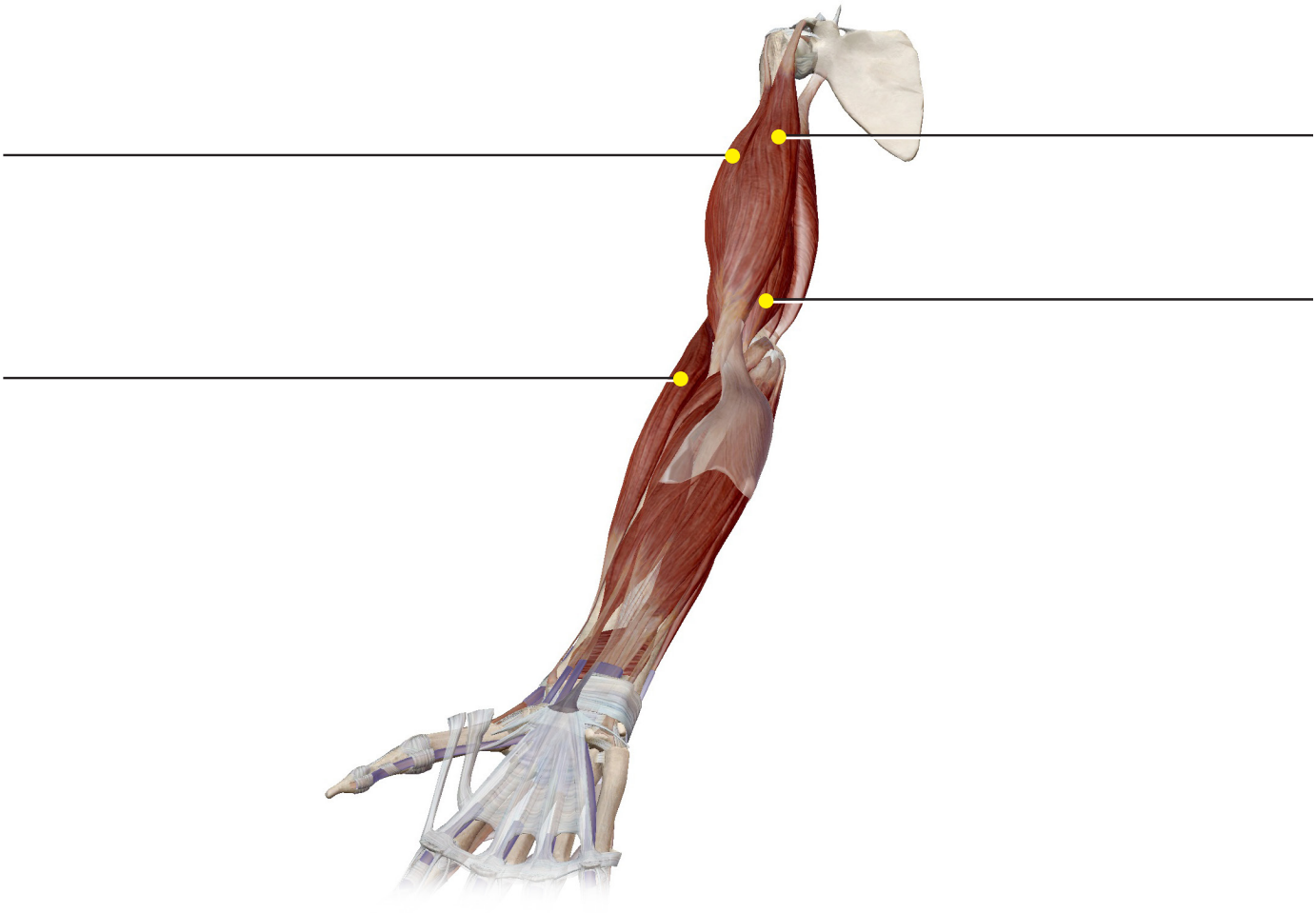
View 11. Shoulder



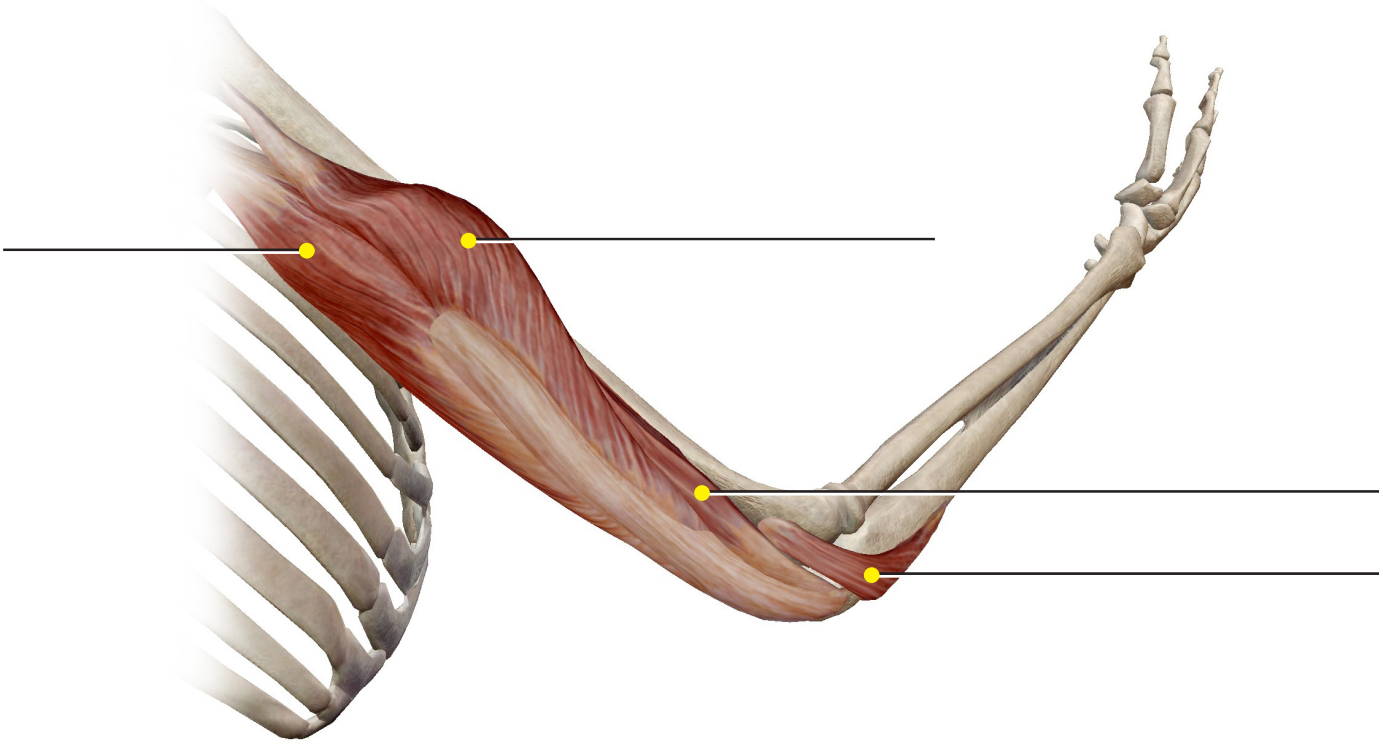
View 20. Muscular System View



View 12. Elbow

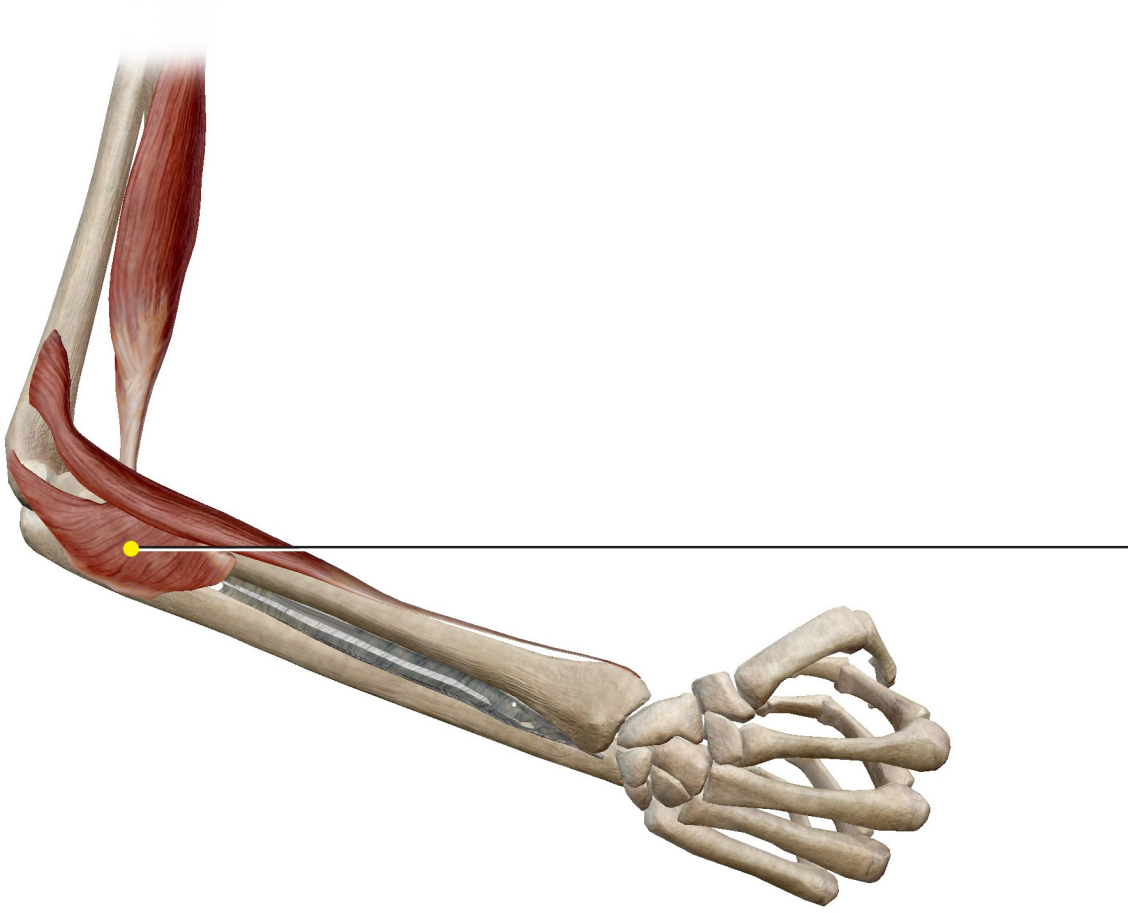


Muscle Action: Elbow Extension

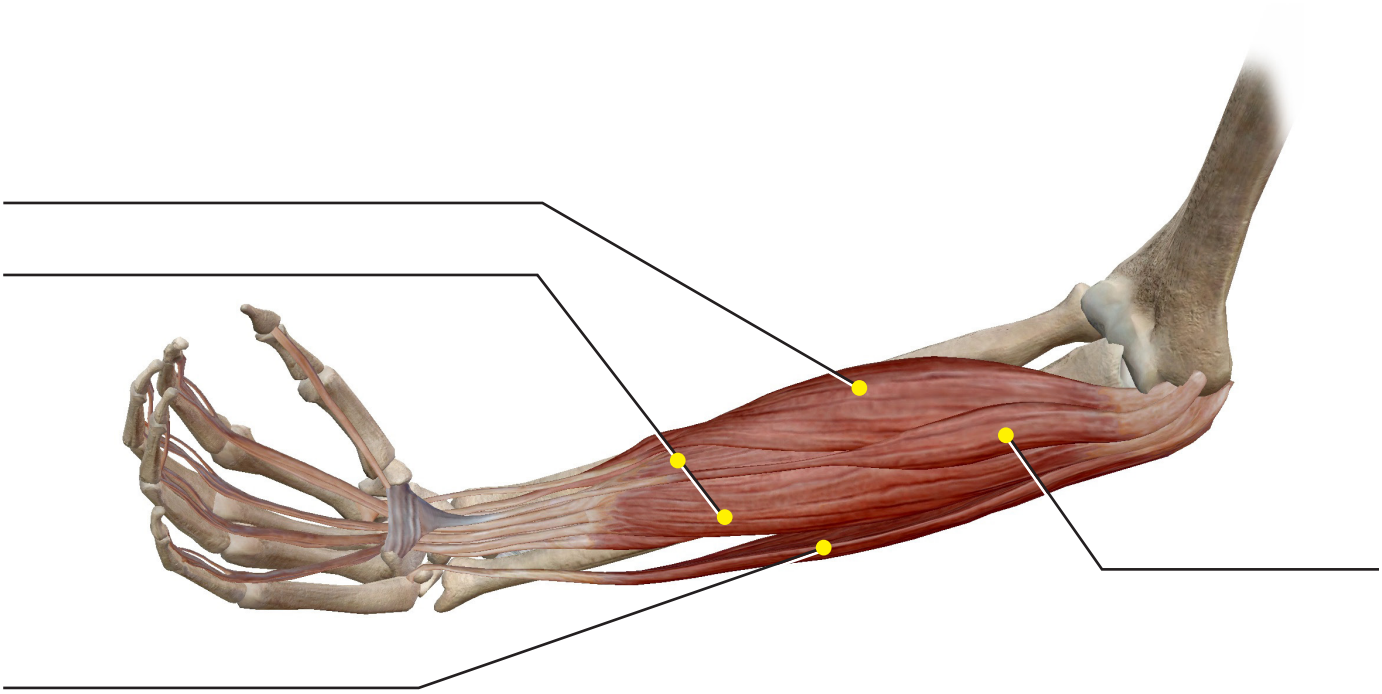


Muscle Action: Forearm Pronation

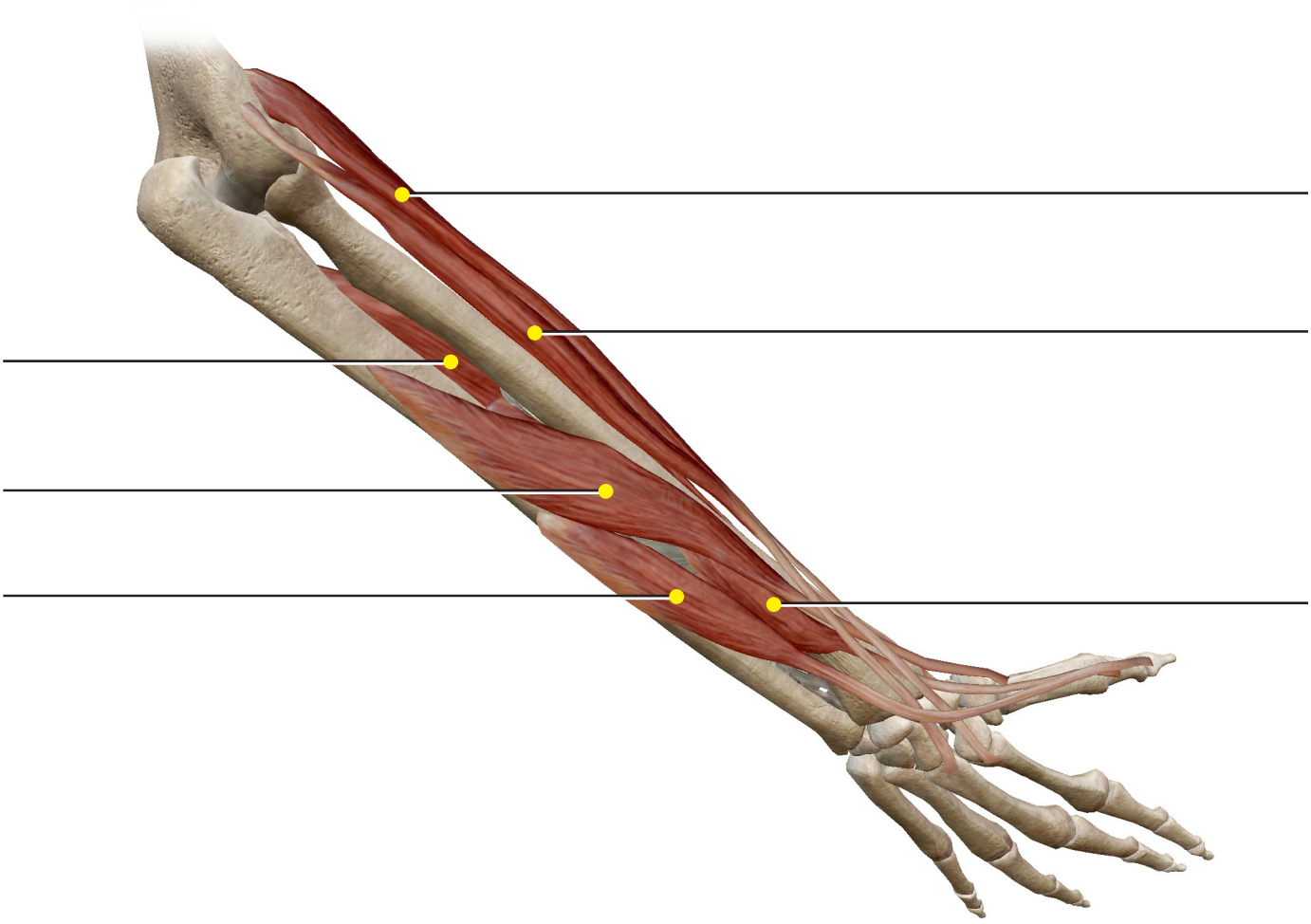
Muscle Action: Supination



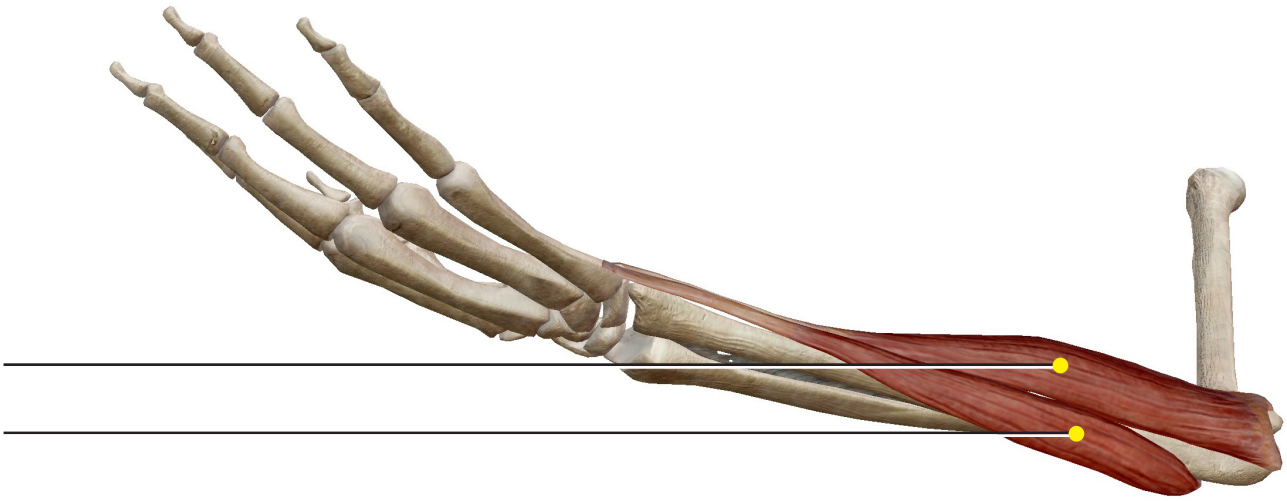
Muscle Action: Wrist Flexion



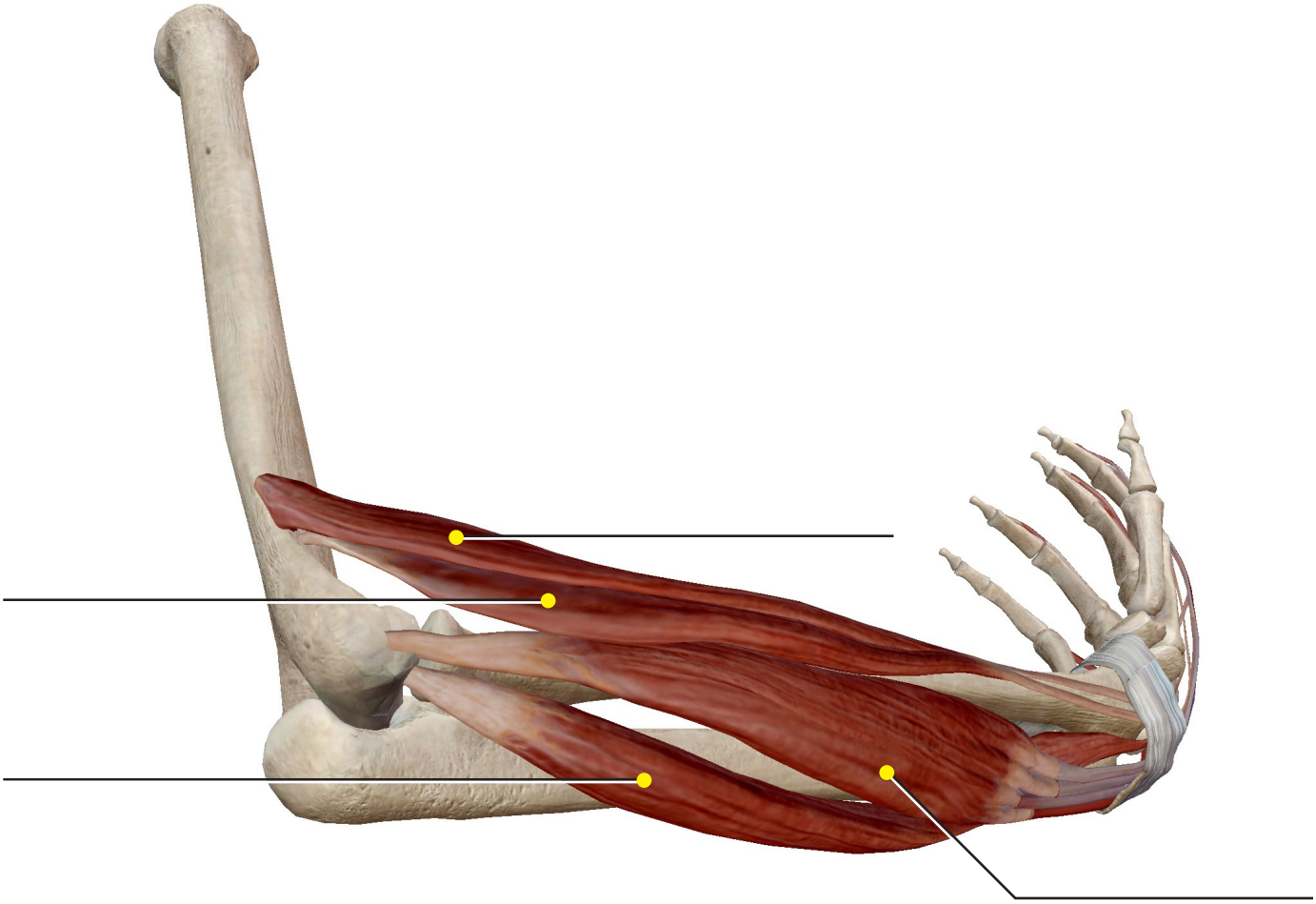
Muscle Action: Wrist Abduction



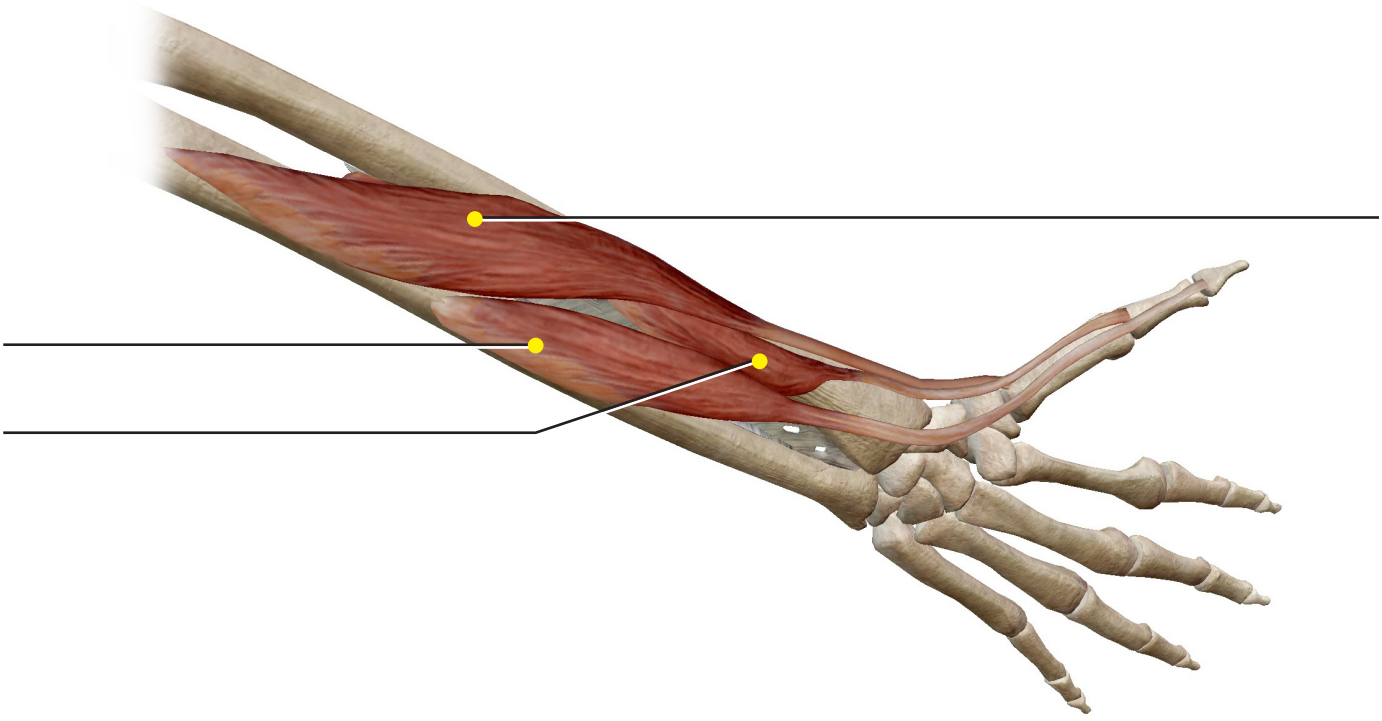
Muscle Action: Wrist Adduction



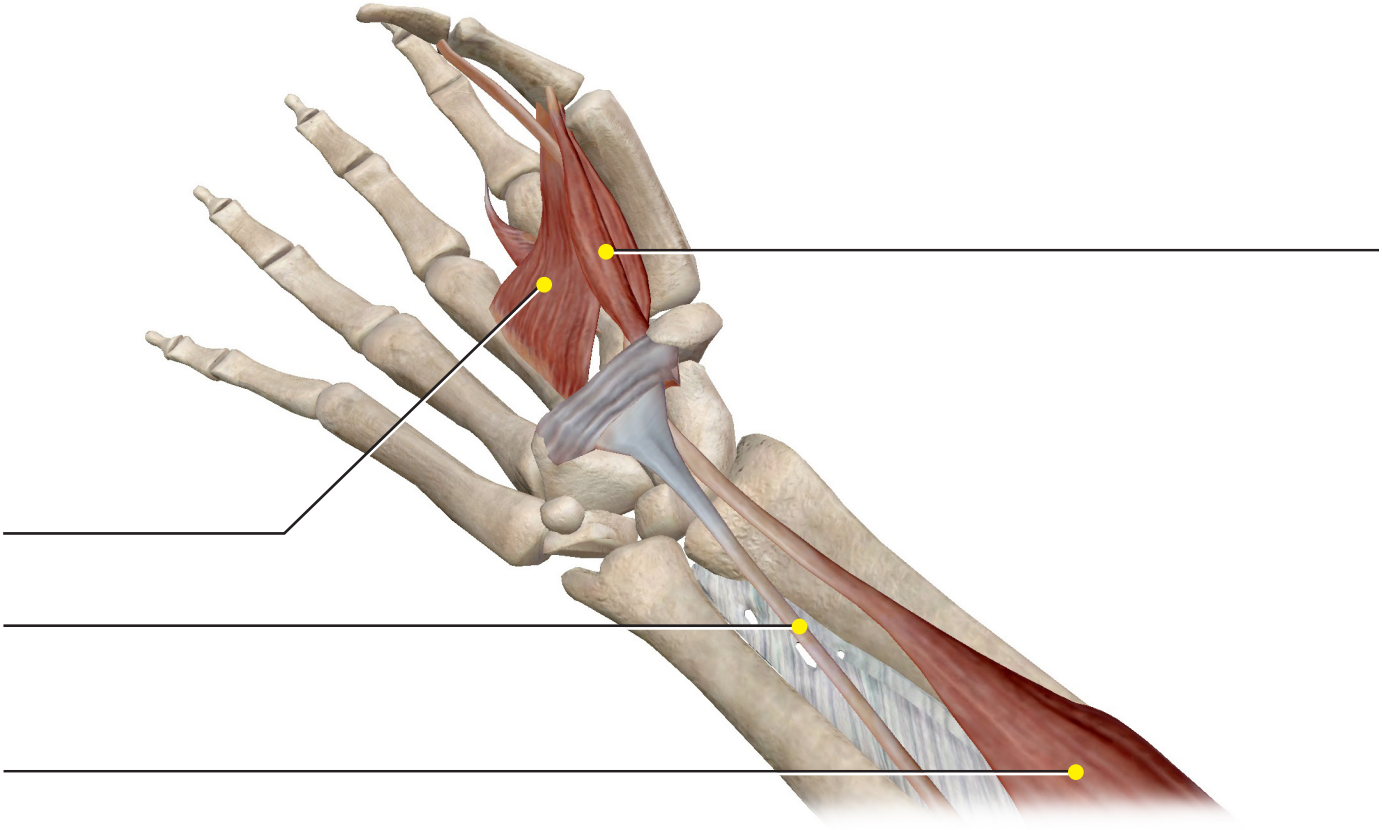
Muscle Action: Wrist Extension



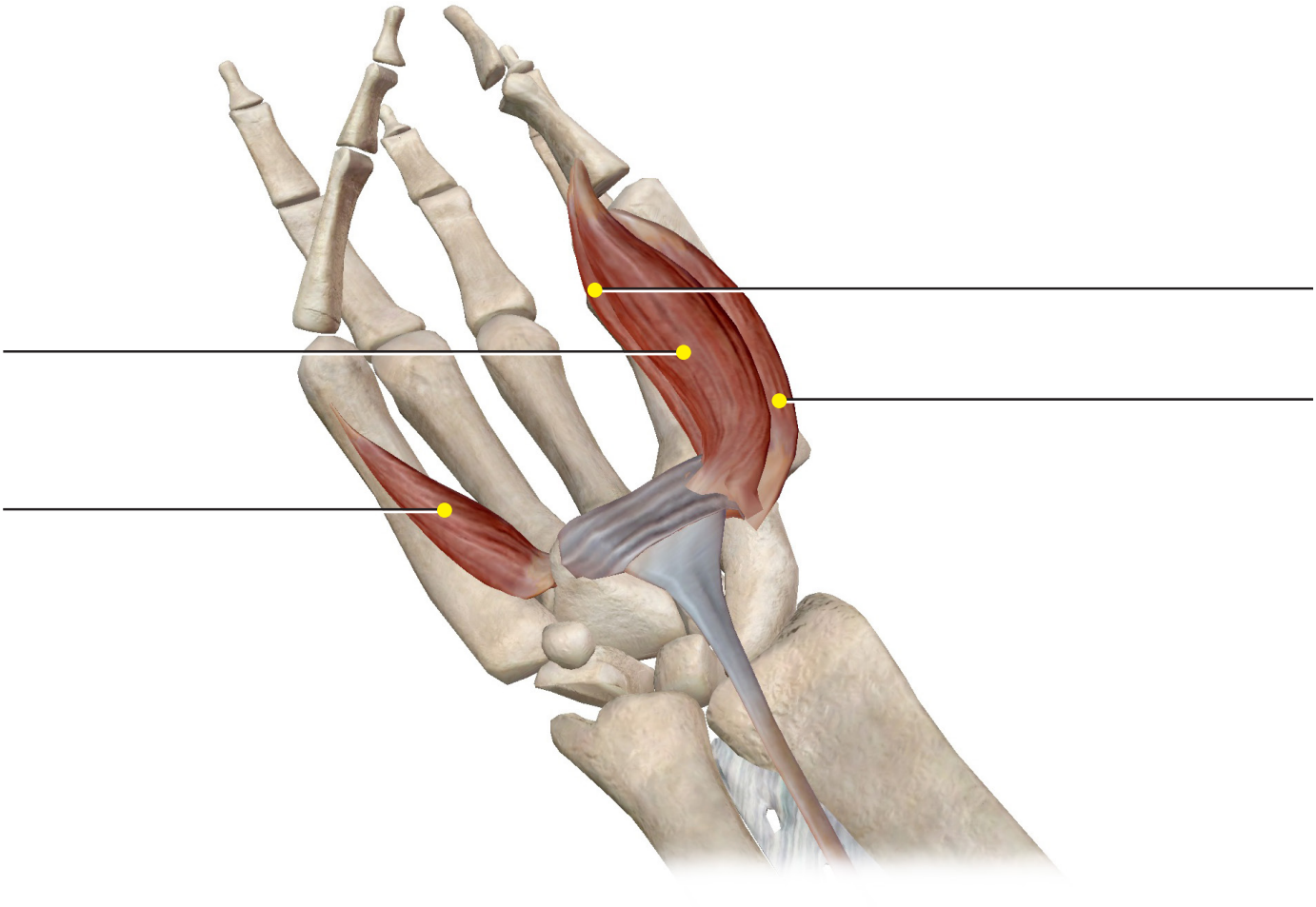
Muscle Action: Thumb Extension



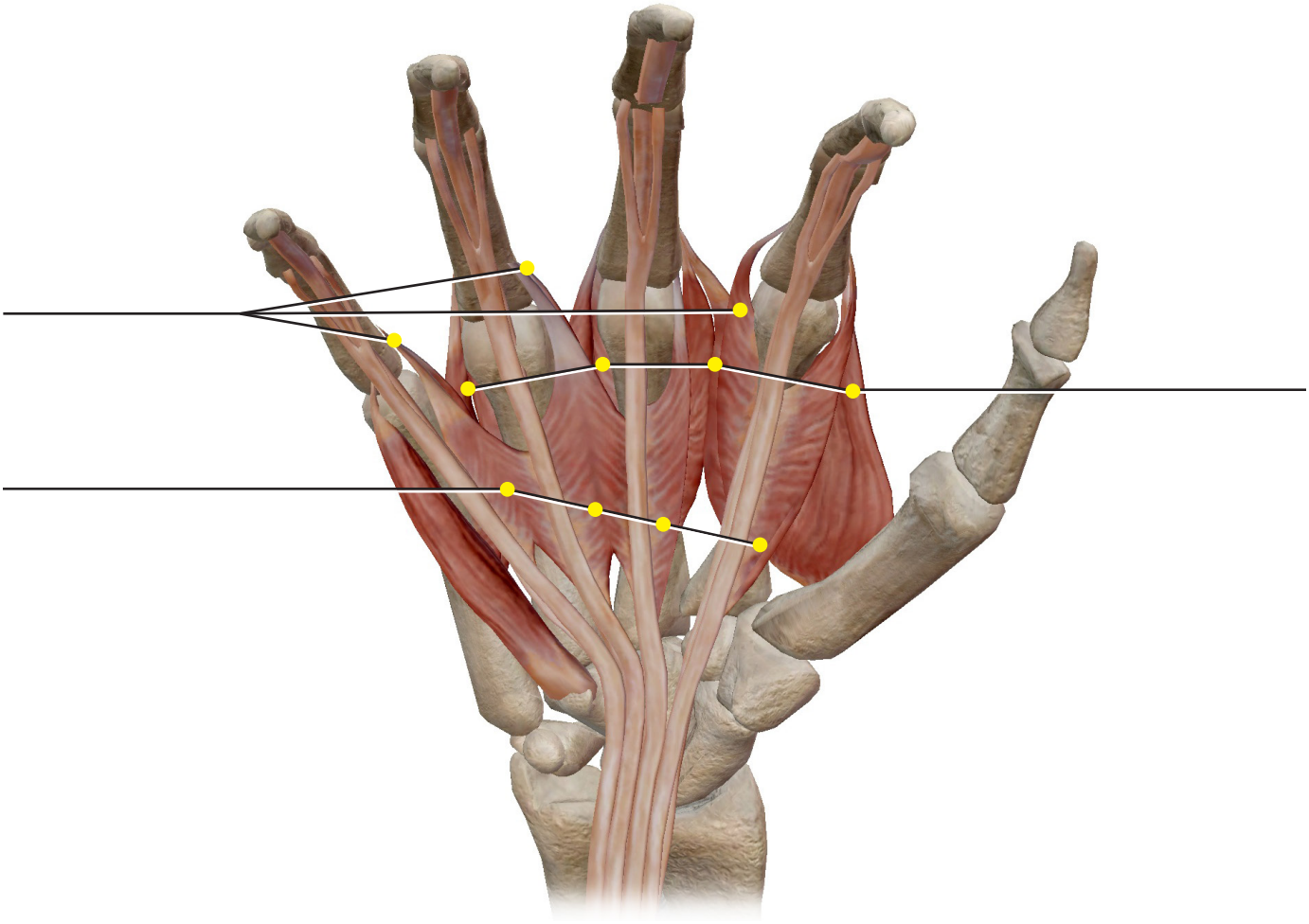
Muscle Action: Thumb Flexion



Muscle Action: Hand Digits Opposition



Muscle Action: Hand Digits 2-5 Flexion



Muscle Action: Hand Digits 2-5 Extension