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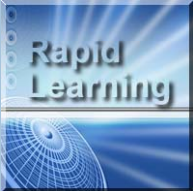
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 **Axial and Appendicular Musculature**

Rapid Learning Medical Series

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Learning Objectives

By completing this tutorial, you will learn about:

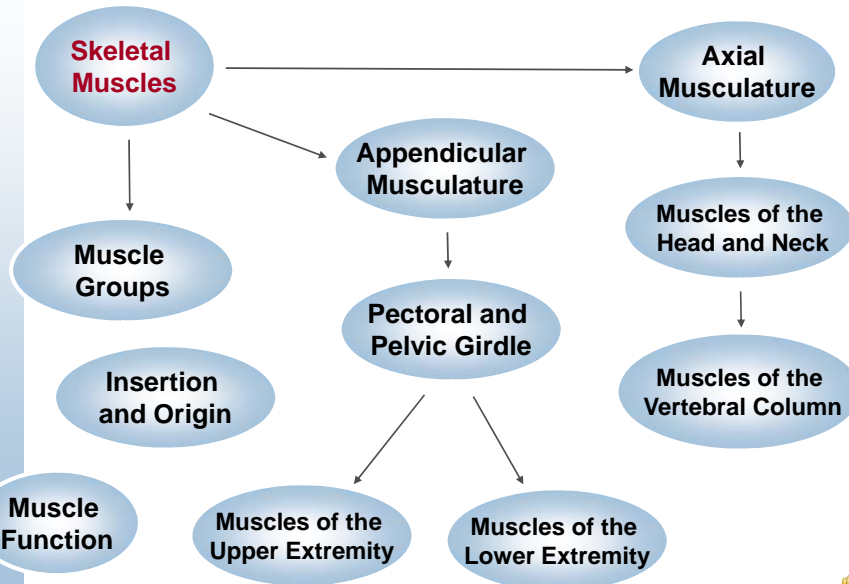


- Muscles of the Head
- Muscles of the Neck
- Muscles of the Trunk
- Muscles of the Upper Extremity
- Muscles of the Lower Extremity

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Concept Map




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Appendicular Musculature



Deltoid Muscle

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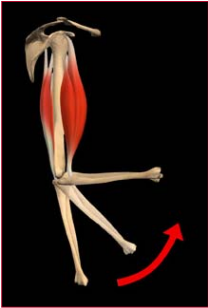



Muscular Action

When learning about the muscles of the body, the **different types of movements of a particular muscle can be tied to the actions of the joint(s) it may cross.**

(1) flexion/extension joint – such as with the knee, flexor muscles cross the anterior aspect of the joint and extensor muscles cross the posterior aspect.

(2) rotation joint – such as the shoulder, muscles involved in medial rotation cross the medial aspect of the joint and muscles involved in lateral rotation cross the lateral aspect.



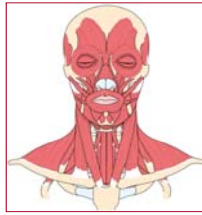


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> Muscle Divisions

The muscles of the body are divided into the **appendicular musculature** and the **axial musculature**. In this tutorial, the appendicular musculature, which includes the muscles of the pectoral and pelvic girdles, as well as the muscles of the upper and lower extremities, will be covered first.

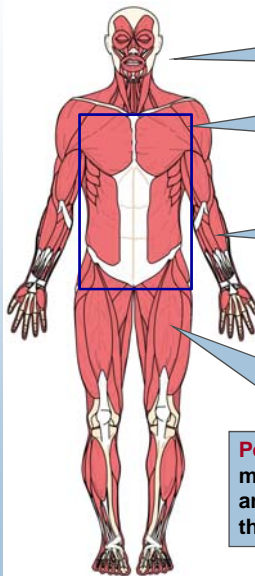
Then, the axial musculature, which includes the muscles of the head and neck, vertebral column, and the muscles of the perineum and pelvic region, will be covered.



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> Muscular System Overview



Head and neck muscles: the muscles of facial expression, pharynx, eye muscles.

Pectoral girdle muscles: the muscles that position the pectoral girdle and contribute to movement of the upper limb.

Upper extremity muscles: the muscles that move the arm, forearm and the hand and fingers.

The **muscles of the vertebral column**, the rectus and oblique muscles.

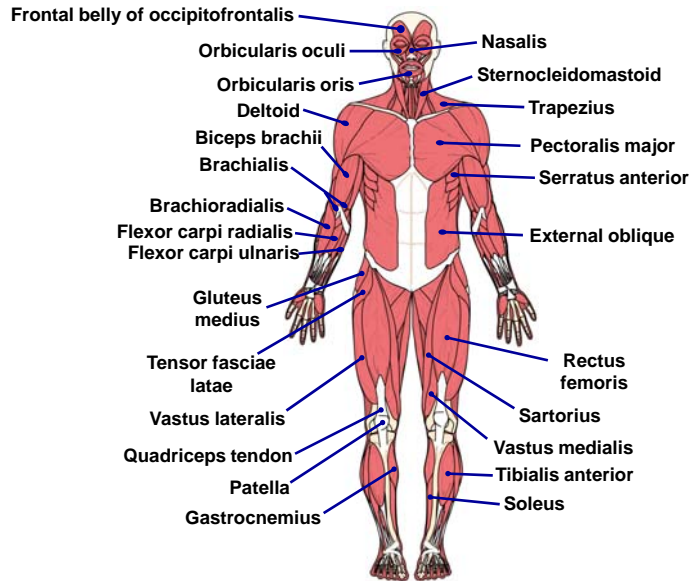
Pelvic girdle and lower extremity muscles: the muscles that move the pelvic girdle, move the leg and foot, as well as the toes. Also the muscles of the perineum and the pelvic diaphragm.

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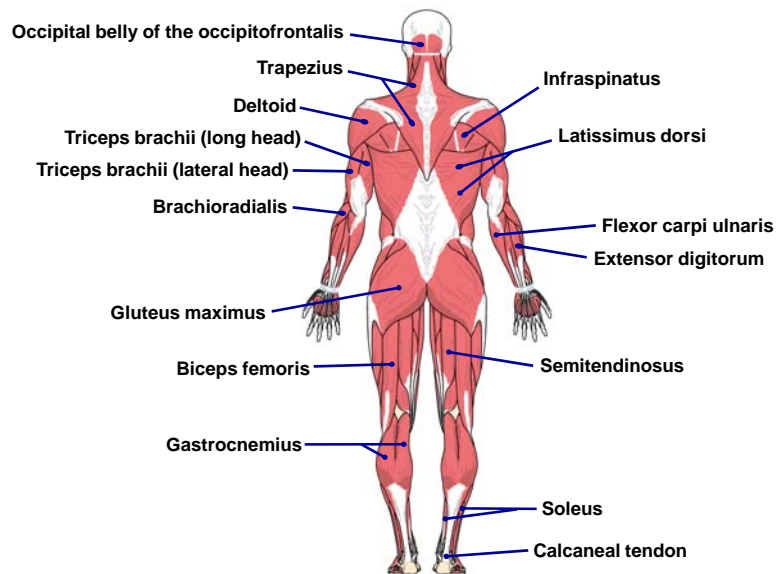
Skeletal Muscles Anterior View



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Skeletal Muscles Posterior View



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Axial vs. Appendicular Musculature

The **function of the axial musculature** include the following: (1) the positioning of the head and vertebral column, and (2) assist in respiration during the breathing cycle.

Unlike the appendicular musculature, the axial musculature does not contribute to the movement of the limbs or their associated girdles (pectoral and pelvic).

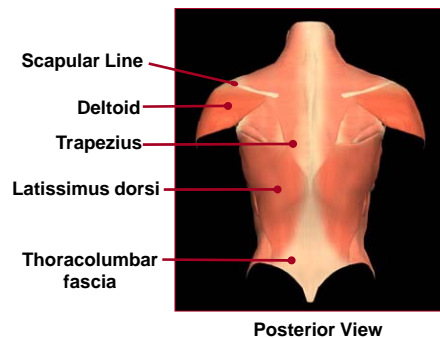
The **functions of the appendicular musculature** are to move and stabilize the upper and lower extremities and the pectoral and pelvic girdles.



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Musculature Associated with the Pectoral Girdle



The **muscles associated with the pectoral girdle and upper limb** can be divided into the following groups:

- (1) muscles that move the arm.
- (2) muscles that position the pectoral girdle.
- (3) muscles that move the forearm and hand.
- (4) muscles that move the hand and fingers.

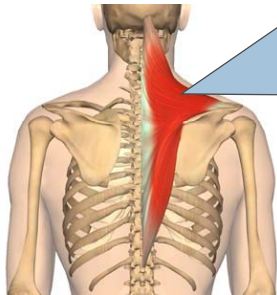
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Muscles that Position the Pectoral Girdle

In order for the arm to move in its full range of movement, the combination of the muscles that position the girdle and the muscles that move the arm must be utilized. The **muscles that position the pectoral girdle are:** (1) Trapezius, (2) Subclavius, (3) Serratus anterior, (4) Rhomboid minor, (5) Rhomboid major, (6) Pectoralis minor, and the (7) Levator scapulae.



Posterior View

The **trapezius** muscle is one of two muscles that cover the posterior portion of the neck and the back. These muscles extend from base of the skull to the region of the 11th thoracic vertebra.

These triangular-shaped muscles have multiple innervations and, therefore, specific regions of this muscle can contract independently.

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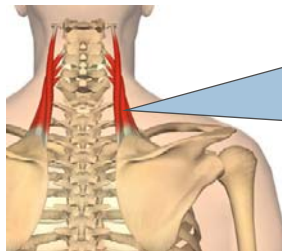
The Rhomboid Muscles and the Levator Scapulae



Posterior View

The **rhomboid muscles** are divided into a rhomboid minor and a rhomboid major. These muscles underlie the trapezius muscle. They are attached to the ventral border of the scapula and are attached to the dorsal surfaces of the cervical and thoracic vertebrae.

The rhomboid muscles adduct or retract the scapula, which pulls it towards the back. These muscles also rotate the scapula downward.



Posterior View

The **levator scapulae** muscle also underlies the trapezius muscle. This muscle is attached to the vertebral border of the scapula, towards the superior angle, and extends to the transverse process of four cervical vertebrae.

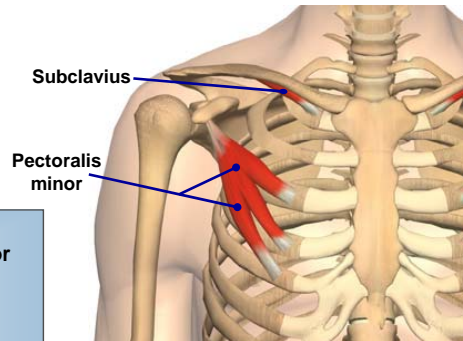
This muscle functions to elevate the scapula bone during the movement of shrugging the shoulders.

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Chest Wall Muscles that Position the Pectoral Girdle



Anterior View

The **subclavius muscles** are a pair of muscles that underlie the pectoralis major muscles. These muscles also rotate the scapula downward.

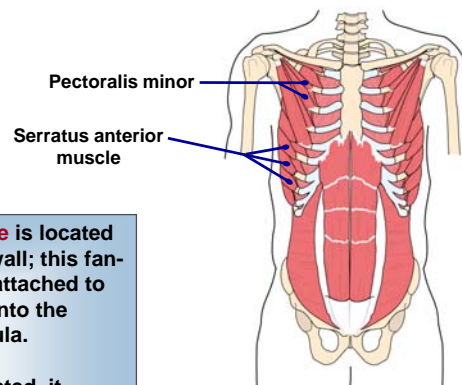
The subclavius muscle depresses and then protracts the end of the clavicle near the scapula, and it also moves the shoulder.

The **pectoralis minor** is located on either side of the chest, and it underlies the pectoralis major muscle. The pectoralis minor muscle also moves the scapula and shoulder, through its attachment to the coracoid process of the scapula.

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Serratus Anterior Muscle



Anterior View

The **serratus anterior muscle** is located on either side of the chest wall; this fan-shaped muscle is typically attached to the first 8 ribs and inserts onto the anterior margin of the scapula.

When this muscle is contracted, it abducts the scapula and moves the shoulder anteriorly.

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Clinical Challenge: Exam Question

A 44-year-old male is seen by his physician after he has been hit in the back by a baseball during a baseball game. The pain the patient has is located in the upper back, slightly lateral to the midline of the back and approximately at the level of the 4th thoracic vertebrae. Based on this information, which of the following would be correct?

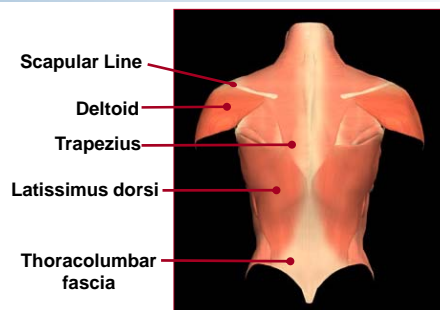
- A. The muscle involved in this injury is the latissimus dorsi.
- B. The muscle involved in this injury is the trapezius.
- C. The long head of the triceps brachii is the cause of this patient's pain.
- D. Either the trapezius or the long head of the triceps could be the source of this patient's pain.
- E. The deltoid muscle could be the source of pain in this patient, as it extends from the shoulder to the region of the 1st lumbar vertebra.



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Clinical Challenge: Exam Answer



Posterior View

This question tests your knowledge of the anatomy of the musculature of the upper back region. Based on the information given, it stated that the injury was in the upper back, slightly lateral to the midline of the back and approximately at the level of the 4th thoracic vertebrae. The correct answer for this question was:

B) The muscle involved in this injury is the trapezius.



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Summary of the Muscles that Position the Pectoral Girdle - 1

Trapezius muscle - Origin: occipital bone, ligamentum nuchae, and the spinous processes of the thoracic vertebrae. Insertion: clavicle and the acromion and scapular spine.

Muscle action: Can elevate, retract, depress or rotate the scapula and the clavicle. Also can extend the neck. Innervation: Accessory nerve (CN XI).



Shoulder depression

Shoulder elevation

Subclavius muscle - Origin: first rib. Insertion: clavicle (inferior border). Muscle action: depresses and retracts the shoulder. Innervation: Nerve to subclavius (C₅-C₆).

Serratus anterior muscle - Origin: anterior and superior margins of ribs 1-9. Insertion: anterior surface of vertebral border of scapula. Muscle action: protracts the shoulder, rotates the scapula causing the glenoid cavity to move superiorly. Innervation: Long thoracic nerve (C₅-C₇).

Rhomboid minor muscle - Origin: spinous processes of C₇-T₁ vertebrae. Insertion: vertebral border of scapula. Muscle action: adducts and performs downward rotation of the scapula. Innervation: Dorsal scapular nerve (C₅).

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Summary of the Muscles that Position the Pectoral Girdle - 2

Rhomboid major muscle - Origin: spinous processes of superior thoracic vertebrae. Insertion: vertebral border of scapula from spine to inferior angle. Muscle action: adducts and performs downward rotation of the scapula. Innervation: Dorsal scapular nerve (C₅).



Shoulder depression

Shoulder elevation

Pectoralis minor muscle - Origin: anterior surfaces and superior margins of ribs 3-5 and fascia covering the associating external intercostal muscles. Insertion: coracoid process of scapula. Muscle action: depresses and protracts the shoulder. Rotates the scapula so the glenoid cavity moves inferiorly and elevates the ribs if scapula is stationary. Innervation: Medial pectoral nerve (C₈-T₁).

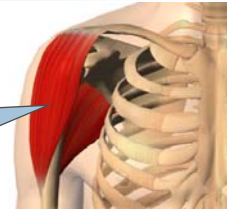
Levator scapulae muscle - Origin: transverse processes of C₁-C₄. Insertion: vertebral border of scapula near superior angle. Muscle action: elevates the scapula. Innervation: Cervical nerves C₃-C₄ and dorsal scapular nerve (C₅).

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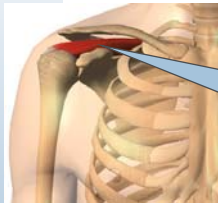


Muscles that Move the Arm - 1

The **deltoid** muscle is the major abductor muscle of the arm. This muscle is also involved in the flexion and medial rotation of the humerus and extension and lateral rotation of the humerus. This superficial muscle is adjacent to the pectoralis major.



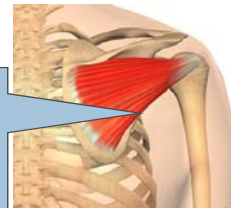
Anterior View



Anterior View

The **supraspinatus** muscle is a superficial muscle that assists the deltoid muscle at the beginning of the abduction of the arm. This muscle extends from the fossa of the scapula to the deltoid tuberosity of the humerus.

The **infraspinatus** muscle underlies a portion of the deltoid muscle. This muscle extends from the infraspinous fossa of the scapula to the greater tubercle of the humerus. The infraspinatus muscle works, along with the teres minor muscle, to perform lateral rotation of the arm.



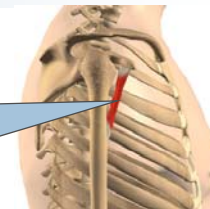
Posterior View

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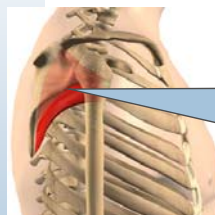


Muscles that Move the Arm – 2

The **coracobrachialis** muscle is a small, deep muscle that produces both flexion and adduction at the shoulder joint. This muscle extends from the coracoid process of the scapula to the medial margin of the humeral shaft.



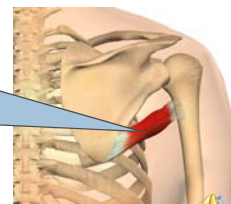
Lateral View



Lateral View

The **subscapularis** muscle is a deep muscle located behind the ribs. This muscle works, along with the teres major muscle, to rotate the arm medially. It extends from the subscapular fossa of the scapula to the lesser tubercle of the humerus.

The **teres major** muscle has a similar function to that of the subscapularis muscle, which is to rotate the arm medially. This deep muscle extends from the inferior angle of the scapula to the medial lip of the intertubercular sulcus of the humerus.



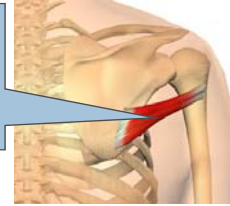
Posterior View

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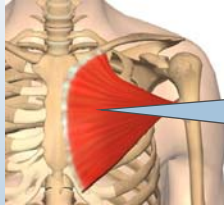


Teres Minor and the Pectoralis Major Muscles

The **teres minor** muscle is a deep muscle that performs lateral rotation of the arm. This muscle performs the same action as the infraspinatus muscle. The teres minor underlies a portion of the infraspinatus muscle.



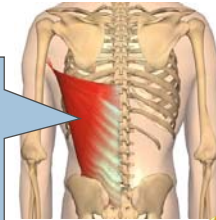
Posterior View



Anterior View

The **pectoralis major** muscle is a superficial muscle on the anterior surface of the upper chest. This muscle performs the following actions: flexion, adduction and medial rotation at the shoulder.

The **latissimus dorsi** muscle is a superficial muscle that extends from a widespread origin - from the spinous processes of the inferior thoracic and all the lumbar vertebrae to the intertubercular sulcus of the humerus.



Posterior View

This muscle performs extension, adduction, and medial rotation of the arm.

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The Upper Arm Muscles

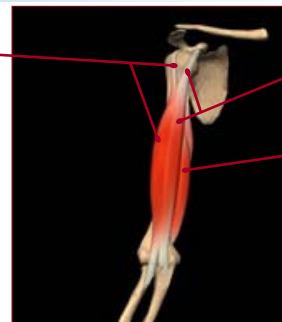


Posterior View

Biceps brachii, long head

Triceps brachii, lateral head

Triceps brachii, long head



Anterior View

Biceps brachii, short head

Triceps brachii

The **biceps brachii** muscle has two origins, both of which are on the scapula, and this muscle inserts into the radius bone. This superficial muscle overlies the coracobrachialis muscle and the brachialis muscle.

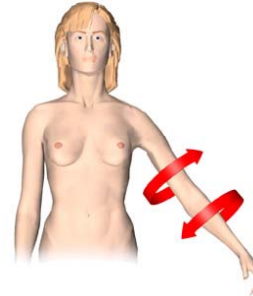
This muscle works across three joints and performs flexion at the elbow and shoulder, and it also performs supination. The triceps brachii long head stems from one of three origins in this muscle. The long head of the triceps perform extension of the elbow, as do the other two heads.

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Summary of the Muscles that Move the Arm - 1

Deltoid muscle - Origin: clavicle and scapula. Insertion: deltoid tuberosity of the humerus. Muscle action: entire muscle can abduct the shoulder, the anterior portion can flex and rotate the humerus medially, and the posterior portion can extend and rotate the humerus laterally. Innervation: Axillary nerve (C₅-C₆).



Supraspinatus muscle - Origin: supraspinous fossa of the scapula. Insertion: greater tubercle of the humerus. Muscle action: abduction at the shoulder. Innervation: Suprascapular nerve (C₅).

Infraspinatus muscle - Origin: infraspinous fossa of the scapula. Insertion: greater tubercle of the humerus. Muscle action: lateral rotation at the shoulder. Innervation: Suprascapular nerve (C₅-C₆).

Coracobrachialis muscle - Origin: coracoid process. Insertion: medial margin of the humerus shaft. Muscle action: adduction and flexion at the shoulder. Innervation: Musculocutaneous nerve (C₅,C₇).

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Summary of the Muscles that Move the Arm - 2

Subscapularis muscle - Origin: subscapular fossa of the scapula. Insertion: lesser tubercle of the humerus. Muscle action: medial rotation at the shoulder. Innervation: Subscapular nerve (C₅-C₆).

Teres major muscle - Origin: inferior angle of the scapula. Insertion: medial lip of the intertubercular sulcus of the humerus. Muscle action: extension and medial rotation at the shoulder. Innervation: Lower subscapular nerve (C₅-C₆).

Teres minor muscle - Origin: lateral border of scapula. Insertion: greater tubercle of humerus. Muscle action: lateral rotation and adduction at the shoulder. Innervation: Axillary nerve (C₅).

Pectoralis major muscle - Origin: cartilages of ribs 2-6, body of sternum, and inferior, medial portion of the clavicle. Insertion: crest of the greater tubercle and the lateral lip of the intertubercular sulcus of the humerus. Muscle action: flexion, adduction and medial rotation at the shoulder. Innervation: Pectoral nerves (C₅,T₁).

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Summary of the Muscles that Move the Arm - 3

Triceps brachii muscle (long head) - Origin: infraglenoid tubercle of scapula. Insertion: olecranon of ulna. Muscle action: extension and adduction at the shoulder and extension at the elbow. Innervation: Radial nerve (C₆-C₈).

Biceps brachii muscle - Origin: short head – coracoid process of the scapula, long head – supraglenoid tubercle of the scapula. Insertion: radial tuberosity. Muscle action: flexion at elbow and shoulder, supination. Innervation: Musculocutaneous nerve (C₅-C₆).

Latissimus dorsi muscle - Origin: spinous processes of inferior thoracic and all lumbar vertebrae, ribs 8-12, and thoracolumbar fascia. Insertion: floor of intertubercular sulcus of the humerus. Muscle action: extension, adduction and medial rotation at the shoulder. Innervation: Thoracodorsal nerve (C₆-C₈).

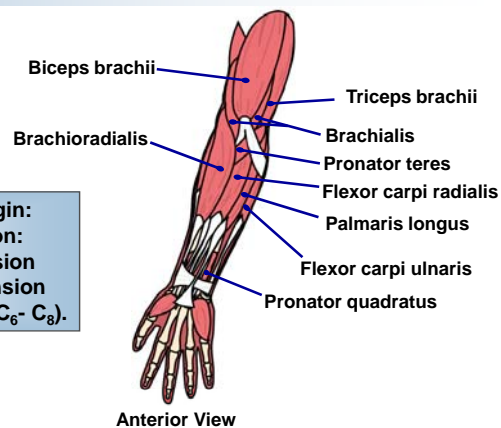


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Muscles that Move the Forearm and Hand

Triceps brachii muscle (long head) - Origin: infraglenoid tubercle of scapula. Insertion: olecranon of ulna. Muscle action: extension and adduction at the shoulder and extension at the elbow. Innervation: Radial nerve (C₆-C₈).



Anterior View

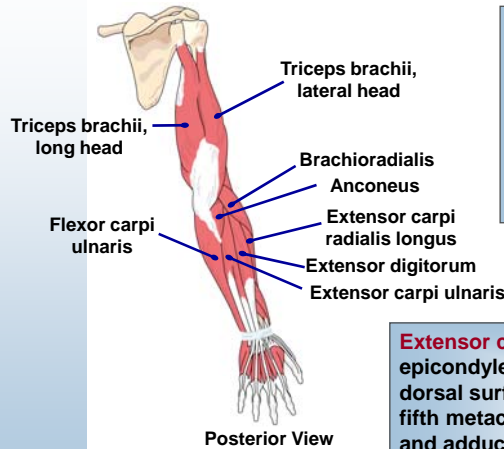
The muscles that move the hand can be organized by groups: (1) Muscles that act at the elbow – biceps brachii, brachialis, and the brachioradialis. The extensor muscles – anconeus, and the triceps, (2) pronators and supinators – pronator quadratus, pronator teres and the supinator muscle, and (3) muscles that act at the wrist – flexor carpi radialis, flexor carpi ulnaris, and the palmaris longus. The extensor muscles – extensor carpi radialis longus, extensor carpi radialis brevis and the extensor carpi ulnaris.

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Muscles on the Posterior aspect of the Arm



Extensor carpi radialis longus muscle - Origin: lateral supracondylar ridge of the humerus. Insertion: base of the second metacarpal bone.

Muscle action: extension and abduction at the wrist. Innervation: Radial nerve (C₆-C₇).

Extensor carpi ulnaris muscle - Origin: lateral epicondyle of the humerus and the adjacent dorsal surface of the ulna. Insertion: base of the fifth metacarpal bone. Muscle action: extension and adduction at the wrist. Innervation: Deep radial nerve (C₆-C₈).

Anconeus muscle - Origin: posterior surface of lateral humerus. Insertion: lateral margin of the olecranon and ulnar shaft. Muscle action: extension at the elbow. Innervation: Radial nerve (C₆-C₈).

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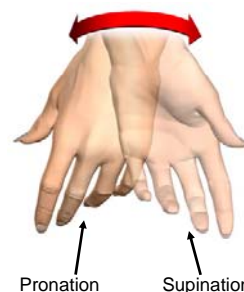


Additional Muscles that Move the Forearm and Hand

Pronator quadratus muscle - Origin: anterior and the medial surfaces of the distal ulna. Insertion: anterolateral surface of the distal portion of the radius. Muscle action: pronates the forearm and hand. Innervation: Median nerve (C₈-T₁).

Pronator teres muscle - Origin: medial epicondyle of the humerus and the coronoid process of the ulna. Insertion: middle of the lateral surface of the radius. Muscle action: pronates the forearm and hand, as well as flexion at the elbow. Innervation: Median nerve (C₆-C₇).

Supinator muscle - Origin: lateral epicondyle of the humerus and the ridge near the radial notch of the ulna. Insertion: anterolateral surface of the radius distal to the radial tuberosity. Muscle action: supinates the forearm and hand. Innervation: Deep radial nerve (C₆-C₈).

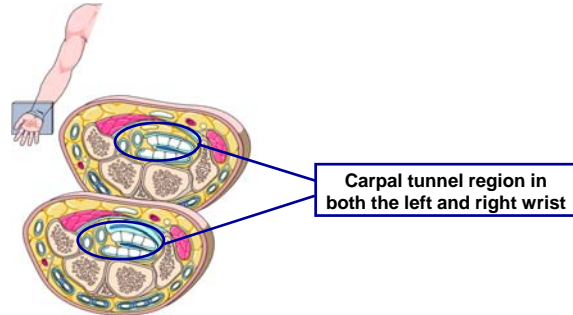


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Clinical Note: Carpal Tunnel Syndrome



Carpal tunnel syndrome is inflammation inside the sheath that wraps around the flexor tendons of the palm, which leads to compression of the median nerve. The symptoms range from mild to severe and include tingling and burning sensations in the wrist and a loss of grip strength. Certain medical conditions can increase the likelihood of developing carpal tunnel syndrome, such as arthritis and hypothyroidism but, in the majority of cases, the exact cause is unknown.

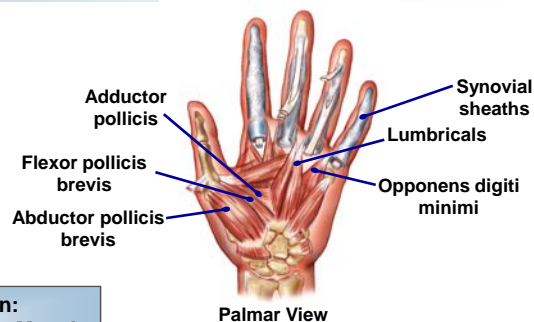
Activities and careers that include repetitive contraction of and use of the muscles in this region can increase the incidence. This syndrome is diagnosed based on symptoms, physical exam and, in some cases, the results of nerve conduction studies. Treatment includes immobilizing braces, anti-inflammatory medication, physiotherapy and occupation therapy.

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Muscles that Move the Hand and Fingers - 1

Adductor pollicis muscle - Origin: metacarpal and carpal bones. Insertion: proximal phalanx of the thumb. Muscle action: adduction of the thumb. Innervation: Ulnar nerve, deep branch (C₈-T₁).



Opponens digiti minimi muscle - Origin: hamate. Insertion: 5th metacarpal bone. Muscle action: flexion at the metacarpophalangeal joint (opposes digit and thumb). Innervation: Ulnar nerve, deep branch (C₈- T₁).

Abductor pollicis brevis muscle - Origin: transverse carpal ligament, scaphoid and trapezium. Insertion: radial side of the base of the proximal phalanx of the thumb. Muscle action: abduction of the thumb. Innervation: Median nerve (C₆- C₇).

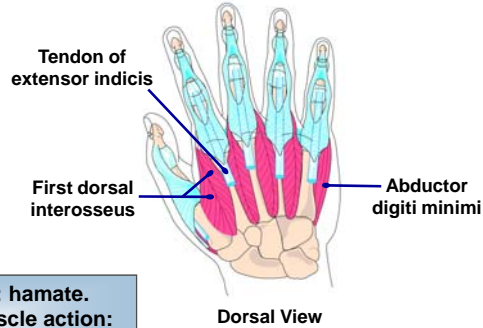
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Muscles that Move the Hand and Fingers - 2

Dorsal interosseus muscle (4) - Origin: each originates from the opposing faces of two metacarpal bones. Insertion: bases of the proximal phalanges of digits 2-4. Muscle action: abduction at the metacarpophalangeal joint of digits 2-4, flexion at the metacarpophalangeal joints. Innervation: Ulnar nerve, deep branch (C₈-T₁).



Opponens pollicis muscle - Origin: hamate. Insertion: 5th metacarpal bone. Muscle action: flexion at the metacarpophalangeal joint (opposes digit and thumb). Innervation: Ulnar nerve, deep branch (C₈- T₁).

Palmaris brevis muscle - Origin: palmar aponeurosis. Insertion: skin of the medial border of the hand. Muscle action: moves the skin on the medial border toward the midline of the palm. Innervation: Ulnar nerve, superficial branch (C₈).

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Clinical Challenge: Exam Question

Which of the following muscles performs flexion at the elbow and shoulder, as well as supination?

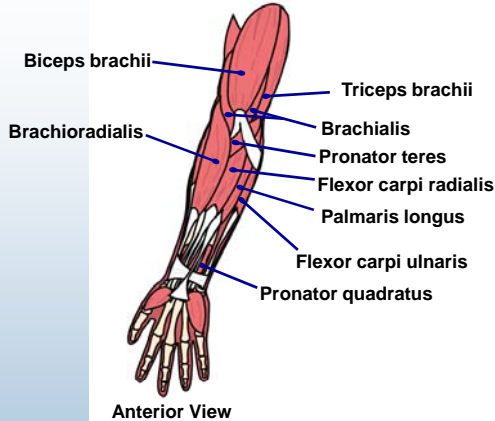
- A. Pronator quadratus muscle.
- B. Supinator muscle.
- C. Adductor pollicis muscle.
- D. Biceps brachii muscle.
- E. Extensor carpi ulnaris muscle.



34/85



Clinical Challenge: Exam Answer



Anterior View

Biceps brachii muscle - Origin: short head – coracoid process of the scapula, long head – supraglenoid tubercle of the scapula. Insertion: radial tuberosity. Muscle action: flexion at elbow and shoulder, supination. Innervation: Musculocutaneous nerve (C₅-C₆).

This question tests your knowledge of the anatomy and function of the muscles in the upper arm. The correct answer for this question was:

D) Biceps brachii muscle.



35/85



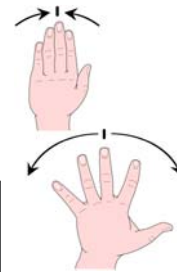
Additional Muscles that Move the Hand and Fingers

Palmar interosseus muscle (4) - Origin: sides of the 2nd, 4th and 5th metacarpal bones. Insertion: bases of the proximal phalanges of digits 2, 4, and 5. Muscle action: adduction at the metacarpophalangeal joints of digits 2, 4, and 5, extension at interphalangeal joints. Innervation: Ulnar nerve, deep branch (C₈-T₁).


Extensor pollicis brevis muscle - Origin: shaft of the radius, distal to the origin of the abductor pollicis longus. Insertion: base of the proximal phalanx of the thumb. Muscle action: extension at the thumb joints and abduction at the wrist. Innervation: Deep radial nerve (C₆-C₇).

Extensor indicis muscle - Origin: posterior surface of the ulna and the interosseous membrane. Insertion: posterior surface of proximal phalanx of index finger. Muscle action: extension and adduction at the joints of the index finger. Innervation: Deep radial nerve (C₆-C₈).


Flexor digitorum profundus muscle - Origin: medial and posterior surfaces of the ulna, medial surfaces of the coronoid process, and the interosseous membrane. Insertion: bases of the distal phalanges of digits 2-5. Muscle action: flexion at the interphalangeal joints, and some flexion in the proximal interphalangeal joints and wrist. Innervation: Anterior interosseous branch of the median and ulnar nerve (C₈-T₁).





36/85



Muscles of the Pelvic Girdle and Lower limb



37/85 







Muscles of the Pelvic Girdle and Lower Extremity

The **muscles associated with the pelvic girdle and the lower extremity can be grouped into the following categories:**

- (1) muscles that move the thigh.
- (2) muscles that move the leg.
- (3) muscles that move the foot and toes.

The musculature of the lower extremity is more powerful than that of the upper extremity.



38/85 



Muscles that Move the Thigh

The **gluteus maximus**, along with the gluteus medius, gluteus minimus and the tensor fasciae latae, make up the gluteal group of muscles that move the thigh. The gluteus maximus is the largest, most superficial muscle that overlies most of the muscles in its group.

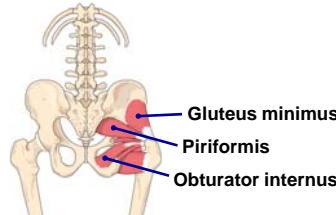


Posterior View



Posterior View

The **gluteus medius muscle** and the gluteus minimus muscle extend from the iliac crest to the greater trochanter of the femur. These muscles perform abduction and medial rotation at the hip.



Posterior View

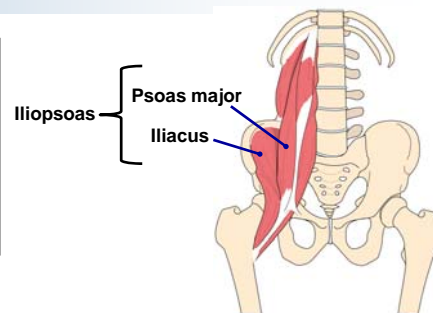
Gluteus minimus
Piriformis
Obturator internus

39/85



Musculature Attached to the Pelvis that Moves the Leg

Iliopsoas group of muscles are involved during flexion movements at the hip. The group includes the **Psoas major muscle** - Origin: anterior surfaces and transverse processes of the T₁₂-L₅ vertebrae. Insertion: Lesser trochanter. Muscle action: flexion at the hip and/or lumbar vertebral joints. Innervation: Branches of the lumbar plexus (L₂- L₃).



Anterior View

Iliacus muscle - Origin: iliac fossa. Insertion: femur distal to the lesser trochanter. Muscle action: flexion at the hip and/or lumbar vertebral joints. Innervation: Femoral nerve (L₂- L₃).

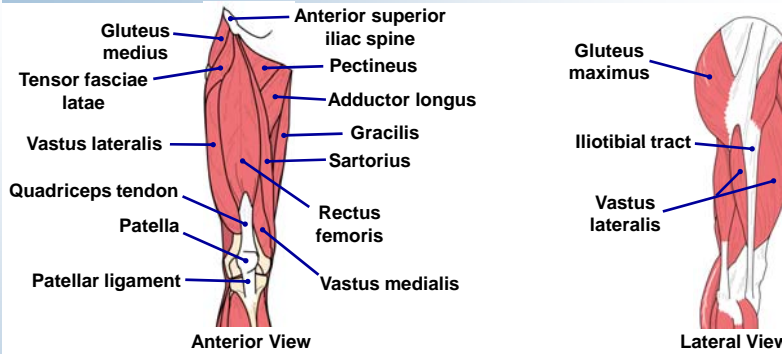
Gracilis muscle - Origin: inferior ramus of pubis. Insertion: medial of tibia, inferior to the medial condyle. Muscle action: flexion and medial rotation at the knee, and adduction and medial rotation at the hip. Innervation: Obturator nerve (L₃- L₄).

40/85





Adductor Group of Muscles



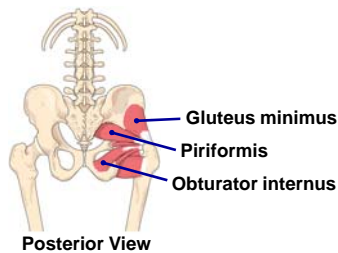
Adductor longus muscle - Origin: inferior ramus of pubis. Insertion: linea aspera of femur. Muscle action: adduction, flexion and medial rotation at the hip. Innervation: Obturator nerve (L₃- L₄).

Pectineus muscle - Origin: superior ramus of pubis. Insertion: pectineal line inferior to the lesser trochanter of the femur. Muscle action: flexion and adduction at the hip. Innervation: Femoral nerve (L₂- L₄).

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Muscles that Perform Lateral Rotation of the Thigh



Obturator (externus and internus) muscle - Origin: lateral and medial margins of the obturator foramen. Insertion: externus – trochanteric fossa of the femur, internus – medial surface of the greater trochanter.

Muscle action: lateral rotation and abduction of the hip. Innervation: Externus – obturator nerve (L₃- L₄), internus – special nerve from sacral plexus (L₅-S₂).

Piriformis muscle - Origin: anterolateral surface of the sacrum. Insertion: greater trochanter of the femur. Muscle action: lateral rotation and abduction of the hip. Innervation: Branches of sacral nerves (S₁- S₂).

Quadratus femoris muscle - Origin: lateral border of the ischial tuberosity. Insertion: intertrochanteric crest of the femur. Muscle action: lateral rotation of the hip. Innervation: Special nerves from sacral plexus (L₄- S₁).

42/85

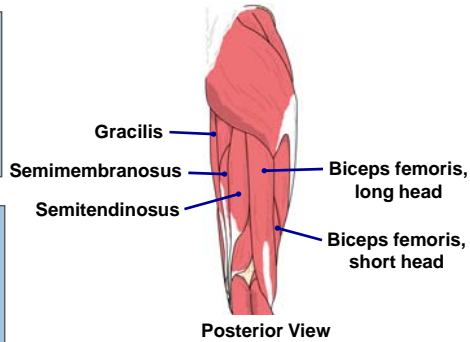




Muscles that Move the Leg

Sartorius muscle - Origin: anterior, superior iliac spine. Insertion: medial surface of the tibia, near the tibial tuberosity. Muscle action: flexion at the knee; abduction, flexion and lateral rotation at the hip. Innervation: Femoral nerve (L₂- L₃).

Semimembranosus muscle - Origin: ischial tuberosity. Insertion: posterior surface of the medial condyle of the tibia. Muscle action: flexion at the knee; extension and medial rotation at the hip. Innervation: Sciatic nerve, tibial portion (L₅- S₂).



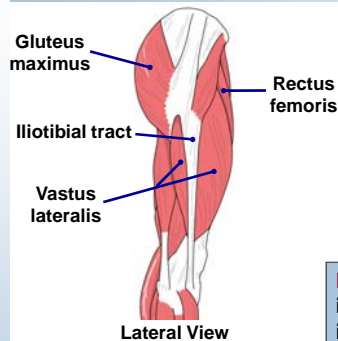
The **biceps femoris muscle** has a long head and a short head. Origin: ischial tuberosity and the linea aspera of the femur. Insertion: head of the fibula, and the lateral condyle of the tibia. Muscle action: flexion at the knee; extension and lateral rotation at the hip.

Innervation: Long head - sciatic nerve, tibial portion (S₁- S₃), short head – common fibular branch (L₅-S₂).

43/85



Extensor Muscles of the Knee



The muscles that extend the knee are the **rectus femoris, vastus intermedius, vastus lateralis, and vastus medialis**.

These muscles form the quadriceps muscles. These muscles cover the anterior and lateral aspects of the femur. These are powerful extensor muscles of the knee, which are attached to the patella through the quadriceps tendon.

Rectus femoris muscle - Origin: anterior, inferior iliac spine and the superior acetabular rim of the ilium. Insertion: tibial tuberosity. Muscle action: extension at the knee and flexion at the hip. Innervation: Femoral nerve (L₂- L₄).

The three vastus muscles (lateralis, intermedius and medialis) share the same insertion, muscular action and innervation as the rectus femoris muscle. The origins of these three muscles differ:

- (1) vastus lateralis – anterior and inferior to the greater trochanter.
- (2) vastus intermedius – anterolateral surface of the femur and the linea aspera.
- (3) vastus medialis – the entire length of the linea aspera of the femur.

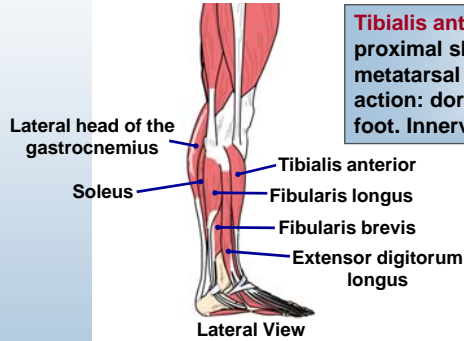
44/85





The Extrinsic Muscles that Move the Foot and Toes - 1

The extrinsic muscles of the foot are known as extrinsic because the majority of the muscle, including the muscle belly, is outside of the foot – on the shin area of the leg.



Tibialis anterior muscle - Origin: lateral condyle and proximal shaft of tibia. Insertion: base of the first metatarsal bone and the medial cuneiform . Muscle action: dorsiflexion at the ankle and inversion of the foot. Innervation: Deep fibular nerve (L₄- S₁).

Gastrocnemius muscle - Origin: femoral condyles. Insertion: calcaneus via the calcaneal tendon. Muscle action: plantar flexion at the ankle and flexion at the knee. Innervation: Tibial nerve (S₁- S₂).

Fibularis brevis muscle - Origin: midlateral margin of the fibula. Insertion: base of the 5th metatarsal bone. Muscle action: eversion of the foot and plantar flexion at the ankle. Innervation: Superficial fibular nerve (L₄- S₁).

45/85

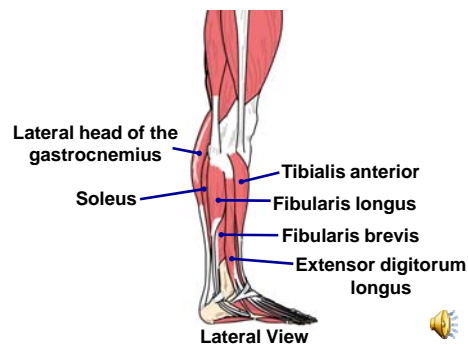


The Extrinsic Muscles that Move the Foot and Toes - 2

Fibularis longus muscle - Origin: head and the proximal shaft of the fibula. Insertion: base of the 1st metatarsal bone and the medial cuneiform. Muscle action: eversion of the foot and plantar flexion at the ankle. Innervation: Superficial fibular nerve (L₄- S₁).

Soleus muscle - Origin: head and the proximal shaft of the fibula and the adjacent posteromedial shaft of the tibia. Insertion: calcaneus via the calcaneal tendon. Muscle action: this is a postural muscle when standing; plantar flexion at the ankle. Innervation: Sciatic nerve, tibial branch (S₁- S₂).

There are also flexor and extensor digitorum and hallucis muscles with origins on anterior, posterior and lateral surfaces of the tibia and fibula bones. The flexor digitorum longus and hallucis longus muscles produce flexion of the big toe and the second toe joints. The extensor digitorum and hallucis muscles extend these toes.



46/85

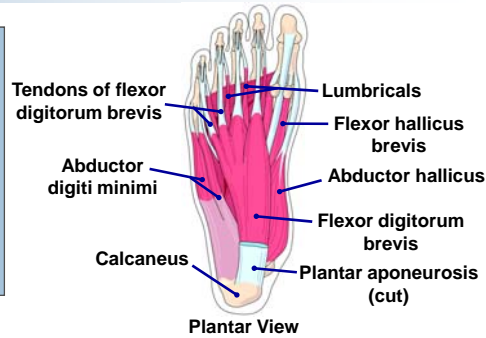




The Intrinsic Muscles that Move the Foot - 1

The flexor hallucis brevis, adductor hallucis, and the abductor hallucis muscle are the intrinsic muscles that move the great toe.

These muscles perform abduction, adduction and flexion of the metatarsophalangeal joint of the great toe. These muscles are innervated by the medial and lateral plantar nerve.



Dorsal interossei (4) muscles - Origin: sides of the metatarsal bones. Insertion: medial and lateral sides of toe 2 and the lateral sides of toes 3 and 4. Muscle action: abduction at the metatarsophalangeal joints of toes 3 and 4, flexion of the metatarsophalangeal joints, and extension at the interphalangeal joints of toes 2-4. Innervation: Lateral plantar nerve (S₁-S₂).

The intrinsic muscles that move the foot originate on the ankle or bones of the foot. **Extensor digitorum brevis muscle** - Origin: superior and lateral surfaces of the calcaneus. Insertion: dorsal surface of toes 1-4. Muscle action: extension at the metatarsophalangeal joints of toes 1-4. Innervation: Deep fibular nerve (S₁,S₂).

47/85



Clinical Challenge: Exam Question

Which muscle is labeled in the image below?



Lateral View



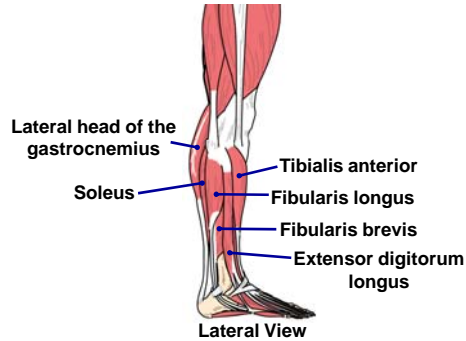
- A. Tibialis anterior.
- B. Fibularis longus.
- C. Soleus.
- D. Gastrocnemius.
- E. Extensor digitorum longus.

48/85





Clinical Challenge: Exam Answer



This question tests your knowledge of the anatomy of the anterior and posterior muscles of the lower leg. The correct answer is:

A) Tibialis anterior.



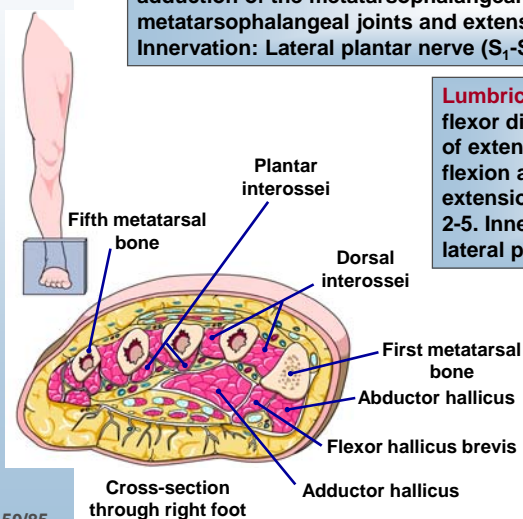
49/85



The Intrinsic Muscles that Move the Foot - 2

Plantar interossei (3) muscles - Origin: bases and medial sides of the metatarsal bones. Insertion: medial sides of toes 3-5. Muscle action: adduction of the metatarsophalangeal joints of toes 3-5 and flexion of the metatarsophalangeal joints and extension at the interphalangeal joints. Innervation: Lateral plantar nerve (S_1 - S_2).

Lumbrical muscles (4) - Origin: tendons of flexor digitorum longus. Insertion: insertions of extensor digitorum longus. Muscle action: flexion at the metatarsophalangeal joints and extension at the interphalangeal joints of toes 2-5. Innervation: Medial plantar nerve (1), lateral plantar nerve (2-4).



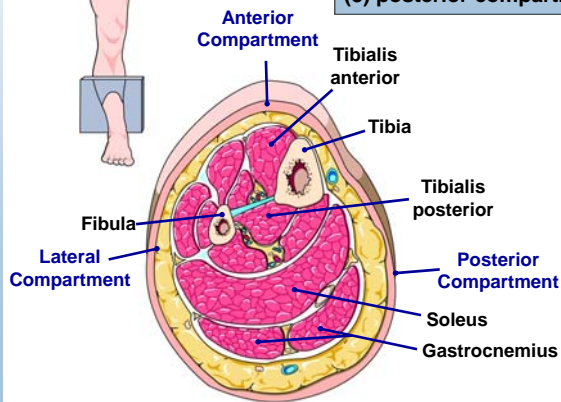
50/85



Fascia-Based Compartments

Fascia is a fibrous layer that permeates different regions of the body. **This fibrous sheet that courses through the arms and legs separates tissue into compartments.** The fascia in the thigh forms the following compartments:

- (1) anterior compartment.
- (2) medial compartment.
- (3) posterior compartment.



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Fascia-Based Compartments of the Arm

The **fascia compartments of the upper limbs** include:

- (1) Arm – the anterior compartment includes the biceps brachii and the brachialis; the posterior compartment includes the triceps brachii.
- (2) forearm – the anterior compartment includes the flexor carpi radialis and the flexor carpi ulnaris; the lateral compartment includes the brachioradialis; and the posterior compartment includes the anconeus and the extensor carpi ulnaris.



52/85

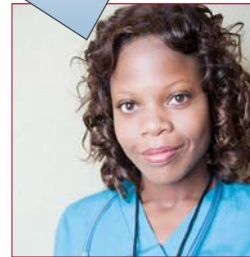




Fascia Based Compartments of the Leg

The **fascia compartments of the lower limbs** include:

(1) thigh – the anterior compartment includes the iliopsoas and the quadriceps femoris; the medial compartment includes the pectineus and the adductor brevis; and the posterior compartment includes the biceps femoris,
 (2) leg – the anterior compartment includes the extensor digitorum longus; the lateral compartment includes the fibularis brevis; and the posterior compartment includes the gastrocnemius in the superficial group and the flexor digitorum longus in the deep group.



53/85



Clinical Note: Compartment Syndrome




Blood vessels are damaged within a certain compartment

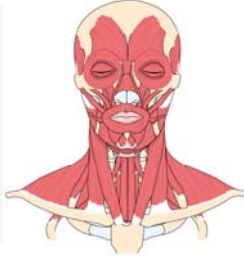
Compartment syndrome is a medical term used to describe a condition in which the blood vessels, nerves and muscle within a compartment are damaged and compressed. Trauma, including a crushing injury, can cause blood vessels to rupture and cause blood and fluid to leak into the compartment, compressing the contents of that compartment.

This can lead to ischemia in the area, as the increased pressure compresses the blood vessels completely shut. Without treatment, this can lead to permanent damage and destruction of the tissue in that compartment. Treatment for compartment syndrome includes surgery to implant drains in the area or a surgical procedure in which the fascia is cut to relieve the pressure (fasciotomy).


54/85



Axial Musculature



55/85






Axial Musculature - Overview


The **axial musculature** moves the head and the spinal column and can be grouped based on function and location into the following:

- (1) muscles of the head and neck.
- (2) muscles of the vertebral column.
- (3) rectus and oblique muscles.
- (4) muscles of the pelvic diaphragm and perineum.

The axial division of the muscular system accounts for approximately 60% of the skeletal muscles in the body.

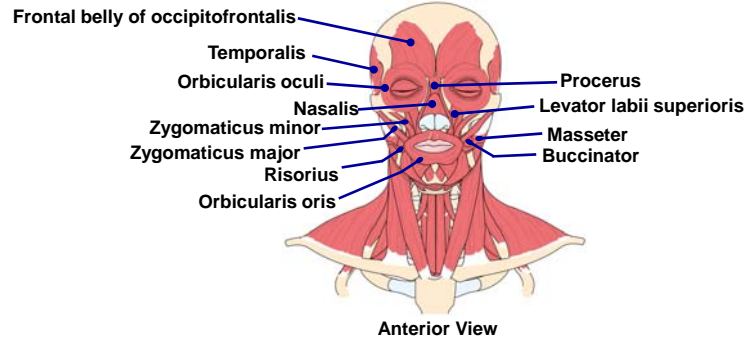


56/85





The Head and Neck Musculature



There are a number of muscles involved in facial expression located on the head, including: **Buccinator muscle** - Origin: alveolar process of the maxilla and the mandible opposite the molar teeth. Insertion: blends into the fibers of the orbicularis oris. Muscle action: compresses the cheeks. Innervation: Facial nerve (N VII).

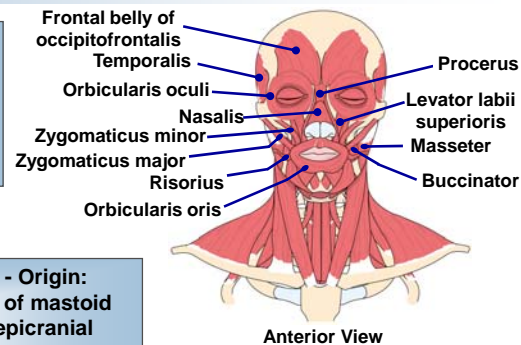
Orbicularis oris muscle - Origin: maxilla and mandible. Insertion: lips. Muscle action: compresses and purses the lips. Innervation: Facial nerve (N VII). All of the muscles of facial expression on the head are innervated by the facial nerve (N VII), with the exception of the Levator palpebrae superioris. This muscle is innervated by the oculomotor nerve (N III).

57/85



Muscles of Facial Expression - 1

Occipitofrontalis muscle (frontal belly) - Origin: epicranial aponeurosis. Insertion: skin of eyebrow and bridge of nose. Muscle action: raises eyebrows and wrinkles forehead. Innervation: Facial nerve (N VII).



Occipitofrontalis muscle (occipital belly) - Origin: superior nuchal line and adjacent region of mastoid portion of the temporal bone. Insertion: epicranial aponeurosis. Muscle action: tenses and retracts the scalp. Innervation: Facial nerve (N VII).

Procerus muscle - Origin: lateral nasal cartilages and the aponeuroses covering the inferior portion of the nasal bones. Insertion: aponeurosis at bridge of nose and skin of forehead. Muscle action: moves the nose, changes the position and shape of nostrils. Innervation: Facial nerve (N VII).

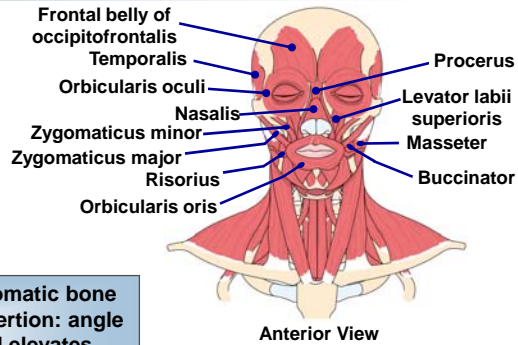
58/85





Muscles of Facial Expression – 2

Levator labii superioris muscle - Origin: inferior margin of the orbit superior to the infra-orbital foramen. Insertion: orbicularis oris. Muscle action: elevates the upper lip. Innervation: Facial nerve (N VII).



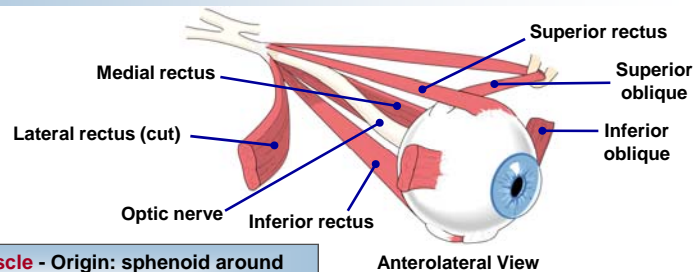
Zygomaticus major muscle - Origin: zygomatic bone near the zygomaticotemporal suture. Insertion: angle of the mouth. Muscle action: retracts and elevates the corner of the mouth. Innervation: Facial nerve (N VII).

Zygomaticus minor muscle - Origin: zygomatic bone posterior to the zygomaticomaxillary suture. Insertion: upper lip. Muscle action: retracts and elevates the upper lip. Innervation: Facial nerve (N VII).

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The Extra-Ocular Muscles



Superior oblique muscle - Origin: sphenoid around optic canal. Insertion: superior, lateral surface of the eyeball. Muscle action: eye rolls, looks down and laterally. Innervation: Oculomotor nerve (N III).

Inferior rectus muscle - Origin: sphenoid around optic canal. Insertion: inferior, medial surface of the eyeball. Muscle action: eye look down. Innervation: Oculomotor nerve (N III).

Lateral rectus muscle - Origin: sphenoid around optic canal. Insertion: lateral surface of the eyeball. Muscle action: eye look laterally. Innervation: Oculomotor nerve (N III).

There are **six extra-ocular muscles** that position the eye, and are located on the surface of the orbit. The extra-ocular muscles are the: medial rectus, lateral rectus, inferior rectus, superior rectus, inferior oblique and the superior oblique muscles.

60/85





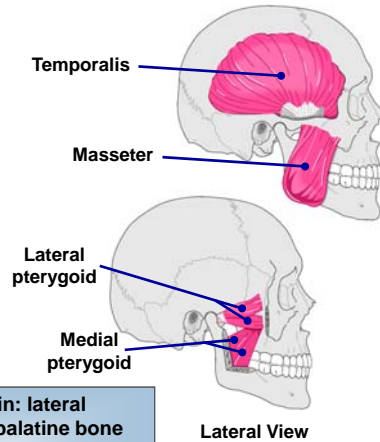
Muscles of the Head and Neck Used for Mastication

To masticate, or chew your food, the mandible and temporomandibular joint must be moved. The muscles of mastication that perform these movements are the: masseter, temporalis, medial pterygoid, and the lateral pterygoid muscle.

Masseter muscle - Origin: zygomatic arch. Insertion: lateral surface and angle of mandibular ramus. Muscle action: elevates mandible and closes the jaw. Innervation: Trigeminal nerve (N V), mandibular branch.

Pterygoid muscles (medial and lateral) - Origin: lateral pterygoid plate and adjacent portions of the palatine bone and greater wing of sphenoid. Insertion: medial surface of mandibular ramus and the anterior neck of the mandibular condyle.

Muscle action: elevates and closes the jaw, opens the jaw and protrudes the mandible bone. Innervation: Trigeminal nerve (N V), mandibular branch.

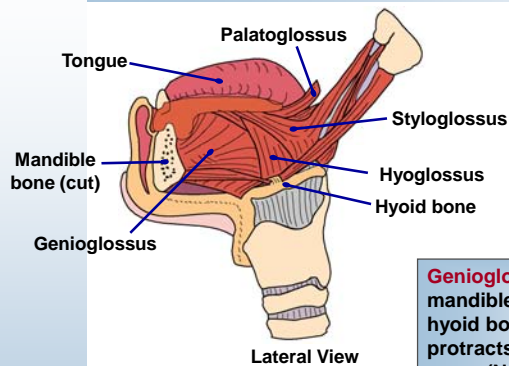


Lateral View

61/85



The Muscles of the Tongue



Lateral View

All the muscles of the tongue end in the word glossus, which is the root word for tongue. **These muscles position the tongue for chewing, drinking, swallowing and speech production.**

Genioglossus muscle - Origin: medial surface of mandible. Insertion: body of the tongue and the hyoid bone. Muscle action: depresses and protracts the tongue. Innervation: Hypoglossal nerve (N XII).

Hyoglossus muscle - Origin: body and greater horn of the hyoid bone. Insertion: side of the tongue. Muscle action: depresses and retracts the tongue. Innervation: Hypoglossal nerve (N XII).

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Clinical Challenge: Exam Question

The eye is moved within the eye orbit by a number of skeletal muscles. These muscles allow for a wide range of movement in the visual system. Which of the following statements about the extra-ocular muscles is correct?

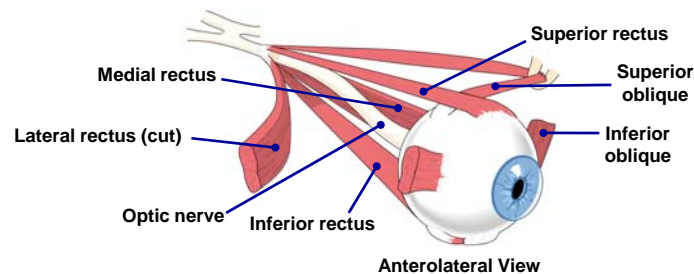
- A. There are a total of 8 extra-ocular muscles on each side of the skull.
- B. The medial oblique muscle moves the eye laterally.
- C. All of the extra-ocular muscles are innervated by the oculomotor nerve (N II).
- D. The muscle action of the superior rectus muscle is to make the eyes look up.
- E. The medial rectus muscle moves the eye laterally.



63/85



Clinical Challenge: Exam Answer



This question tests your knowledge of the anatomy and function of the extra-ocular muscles. The correct answer is:

D) The muscle action of the superior rectus muscle is to make the eyes look up.

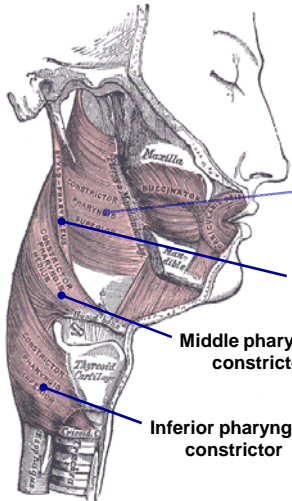


64/85





The Muscles of the Pharynx



Superior pharyngeal constrictor

Stylopharyngeus

Middle pharyngeal constrictor

Inferior pharyngeal constrictor

The muscles of the pharynx position the food bolus into the esophagus during swallowing; they also elevate the larynx.

Stylopharyngeus constrictor muscle - Origin: styloid process of the temporal bone. Insertion: thyroid cartilage. Muscle action: elevate the larynx. Innervation: Branches of pharyngeal plexus (N IX).

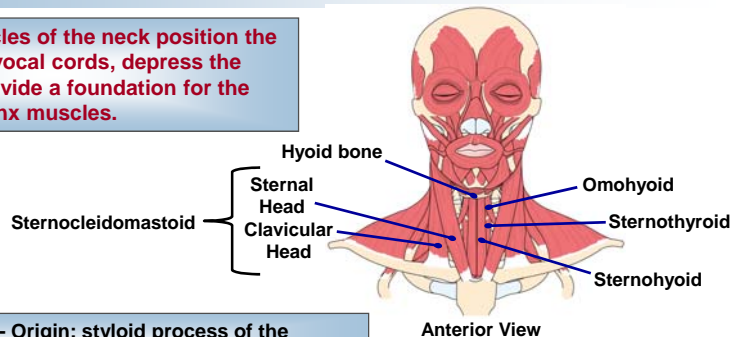
Superior constrictor muscle - Origin: pterygoid process of the sphenoid, medial surfaces of the mandible and the side of the tongue. Insertion: median raphe attached to the occipital bone. Muscle action: constrict pharynx to move the food bolus into the esophagus. Innervation: Branches of pharyngeal plexus (N X).

65/85



The Anterior Muscles of the Neck

The anterior muscles of the neck position the larynx, move the vocal cords, depress the mandible, and provide a foundation for the tongue and pharynx muscles.



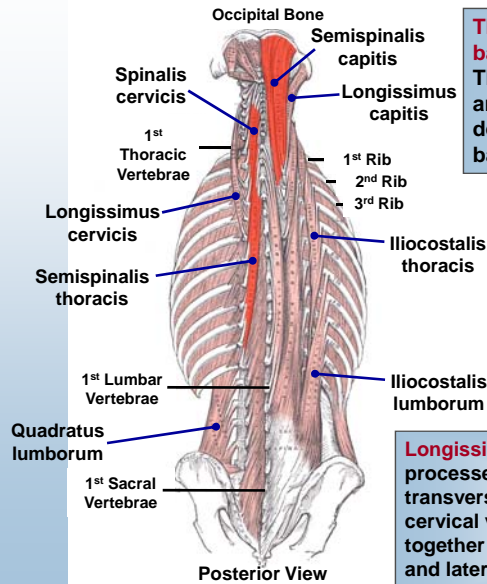
Stylohyoid muscle - Origin: styloid process of the temporal bone. Insertion: hyoid bone. Muscle action: elevates the larynx. Innervation: Facial nerve (N VII).

Sternocleidomastoid muscle (clavicular head and sternal head)- Origin: clavicular head – attaches to the sternal end of the clavicle, sternal head – attaches to the manubrium. Insertion: mastoid region of the skull and the lateral portion of the superior nuchal line. Muscle action: both the heads function together to flex the neck. Individually, one side bends the neck towards the shoulder and turns the face to the opposite side. Innervation: Accessory nerve (N XI) and the cervical spinal nerves (C₂-C₃) of the cervical plexus.

66/85



The Vertebral Column Musculature - 1



There are three layers of muscle in the back: superficial, intermediate and deep. The superficial and intermediate muscles are extrinsic muscles of the back and the deep muscles are intrinsic muscles of the back.

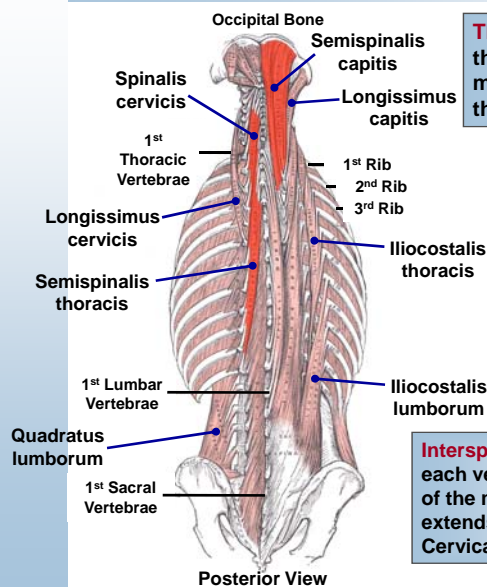
Spinalis cervicis muscle - Origin: inferior portion of the ligamentum nuchae and the spinous process of C₇. Insertion: spinous process of the axis. Muscle action: extends the neck. Innervation: Cervical spinal nerves.

Longissimus cervicis muscle - Origin: transverse processes of superior thoracic vertebrae. Insertion: transverse processes of middle and superior cervical vertebrae. Muscle action: the two sides act together to extend the neck; each side can rotate and laterally flex the neck to that side. Innervation: Cervical and thoracic spinal nerves.

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The Vertebral Column Musculature – 2



The deep muscles of the back include: the three semispinalis muscles and the multifidus, rotatores, interspinales, and the intertransversarii muscles.

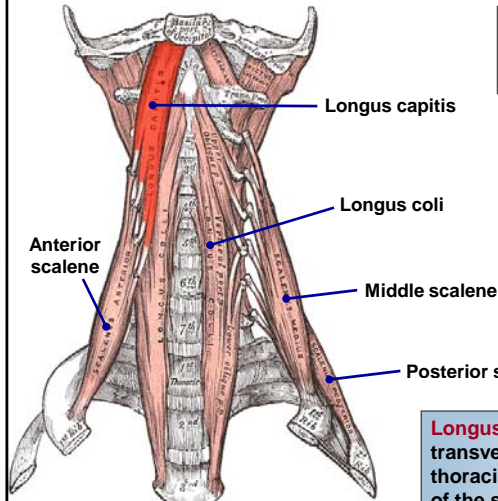
Semispinalis capitis muscle - Origin: processes of the inferior cervical and the superior thoracic vertebrae. Insertion: occipital bone. Muscle action: together, the two sides extend the neck; individually, they extend and laterally flex the neck and turn the head to the opposite side. Innervation: Cervical spinal nerves.

Interspinales muscle - Origin: spinous process of each vertebrae. Insertion: the spinous processes of the more superior vertebrae. Muscle action: extends the vertebral column. Innervation: Cervical, thoracic and lumbar spinal nerves.

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Spinal Flexor Muscles



Anterior View

The spinal flexor of the back includes: longus capitis, longus coli and the quadratus lumborum.

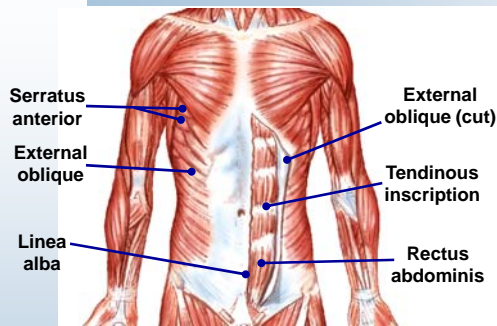
Longus capitis muscle - Origin: transverse processes of cervical vertebrae. Insertion: base of the occipital bone. Muscle action: together, the two sides flex the neck; individually, each side rotates the head to that side. Innervation: Cervical spinal nerves.

Longus coli muscle - Origin: anterior surfaces of the transverse processes of cervical and superior thoracic vertebrae. Insertion: transverse processes of the superior cervical vertebrae. Muscle action: flexes and/or rotates the neck and limits hyperextension. Innervation: Cervical spinal nerves.

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The Oblique and Rectus Musculature



Anterior View

External oblique muscle - Origin: external and inferior borders of ribs 5-12. Insertion: external oblique aponeuroses extending to the linea alba and iliac crest. Muscle action: compresses the abdomen and depresses the ribs; flexes or laterally rotates the vertebral column to the opposite side. Innervation: Intercostal nerves 5-12, iliohypogastric and the ilioinguinal nerves.

Intercostal muscles (internal and external) - Origin: external – inferior border of each rib, internal – superior border of each rib. Insertion: external – superior border of more inferior rib, internal – inferior border of the more superior rib. Muscle actions: the external intercostals elevate the ribs and the internal intercostals depress the ribs. Innervation: Intercostal nerves.

Between the vertebral column and the ventral midline are the oblique and rectus muscles. These muscles perform rotation of the vertebral column and the rectus muscles oppose the action of the erector spinae muscles. **The thoracic cavity and the abdominopelvic cavity are separated by the oblique and rectus muscles of the trunk and the diaphragm.**

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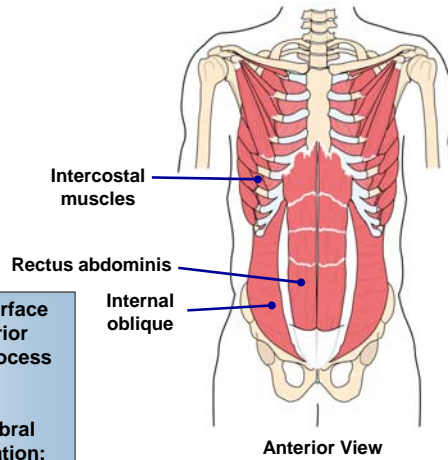
The Deep Oblique and Rectus Musculature

Internal oblique muscle - Origin: thoracolumbar fascia and iliac crest. Insertion: inferior surfaces of ribs 9-12, costal cartilages 8-10, linea alba, and the pubis.

Muscle action: compresses the abdomen; depresses the ribs and flexes and rotates the vertebral column to the same side. **Innervation:** Intercostal nerves 5-12, iliohypogastric and the ilioinguinal nerves.

Rectus abdominis muscle - Origin: superior surface of pubis around the symphysis. Insertion: inferior surfaces of cartilages (ribs 5-7) and xiphoid process of the sternum.

Muscle action: depresses the ribs, flexes vertebral column and compresses the abdomen. **Innervation:** Intercostal nerves (T₇-T₁₂).

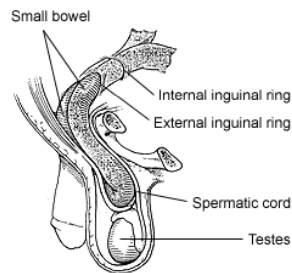


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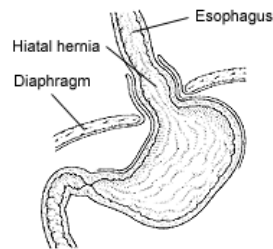


Clinical Note: Hernias

Inguinal Hernia



Hiatal Hernia



Hernia involves the protrusion of an organ or fascia through the wall that normally contains it in its cavity. The different types of hernias include an inguinal hernia and a hiatal hernia. An inguinal hernia is caused by the protrusion of an organ or tissue in the abdominal cavity into the inguinal canals.

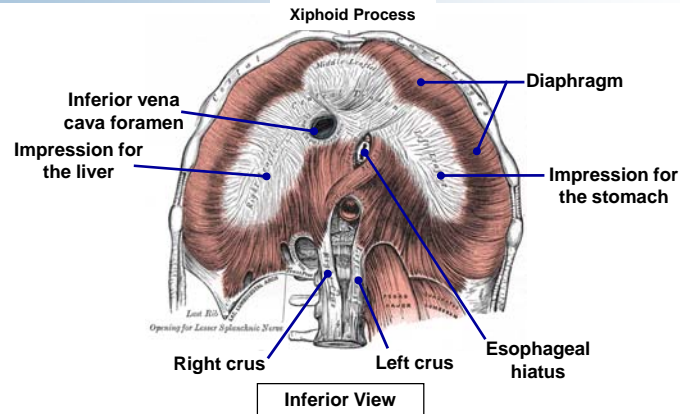
These canals normally are a passageway for the testes in the male to descend into the scrotum; this is the most common type of hernia in males. A hiatal (diaphragmatic) hernia occurs when a defect in the esophageal hiatus of the diaphragm leads to the protrusion of the stomach into the chest. Hernias can be diagnosed based on clinical history, physical exam and imaging, such as a barium swallow. Typically, hernias require surgery to repair the defect in the wall that contains the organ, or the normal passageway it lines.

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The Diaphragm



The diaphragm is a large muscle that separates the abdominopelvic and thoracic cavities. The diaphragm is part of the rectus group of muscles and its origin is the xiphoid process, ribs 7-12 and their associated cartilages, and anterior surfaces of the lumbar vertebrae. Insertion: central tendinous sheet.

Muscle action: contraction of the diaphragm expands the thoracic cavity and compresses the abdominopelvic cavity.

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Perineum and Pelvic Diaphragm Musculature

The muscles of the perineum and the pelvic diaphragm function to (1) support the organs of the pelvic cavity, (2) control the movements of material through the urethra and the anus, and (3) flex the joints of the sacrum and coccyx.

This musculature extends from the sacrum and coccyx to the ischium and pubis. The terms “pelvic diaphragm” or “anal diaphragm” pertain to the muscular sheet in that region.

The muscles of the perineum include the bulbospongiosus, ischiocavernosus, superficial transverse perineal, deep transverse perineal and the external urethral sphincter.

The muscles of the pelvic diaphragm are the coccygeus, the levator ani (iliococcygeus and the pubococcygeus) and the external anal sphincter. The pelvic diaphragm forms the foundation of the anal triangle.

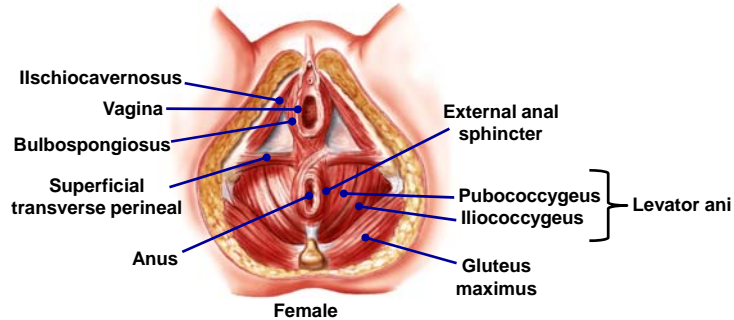


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Perineum and Pelvic Diaphragm Musculature in the Female - 1



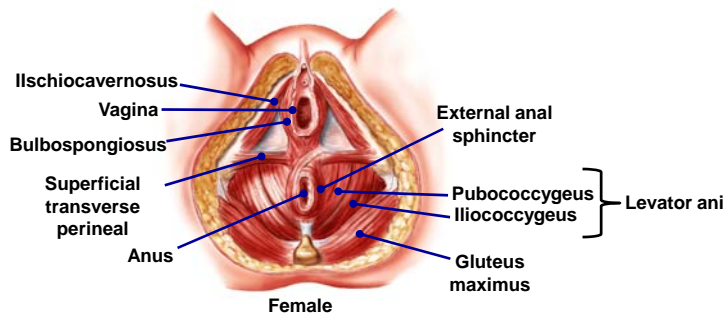
Bulbospongiosus muscle (female)- Origin: perineal body (central tendon of the perineum). Insertion: bulb of the vestibule, perineal membrane, body of the clitoris and the corpus cavernosum. Muscle action: compresses and stiffens the clitoris and narrows the vaginal opening. Innervation: Pudendal nerve, perineal branch (S₂-S₄).

External urethral sphincter (female) - Origin: ischial and pubic rami. Insertion: to median raphe; inner fibers that encircle the urethra. Muscle action: closes the urethra; compresses the vagina and greater vestibular glands. Innervation: Pudendal nerve, perineal branch (S₂-S₄).

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Perineum and Pelvic Diaphragm Musculature in the Female - 2



Ischiocavernosus muscle - Origin: ramus and tuberosity of the ischium. Insertion: corpus cavernosum of the clitoris and also to the ischiopubic ramus (in the female only). Muscle action: compresses and stiffens the clitoris. Innervation: Pudendal nerve, perineal branch (S₂-S₄).

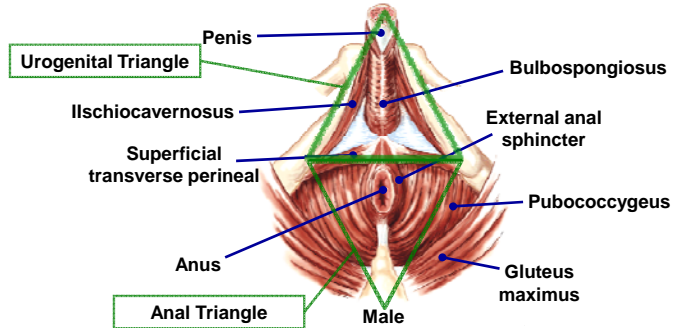
Superficial transverse perineal muscle - Origin: ischial ramus. Insertion: central tendon of the perineum. Muscle action: stabilizes the central tendon of the perineum. Innervation: Pudendal nerve, perineal branch (S₂-S₄).

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Perineum and Pelvic Diaphragm Musculature in the Male - 1



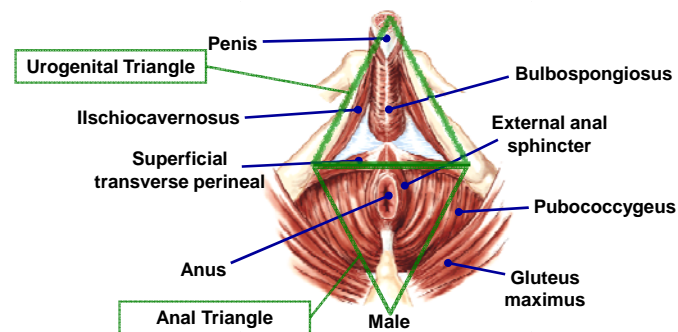
Bulbospongiosus muscle (male) - Origin: perineal body (central tendon of the perineum) and the median raphe. Insertion: corpus spongiosum, perineal membrane, and the corpus cavernosum. Muscle action: compresses base, stiffens the penis, and ejects the urine or semen. Innervation: Pudendal nerve, perineal branch (S₂-S₄).

External urethral sphincter (male) - Origin: ischial and pubic rami. Insertion: median raphe at base of the penis; inner fibers that encircle the urethra. Muscle action: closes the urethra; compresses the prostate and bulbo-urethral glands. Innervation: Pudendal nerve, perineal branch (S₂-S₄).

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Perineum and Pelvic Diaphragm Musculature in the Male - 2



Deep transverse perineal muscle - Origin: ischial ramus. Insertion: median raphe of the urogenital diaphragm. Muscle action: stabilizes the central tendon of the perineum. Innervation: Pudendal nerve, perineal branch (S₂-S₄).

Coccygeus muscle - Origin: ischial spine. Insertion: lateral, inferior borders of the sacrum and coccyx. Muscle action: flexes the coccygeal joints, elevates and supports the pelvic floor. Innervation: Inferior sacral nerves (S₄-S₅).

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Clinical Challenge: Exam Question

Which of the following statements about the bulbospongiosus muscle is correct?

- A. Only males have a bulbospongiosus muscle.
- B. In the both the male and female, the bulbospongiosus muscle is innervated by the pudendal nerve, perineal branch.
- C. In the female, the bulbospongiosus muscle inserts on the central tendon of the perineum.
- D. In the male, the bulbospongiosus muscle inserts on the central tendon of the perineum.
- E. The pelvic nerve innervates the bulbospongiosus muscle.



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Clinical Challenge: Exam Answer

Bulbospongiosus muscle (female) - Origin: perineal body (central tendon of the perineum). Insertion: bulb of the vestibule, perineal membrane, body of the clitoris and the corpus cavernosum. Muscle action: compresses and stiffens the clitoris and narrows the vaginal opening. Innervation: Pudendal nerve, perineal branch (S₂-S₄).

Bulbospongiosus muscle (male) - Origin: perineal body (central tendon of the perineum) and the medium raphe. Insertion: corpus spongiosum, perineal membrane, and the corpus cavernosum. Muscle action: compresses base, stiffens the penis, and ejects the urine or semen. Innervation: Pudendal nerve, perineal branch (S₂-S₄).

This question tests your knowledge of the anatomy and function of the muscles of the perineum and the pelvic diaphragm. The correct answer for this question was:

B) In the both the male and female, the bulbospongiosus muscle is innervated by the pudendal nerve, perineal branch.



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Clinical Terms: The Axial and Appendicular Musculature - 1

- **Hernia** – when an organ or tissue protrudes through the cavity wall that normally contains it.
- **Bursitis** – the inflammation of a bursa in one of the joints of the body.
- **Muscle Cramps** – involuntary, prolonged muscle contractions that can be painful.
- **Rotator Cuff** – the group of muscles and tendons that stabilize the shoulder.
- **Tendinitis** – inflammation of the connective tissue that surrounds a tendon.



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Clinical Terms: The Axial and Appendicular Musculature - 2

- **Myotomy** – a surgical procedure in which a muscle is cut.
- **Ischemia** – a restriction in the blood supply to an area or tissue that can lead to the damage to the tissue it supplies.
- **Sprains** – tear or damage in a ligament or tendon of the body, typically caused by the overextension of the ligament or tendon.
- **Strain** – an injury to a muscle or tendon that is a result of overstretching, also known as a “pulled” muscle.



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Learning Summary


The muscles associated with the pelvic girdle and the lower extremity can be grouped into the following categories: (1) muscles that move the thigh, (2) muscles that move the leg and the (3) muscles that move the foot and toes.

The muscles that position the pectoral girdle are: (1) Trapezius, (2) Subclavius, (3) Serratus anterior, (4) Rhomboid minor, (5) Rhomboid major, (6) Pectoralis minor, and the (7) Levator scapulae.

Fascia is a fibrous layer that permeates different regions of the body. **This fibrous sheet that courses through the arms and legs separates tissue into compartments.**

The muscles of the perineum and the pelvic diaphragm function to (1) support the organs of the pelvic cavity, (2) control the movements of material through the urethra and the anus, and (3) flex the joints of the sacrum and coccyx.

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core tutorial

Axial and Appendicular Musculature


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Step 3: Recap – Super Review Cheat Sheet

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