

Exhibit 8.3 Muscles That Move the Eyeballs: Extrinsic Muscles (Figure 8.15)

OBJECTIVE • Describe the origin, insertion, and action of the extrinsic muscles of the eyeballs.

Overview: Two types of muscles are associated with the eyeball, extrinsic and intrinsic. *Extrinsic muscles* originate outside the eyeball and are inserted on its outer surface (sclera). They move the eyeballs in various directions. *Intrinsic muscles* originate and insert entirely within the eyeball. They move structures within the eyeballs, such as the iris and the lens.

Movements of the eyeballs are controlled by three pairs of extrinsic muscles: (1) superior and inferior recti, (2) lateral and medial recti, and (3) superior and inferior obliques. Two pairs of rectus muscles move the eyeball in the direction indicated by their respective names: superior, inferior, lateral, and medial. One pair of muscles, the oblique muscles—superior and inferior—rotate the eyeball on its axis. The extrinsic muscles of the eyeballs are among the fastest contracting and most precisely controlled skeletal muscles of the body.

Strabismus is a condition in which the two eyes are not properly aligned. A lesion of the oculomotor (III) nerve, which controls the superior, inferior, and medial recti and the inferior oblique muscles, causes the eyeball to move laterally when at rest. The person cannot move the eyeball medially and inferiorly. A lesion in the abducens (VI) nerve, which innervates the lateral rectus muscle, causes the eyeball to move medially when at rest with inability to move the eyeball laterally.

Relating muscles to movements: Arrange the muscles in this exhibit according to their actions on the eyeballs: (1) elevation, (2) depression, (3) abduction, (4) adduction, (5) medial rotation, and (6) lateral rotation. The same muscle may be mentioned more than once.

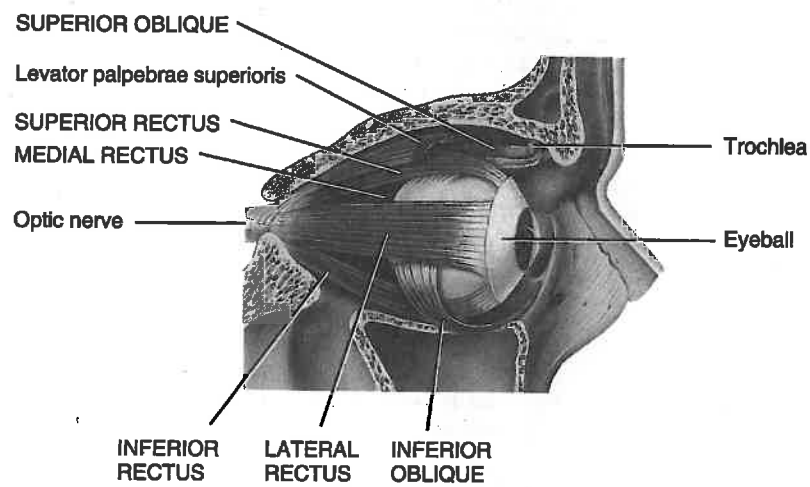
■ **CHECKPOINT**

Which muscles contract and relax in each eye as you gaze to your left without moving your head?

Muscle	Origin	Insertion	Action
Superior rectus (REK-tus; <i>superior</i> = above; <i>rect-</i> = straight; here, muscle fibers that are parallel to long axis of eyeball)	Tendinous ring attached to bony orbit around optic foramen.	Superior and central part of eyeball.	Moves eyeball upward (elevation) and medially (adduction), and rotates it medially.
Inferior rectus (<i>inferior</i> = below)	Same as above.	Inferior and central part of eyeball.	Moves eyeball downward (depression) and medially (adduction), and rotates it medially.
Lateral rectus	Same as above.	Lateral side of eyeball.	Moves eyeball laterally (abduction).
Medial rectus	Same as above.	Medial side of eyeball.	Moves eyeball medially (adduction).
Superior oblique (ō-BLĒK; <i>oblique</i> = slanting; here, muscle fibers run diagonally to long axis of eyeball)	Same as above.	Eyeball between superior and lateral recti. The muscle moves through a ring of fibrocartilaginous tissue called the trochlea (<i>trochlea</i> = pulley).	Moves eyeball downward (depression) and laterally (abduction), and rotates it medially.
Inferior oblique	Maxilla.	Eyeball between inferior and lateral recti.	Moves eyeball upward (elevation) and laterally (abduction), and rotates it laterally.

Figure 8.15 Extrinsic muscles of the eyeballs.

 The extrinsic muscles of the eyeball are among the fastest contracting and most precisely controlled skeletal muscles in the body.



Lateral view of right eyeball

 Which muscle passes through the trochlea?

Exhibit 8.4 Muscles That Act on the Anterior Abdominal Wall (Figure 8.16)

OBJECTIVE • Describe the origin, insertion, and action of the muscles that act on the anterior abdominal wall.

Overview: The anterior abdominal wall is composed of skin; fascia; and four pairs of muscles: rectus abdominis, external oblique, internal oblique, and transverse abdominis.

A **hernia** is a protrusion of an organ through a structure that normally contains it, which creates a lump that can be seen or felt through the skin's surface. The inguinal region is a weak area in the abdominal wall. It is often the site of an **inguinal hernia**, a rupture or separation of a portion of the inguinal area of the abdominal wall resulting in the protrusion of a part of the small intestine. Hernia is much more common in males than in females because the inguinal canals in males are larger to accommodate the spermatic cord and ilioinguinal nerve. Treatment of hernias most often involves surgery. The organ that protrudes is "tucked" back into the abdominal cavity and the defect in the abdominal muscles is repaired. In addition, a mesh is often applied to reinforce the area of weakness.

Relating muscles to movements:

Arrange the muscles in this exhibit according to the following actions on the vertebral column: (1) flexion, (2) lateral flexion, (3) extension, and (4) rotation. The same muscle may be mentioned more than once.

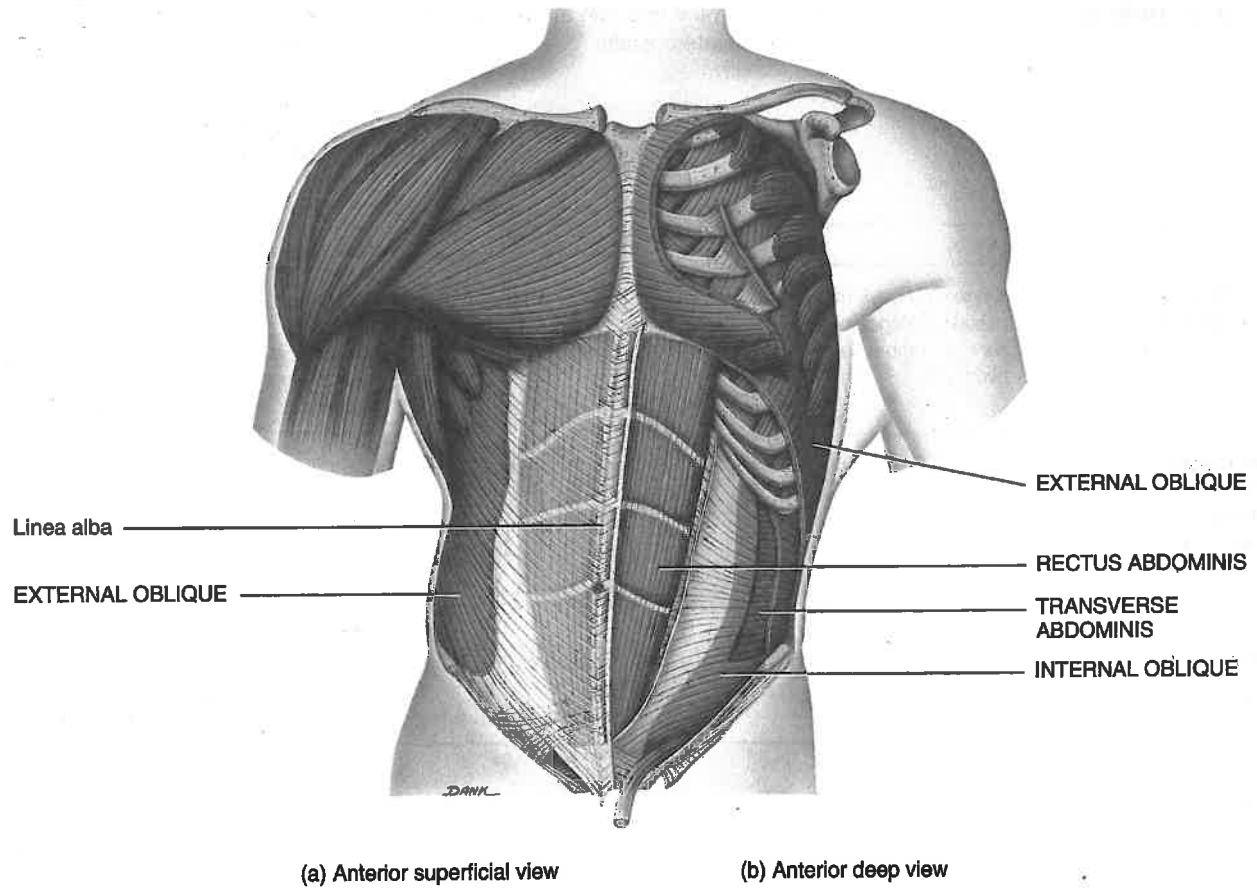
■ CHECKPOINT

Which muscles do you contract when you "suck in your tummy," thereby compressing the anterior abdominal wall?

Muscle	Origin	Insertion	Action
Rectus abdominis (REK-tus ab-DOM-in-is; <i>rect-</i> = straight, fibers parallel to midline; <i>abdomin-</i> = abdomen)	Pubis and pubic symphysis.	Cartilage of fifth to seventh ribs and xiphoid process of sternum.	Flexes vertebral column, and compresses abdomen to aid in defecation, urination, forced expiration, and childbirth.
External oblique (5-BLEK; <i>external</i> = closer to surface; <i>oblique</i> = slanting; here, fibers that are diagonal to midline)	Lower eight ribs.	Crest of ilium and linea alba (a tough connective tissue band that runs from the xiphoid process of the sternum to the pubic symphysis).	Contraction of both external obliques compresses abdomen and flexes vertebral column; contraction of one side alone bends vertebral column laterally and rotates it.
Internal oblique (<i>internal</i> = farther from surface)	Ilium, inguinal ligament, and thoracolumbar fascia.	Cartilage of last three or four ribs and linea alba.	Contraction of both internal obliques compresses abdomen and flexes vertebral column; contraction of one side alone bends vertebral column laterally and rotates it.
Transverse abdominis (<i>transverse</i> = fibers that are perpendicular to midline)	Ilium, inguinal ligament, lumbar fascia, and cartilages of last six ribs.	Xiphoid process of sternum, linea alba, and pubis.	Compresses abdomen.

Figure 8.16 Muscles of the male anterolateral abdominal wall.

 The inguinal ligament separates the thigh from the body wall.



 Which abdominal muscle aids in urination?

Exhibit 8.5 Muscles Used in Breathing (Figure 8.17)

OBJECTIVE • Describe the origin, insertion, and action of the muscles used in breathing.

Overview: The muscles described here alter the size of the thoracic cavity so that breathing can occur. Inhalation (breathing in) occurs when the thoracic cavity increases in size, and exhalation (breathing out) occurs when the thoracic cavity decreases in size.

The dome-shaped **diaphragm** is the most important muscle that powers quiet breathing. The **external intercostals**, located between the ribs, assist the diaphragm during quiet breathing. The **internal intercostals**, also between the ribs, run at right angles to the external intercostals.

Relating muscles to movements: Arrange the muscles in this exhibit according to the following actions on the size of the thorax: (1) increase in vertical dimension, (2) increase in lateral and anteroposterior dimensions, and (3) decrease in lateral and anteroposterior dimensions.

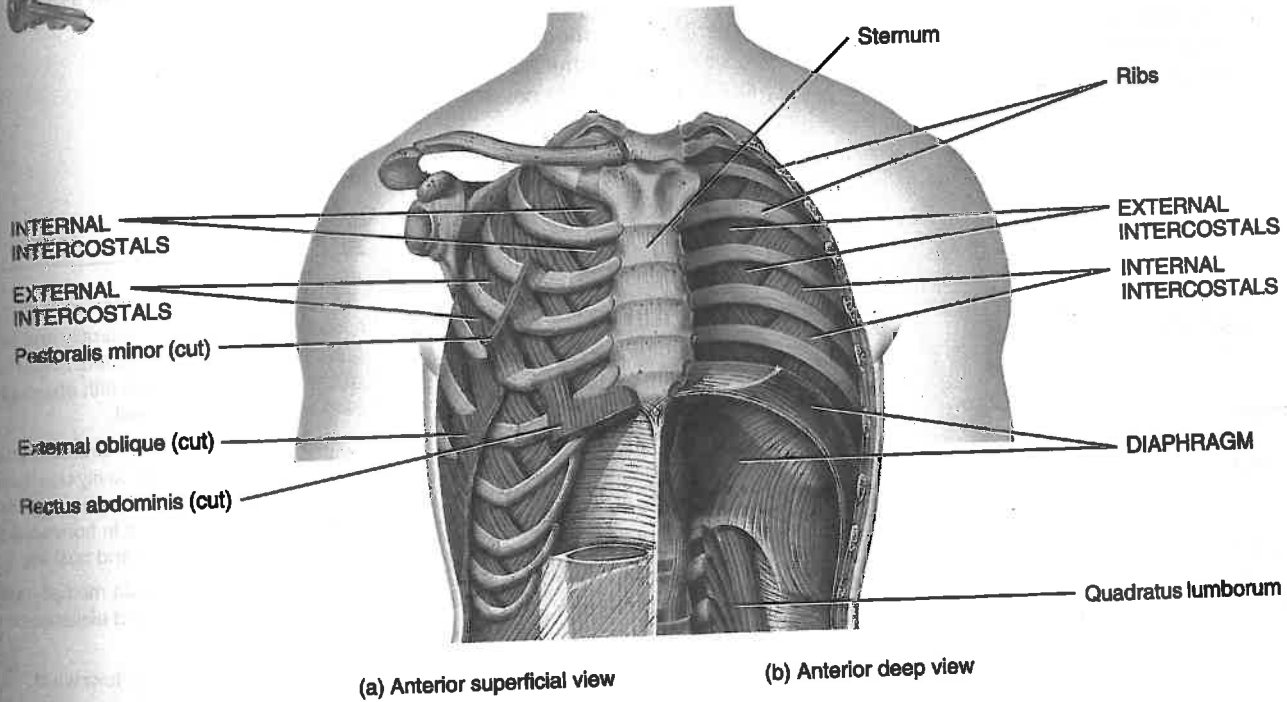
■ **CHECKPOINT**

What situations would require forceful breathing?

Muscle	Origin	Insertion	Action
Diaphragm (DĪ-a-frag; <i>dia</i> = across; <i>-phragm</i> = wall)	Xiphoid process of the sternum, costal cartilages of the inferior six ribs, lumbar vertebrae, and twelfth rib.	Central tendon.	Contraction of the diaphragm causes it to flatten and increases the vertical (top-to-bottom) dimension of the thoracic cavity, resulting in inhalation; relaxation of the diaphragm causes it to move superiorly and decreases the vertical dimension of the thoracic cavity, resulting in exhalation.
External intercostals (in'-ter-KOS-tals; <i>external</i> = closer to surface; <i>inter</i> = between; <i>costa</i> = rib)	Inferior border of rib above.	Superior border of rib below.	Contraction elevates the ribs and increases the anteroposterior (front-to-back) and lateral (side-to-side) dimensions of the thoracic cavity, resulting in inhalation; relaxation depresses the ribs and decreases the anteroposterior and lateral dimensions of the thoracic cavity, resulting in exhalation.
Internal intercostals (<i>internal</i> = farther from surface)	Superior border of rib below.	Inferior border of rib above.	Contraction draws adjacent ribs together to further decrease the anteroposterior and lateral dimensions of the thoracic cavity during forced exhalation.

Figure 8.17 Muscles used in breathing.

The muscles used in breathing after the size of the thoracic cavity.



? Which muscles contract during a normal quiet inhalation?

Exhibit 8.6 Muscles That Move the Pectoral (Shoulder) Girdle (Figure 8.18)

OBJECTIVE • Describe the origin, insertion, and action of the muscles that move the pectoral girdle.

Overview: Muscles that move the pectoral (shoulder) girdle originate on the axial skeleton and insert on the clavicle or scapula. The main action of the muscles is to hold the scapula in place so that it can function as a stable point of origin for most of the muscles that move the humerus (arm bone).

Relating muscles to movements: Arrange the muscles in this exhibit according to the following actions on the scapula: (1) depression, (2) elevation, (3) lateral and forward movement, and (4) medial and backward movement. The same muscle may be mentioned more than once.

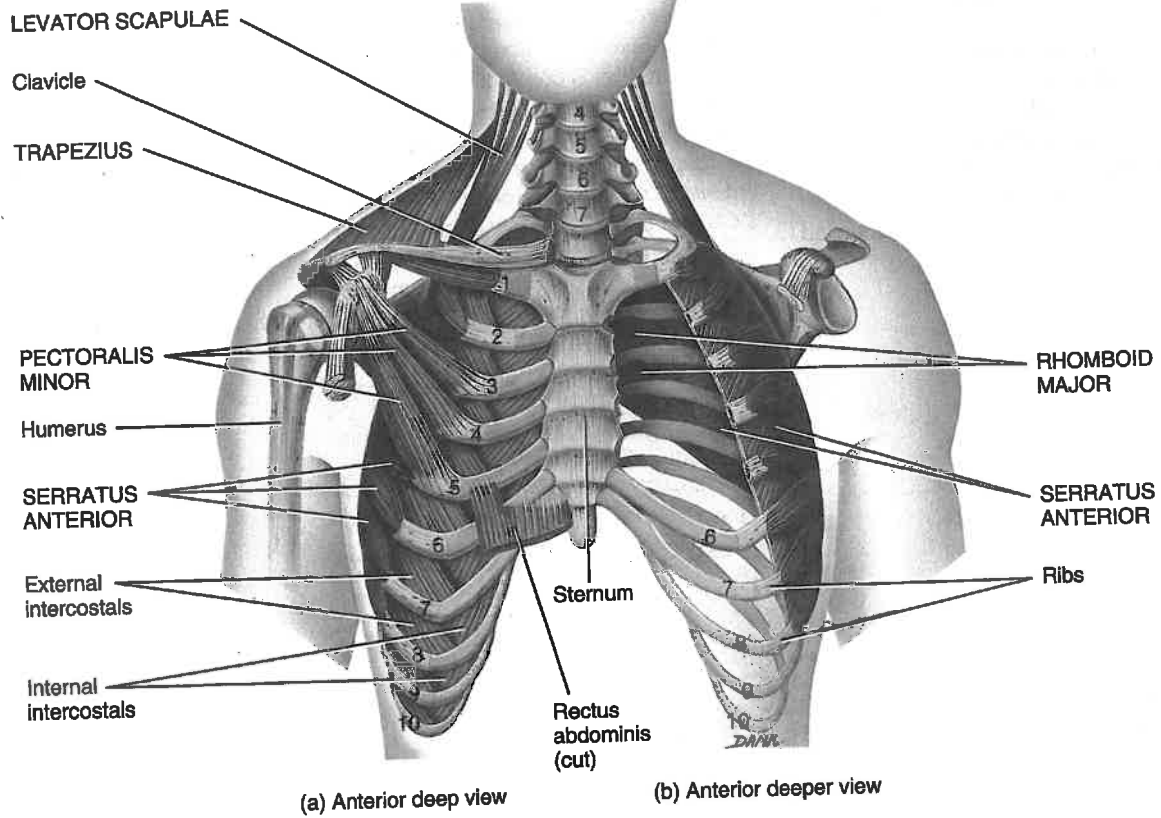
■ CHECKPOINT

Which muscle in this exhibit not only moves the pectoral girdle but also assists in forced inhalation?

Muscle	Origin	Insertion	Action
Pectoralis minor (pek'-tor-Ā-lis; <i>pect-</i> = breast, chest, thorax; <i>minor</i> = lesser)	Third through fifth ribs.	Scapula.	Depresses scapula, moves it laterally and forward, and rotates it downward (movement of glenoid cavity upward); elevates third through fifth ribs during forced inhalation when scapula is fixed.
Serratus anterior (ser-Ā-tus; <i>serratus</i> = saw-toothed; <i>anterior</i> = before)	Upper eight or nine ribs.	Scapula.	Moves scapula laterally and forward, and rotates it upward (movement of glenoid cavity downward); elevates ribs when scapula is fixed; known as "boxer's muscle" because it is important in horizontal arm movements such as punching and pushing.
Trapezius (tra-PĒ-zē-us; <i>trapezi-</i> = trapezoid-shaped) (See also Figure 8.13b.)	Occipital bone and spines of seventh cervical and all thoracic vertebrae.	Clavicle and scapula.	Elevates clavicle; moves scapula medially and backward, rotates it upward, and elevates or depresses it; extends head.
Levator scapulae (le-VĀ-tor SKA-pū-lē; <i>levator</i> = to raise; <i>scapulae</i> = of the scapula)	Upper four or five cervical vertebrae.	Scapula.	Elevates scapula and rotates it downward.
Rhomboid major (rom-BOYD); <i>rhomboid</i> = rhomboid or diamond-shaped)	Spines of second to fifth thoracic vertebrae.	Scapula.	Elevates scapula, moves it medially and backward, and rotates it downward.

Figure 8.18 Muscles that move the pectoral (shoulder) girdle.

Muscles that move the pectoral girdle originate on the axial skeleton and insert on the clavicle or scapula.



? Which muscles originate on the ribs? The vertebrae?

Exhibit 8.7 Muscles That Move the Humerus (Arm Bone) (Figure 8.19)

OBJECTIVE • Describe the origin, insertion, and action of the muscles that move the humerus.

Overview: Of the nine muscles that cross the shoulder joint, only two of them (pectoralis major and latissimus dorsi) do not originate on the scapula.

The strength and stability of the shoulder joint are provided by four deep muscles of the shoulder and their tendons: subscapularis, supraspinatus, infraspinatus, and teres minor. The tendons are arranged in a nearly complete circle around the joint, like the cuff on a shirt sleeve. This arrangement is called the **rotator cuff**.

One of the most common causes of shoulder pain and dysfunction in athletes is known as **impingement syndrome**. The repetitive movement of the arm over the head that is common in baseball, overhead racquet sports, lifting weights over the head, spiking a volleyball, and swimming puts these athletes at risk for developing this syndrome. It may also be caused by a direct blow or stretch injury. Continual pinching of the supraspinatus tendon as a result of overhead motions causes it to become inflamed and results in pain. If movement is continued despite the pain, the tendon may degenerate near the attachment to the humerus and ultimately may tear away from the bone (rotator cuff injury). Treatment consists of resting the injured tendons, strengthening the shoulder through exercise, and surgery if the injury is particularly severe.

Relating muscles to movements: Arrange the muscles in this exhibit according to the following actions on the humerus at the shoulder joint: (1) flexion, (2) extension, (3) abduction, (4) adduction, (5) medial rotation, and (6) lateral rotation. The same muscle may be mentioned more than once.

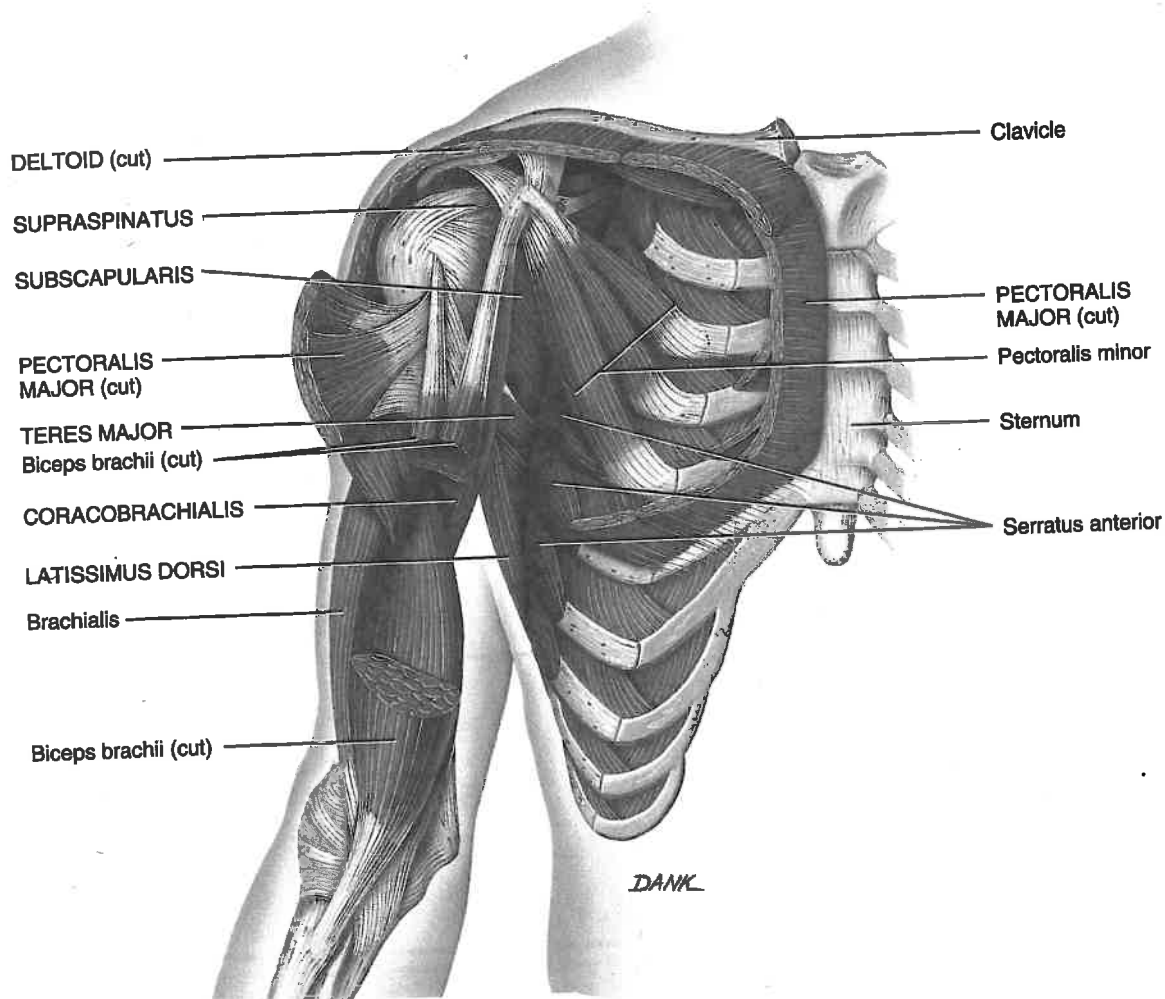
■ **CHECKPOINT**

What is the rotator cuff?

Muscle	Origin	Insertion	Action
Pectoralis major (pek'-tō-RĀ-lis; <i>pector-</i> = chest; <i>major</i> = greater) (See also Figure 8.13a.)	Clavicle, sternum, cartilages of second to sixth ribs.	Humerus.	Adducts and rotates arm medially at shoulder joint; flexes and extends arm at shoulder joint.
Latissimus dorsi (la-TIS-i-mus DOR-sī; <i>latissimus</i> = widest; <i>dorsi</i> = of the back) (See also Figure 8.13b.)	Spines of lower six thoracic vertebrae, lumbar vertebrae, sacrum and ilium, lower four ribs.	Humerus.	Extends, adducts, and rotates arm medially at shoulder joint; draws arm downward and backward.
Deltoid (DEL-toyd; <i>deltoid</i> = triangularly shaped) (See also Figure 8.13a, b.)	Clavicle and scapula.	Humerus.	Abducts, flexes, extends, and rotates arm at shoulder joint.
Subscapularis (sub-scap'-ū-LĀ-ris; <i>sub-</i> = below; <i>scapularis</i> = scapula)	Scapula.	Humerus.	Rotates arm medially at shoulder joint.
Supraspinatus (soo'-pra-spi-NĀ-tus; <i>supra-</i> = above; <i>spina-</i> = spine of scapula)	Scapula.	Humerus.	Assists deltoid muscle in abducting arm at shoulder joint.
Infraspinatus (in'-fra-spi-NĀ-tus; <i>infra-</i> = below) (See Figure 8.13b.)	Scapula.	Humerus.	Rotates arm laterally and adducts arm at shoulder joint.
Teres major (TE-rēz) (<i>teres</i> = long and round) (see Figure 8.13b.)	Scapula.	Humerus.	Extends arm at shoulder joint; assists in adduction and rotation of arm medially at shoulder joint.
Teres minor (See Figure 8.13b.)	Scapula.	Humerus.	Rotates arm laterally, extends and adducts arm at shoulder joint.
Coracobrachialis (kor'-a-kō-brā-kē-Ā-lis; <i>coraco</i> = coracoid process; <i>brachi-</i> = arm)	Scapula.	Humerus.	Flexes and adducts arm at shoulder joint.

Figure 8.19 Muscles that move the humerus (arm bone).

The strength and stability of the shoulder joint are provided by the tendons of the muscles that form the rotator cuff.



Anterior deep view (the intact pectoralis major muscle is shown in Figure 8.13a)

? Of the nine muscles that cross the shoulder joint, which two muscles do not originate on the scapula?

Exhibit 8.8 Muscles That Move the Radius and Ulna (Forearm Bones) (Figure 8.20)**OBJECTIVE • Describe the origin, insertion, and action of the muscles that move the radius and ulna.**

Overview: Recall that the elbow joint is a hinge joint, capable only of flexion and extension. The biceps brachii, brachialis, and brachioradialis are flexors of the elbow joint; the triceps brachii is an extensor. Other muscles that move the radius and ulna are concerned with supination and pronation. In the limbs, functionally related skeletal muscles and their associated blood vessels and nerves are grouped together by deep fascia into regions called **compartments**. Thus, in the arm,

the biceps brachii, brachialis, and coracobrachialis muscles constitute the **anterior (flexor) compartment**; the triceps brachii muscle forms the **posterior (extensor) compartment**.

Relating muscles to movements: Arrange the muscles in this exhibit according to the following actions: (1) flexion and extension of the elbow joint; (2) supination and pronation of the forearm; and (3) flexion and extension of the humerus. The same muscle may be mentioned more than once.

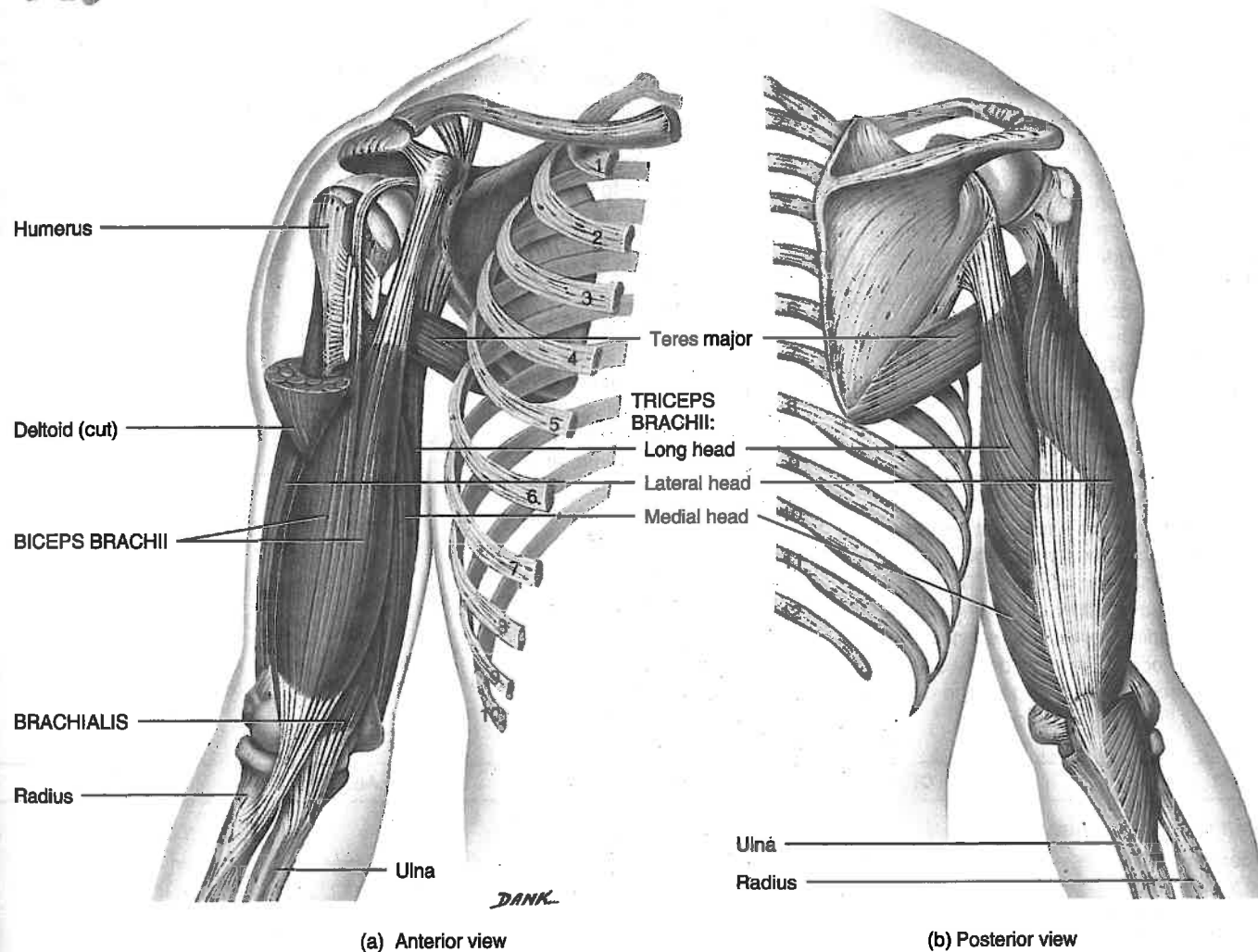
■ CHECKPOINT

Which muscles are in the anterior and posterior compartments of the arm?

Muscle	Origin	Insertion	Action
Biceps brachii (Bī-ceps BRĀ-kē-ī; <i>biceps</i> = two heads of origin; <i>brachi</i> = of the arm)	Scapula.	Radius.	Flexes and supinates forearm at elbow joint; flexes arm at shoulder joint.
Brachialis (brā'-kē-Ā-lis)	Humerus.	Ulna.	Flexes forearm at elbow joint.
Brachioradialis (brā'-kē-ō-rā'-dē-Ā-lis; <i>radi</i> = radius) (See Figure 8.21a.)	Humerus.	Radius.	Flexes forearm at elbow joint.
Triceps brachii (TRī-ceps BRĀ-kē-ī; <i>triceps</i> = three heads of origin)	Scapula and humerus.	Ulna.	Extends forearm at elbow joint; extends arm at shoulder joint.
Supinator (SOO-pi-nā-tor; <i>supination</i> = turning palm forward). (Not illustrated.)	Humerus and ulna.	Radius.	Supinates forearm.
Pronator teres (PRŌ-nā-tor TE-rēz; <i>pronation</i> = turning palm backward) (See Figure 8.21a.)	Humerus and ulna.	Radius.	Pronates forearm.

Figure 8.20 Muscles that move the radius and ulna (forearm bones).

The anterior arm muscles flex the forearm, but the posterior arm muscles extend it.



(a) Anterior view

(b) Posterior view

? What is a compartment?

Exhibit 8.9 Muscles That Move the Wrist, Hand, and Fingers (Figure 8.21)

OBJECTIVE • Describe the origin, insertion, and action of the muscles that move the wrist, hand, and fingers.

Overview: Muscles that move the wrist, hand, and fingers are located on the forearm and are many and varied. Their names for the most part give some indication of their origin, insertion, or action. On the basis of location and function, the muscles are divided into two compartments. The **anterior (flexor) compartment muscles** originate on the humerus and typically insert on the carpals, metacarpals, and phalanges. The bellies of these muscles form the bulk of the proximal forearm. The **posterior (extensor) compartment muscles** arise on the humerus and insert on the metacarpals and phalanges.

The tendons of the muscles of the forearm that attach to the wrist or continue into the hand, along with blood vessels and nerves, are held close to bones by fascia. The tendons are also surrounded by tendon sheaths. At the wrist, the deep fascia is thickened into fibrous bands called **retinacula** (re-ti-NAK-ū-lā; retinacul = a holdfast; singular is *retinaculum*). The **flexor retinaculum** is located over the palmar surface of the carpal bones. Through it pass the long flexor tendons of the fingers and wrist and the median nerve. The **extensor retinaculum** is located over the dorsal surface of the carpal bones. Through it pass the extensor tendons of the wrist and fingers.

The **carpal tunnel** is a narrow passageway formed anteriorly by the flexor retinaculum and posteriorly by the carpal bones. Through this tunnel pass the median nerve, the most superficial structure, and the long flexor tendons for the digits (Figure 8.21c). Structures within the carpal tunnel, especially the median nerve, are vulnerable to compression, and the resulting condition is called **carpal tunnel syndrome**. Compression of the median nerve leads to sensory changes over the lateral side of the hand and muscle weakness in the thenar eminence. This results in pain, numbness, and tingling of the fingers. The condition may be caused by inflammation of the digital tendon sheaths, fluid retention, excessive exercise, infection, trauma, and/or repetitive activities that involve flexion of the wrist, such as keyboarding, cutting hair, and playing a piano. Treatment may involve the use of nonsteroidal anti-inflammatory drugs (such as ibuprofen or aspirin), wearing a wrist splint, corticosteroid injections, or surgery to cut the flexor retinaculum and release pressure on the median nerve.

Relating muscles to movements:

Arrange the muscles in this exhibit according to the following actions: (1) flexion, extension, abduction, and adduction of the wrist joint and (2) flexion and extension of the phalanges. The same muscle may be mentioned more than once.

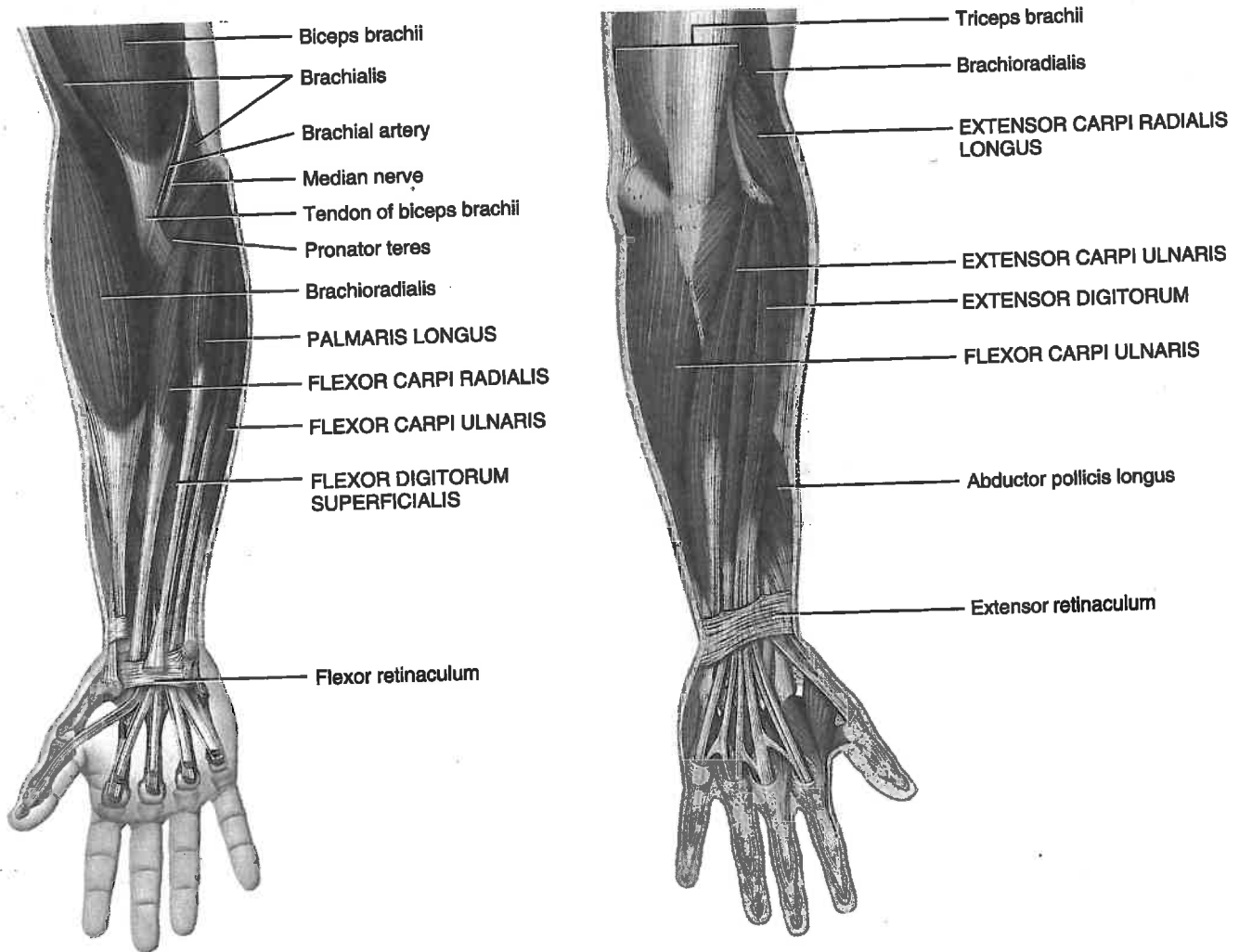
■ CHECKPOINT

Which muscles and actions of the wrist, hand, and digits are used when writing?

Muscle	Origin	Insertion	Action
Anterior (Flexor) Compartment			
Flexor carpi radialis (FLEK-sor KAR-pē rā'-dē-Ā-lis; <i>flexor</i> = decreases angle at joint; <i>carpi</i> = wrist; <i>radi-</i> = radius)	Humerus.	Second and third metacarpals.	Flexes and abducts hand at wrist joint.
Flexor carpi ulnaris (ul-NAR-is; <i>ulnar-</i> = ulna)	Humerus and ulna.	Pisiform, hamate, and fifth metacarpal.	Flexes and adducts hand at wrist joint.
Palmaris longus (pal-MA-ris LON-gus; <i>palma</i> = palm; <i>longus</i> = long)	Humerus.	Flexor retinaculum.	Weakly flexes hand at wrist joint.
Flexor digitorum superficialis (soo'-per-fish'-ē-Ā-lis; <i>digit</i> = finger or toe; <i>superficialis</i> = closer to surface)	Humerus, ulna, and radius.	Middle phalanges.	Flexes hand at wrist joint; flexes phalanges of each finger.
Flexor digitorum profundus (di'-ji-TOR-um pro-FUN-dus <i>profundus</i> = deep). (Not illustrated.)	Ulna.	Bases of distal phalanges.	Flexes hand at wrist joint; flexes phalanges of each finger.
Posterior (Extensor) Compartment			
Extensor carpi radialis longus (eks-TEN-sor; <i>extensor</i> = increases angle at joint)	Humerus.	Second metacarpal.	Extends and abducts hand at wrist joint.
Extensor carpi ulnaris	Humerus and ulna.	Fifth metacarpal.	Extends and adducts hand at wrist joint.
Extensor digitorum	Humerus.	Second through fifth phalanges.	Extends hand at wrist joint; extends phalanges.

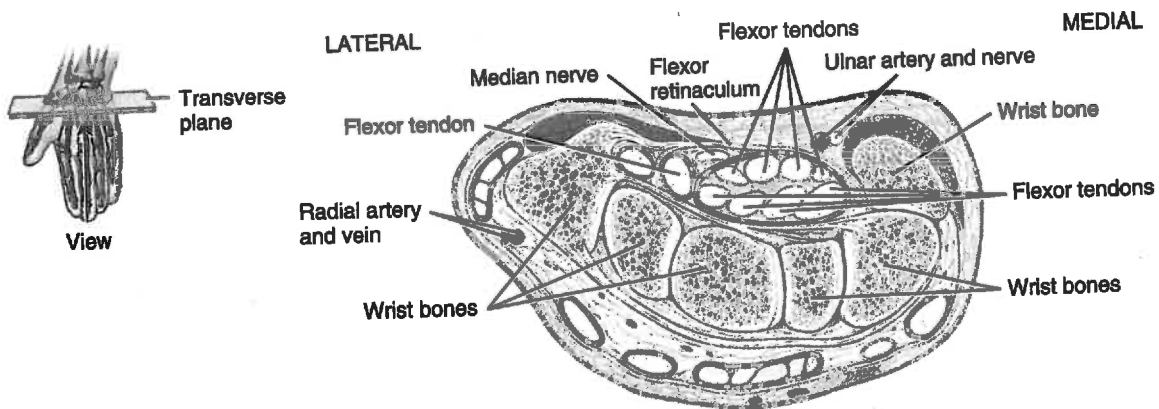
Figure 8.21 Muscles that move the wrist, hand, and fingers.

The anterior compartment muscles function as flexors, and the posterior compartment muscles function as extensors.



(a) Anterior superficial view

(b) Posterior superficial view



(c) Inferior view of transverse section

? Which nerve is associated with the flexor retinaculum?

Exhibit 8.10 Muscles That Move the Vertebral Column (Backbone) (Figure 8.22)

OBJECTIVE • Describe the origin, insertion, and action of the muscles that move the vertebral column.

Overview: The **erector spinae muscles** form the largest muscular mass of the back, forming a prominent bulge on either side of the vertebral column (Figure 8.22). It consists of three groups of overlapping muscles: **iliocostalis group** (il'-ē-ō-kos-TĀ-lis), **longissimus group** (lon'-JI-si-mus), and **spinalis group** (spi-NĀ-lis). Other muscles that move the vertebral column include the **sternocleidomastoid**, **quadratus lumborum**, **rectus abdominis** (see Exhibit 8.4), **psoas major** (see Exhibit 8.11), and **iliacus** (see Exhibit 8.11).

Full flexion at the waist, as in touching your toes, overstretches the erector spinae muscles and muscles that are overstretched cannot contract effectively. Straightening up from such a position is therefore initiated by the hamstring muscles on the back of the thigh and the gluteus maximus muscles of the buttocks. The erector spinae muscles join in as the degree of flexion decreases. **Improperly lifting a heavy weight**, however, can strain the erector spinae muscles. The result can be painful muscle spasms, tearing of tendons and ligaments of the lower back, and rupturing of intervertebral discs. The lumbar muscles are adapted for maintaining posture, not for lifting. This is why it is important to kneel and use the powerful extensor muscles of the thighs and buttocks while lifting a heavy load.

Relating muscles to movements: Arrange the muscles in this exhibit according to the following actions on the vertebral column: (1) flexion and (2) extension.

■ **CHECKPOINT**

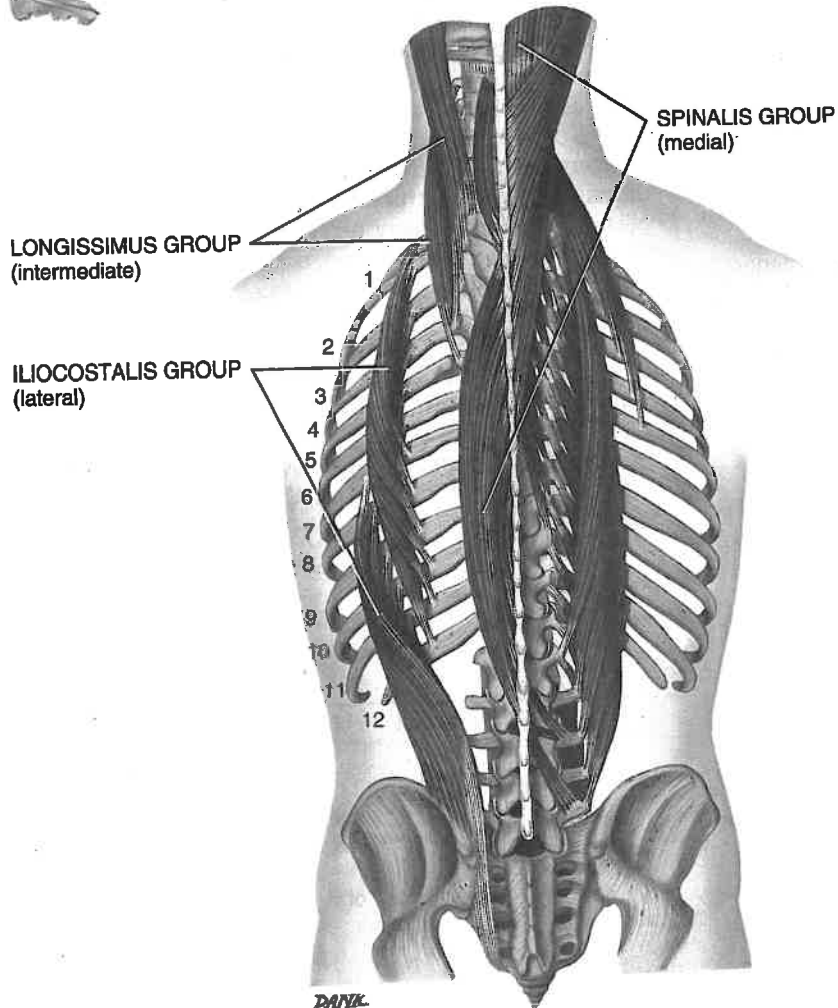
Which groups of muscles make up the erector spinae?

Muscle	Origin	Insertion	Action
Erector spinae (e-REK-tor SPI-nē; <i>erector</i> = raise; <i>spinae</i> = of the spine) (iliocostalis group, longissimus group, and spinalis group)	All ribs plus cervical, thoracic, and lumbar vertebrae.	Occipital bone, temporal bone, ribs, and vertebrae.	Extends head; extends and laterally flexes vertebral column.
Sternocleidomastoid (ster'-nō-klī-dō-MAS-toid; <i>sternum</i> = breastbone; <i>cleido-</i> = clavicle; <i>mastoid</i> = mastoid process of temporal bone) (See Figure 8.13b.)	Sternum and clavicle.	Temporal bone.	Contractions of both muscles flex cervical part of the vertebral column and flex the head; contraction of one muscle rotates head toward side opposite contracting muscle.
Quadratus lumborum (kwod-RĀ-tus lum-BOR-um; <i>quadratus</i> = four-sided; <i>lumbo</i> = lumbar region). (See Figure 8.17b.)	Ilium.	Twelfth rib and upper four lumbar vertebrae.	Contractions of both muscles extend lumbar part of the vertebral column; contraction of one muscle flexes lumbar part of vertebral column.



Figure 8.22 Major muscles that move the vertebral column (backbone).

The erector spinae muscles extend the vertebral column.



Posterior view of erector spinae muscles



Which muscles constitute the erector spinae?