

TABLE 8-1

Muscles of the Hip

MUSCLE	PROXIMAL ATTACHMENT	DISTAL ATTACHMENT	PRIMARY ACTION(S) ABOUT THE HIP	INNERVATION
Rectus femoris	Anterior inferior iliac spine (ASIS)	Patella	Flexion	Femoral (L ₂ -L ₄)
Iliopsoas		Lesser trochanter of the femur	Flexion	L ₁ and femoral
(Iliacus)	Iliac fossa and adjacent sacrum			(L ₂ -L ₄)
(Psoas)	12 th thoracic and all lumbar vertebrae and lumbar discs			(L ₁ -L ₃)
Sartorius	Anterior superior iliac spine	Upper medial tibia	Assists with flexion, abduction, and lateral rotation	Femoral (L ₂ , L ₃)
Pectineus	Pectineal crest of pubic ramus	Medial, proximal femur	Flexion, adduction and medial rotation	Femoral (L ₂ , L ₃)
Tensor fascia latae	Anterior crest of the ilium and ASIS	Iliotibial band	Assists with flexion, abduction, and medial rotation	Superior gluteal (L ₄ -S ₁)
Gluteus maximus	Posterior ilium, iliac crest, sacrum, and coccyx	Gluteal tuberosity of the femur and iliotibial band	Extension, lateral rotation	Inferior gluteal (L ₅ -S ₂)
Gluteus medius	Between posterior and anterior gluteal lines on the posterior ilium	Superior, lateral greater trochanter	Abduction, medial rotation	Superior gluteal (L ₄ -S ₁)
Gluteus minimus	Between anterior and inferior gluteal lines on the posterior ilium	Anterior surface of the greater trochanter	Abduction, medial rotation	Superior gluteal (L ₄ -S ₁)
Gracilis	Anterior, inferior pubic symphysis	Medial, proximal tibia	Adduction	Obturator (L ₃ , L ₄)
Adductor magnus	Inferior ramus of pubis and ischium	Entire linea aspera	Adduction, lateral rotation	Obturator (L ₃ , L ₄)
Adductor longus	Anterior pubis	Middle linea aspera	Adduction, assists with flexion	Obturator (L ₂ , L ₃)
Adductor brevis	Inferior ramus of the pubis	Upper linea aspera	Adduction, lateral rotation	Obturator (L ₃ , L ₄)
Semitendinosus	Medial ischial tuberosity	Proximal, medial tibia	Extension	Tibial (L ₅ -S ₁)
Semimembranosus	Lateral ischial tuberosity	Proximal, medial tibia	Extension	Tibial (L ₅ -S ₁)
Biceps femoris (long head)	Lateral ischial tuberosity	Posterior lateral condyle of tibia, head of fibula	Extension	Tibial (L ₅ -S ₂)
The six outward rotators	Sacrum, ilium, and ischium	Posterior greater trochanter	Outward rotation	(L ₅ -S ₂)

Three other key bursae associated with the knee, but not contained in the joint capsule, are the prepatellar, superficial infrapatellar, and deep infrapatellar bursae. The prepatellar bursa is located between the skin and the anterior surface of the patella, allowing free movement of the skin over the patella during flexion and extension. The superficial infrapatellar bursa provides cushioning between the skin and the patellar tendon, and the deep infrapatellar bursa reduces friction between the tibial tuberosity and the patellar tendon.

MOVEMENTS AT THE KNEE

Muscles Crossing the Knee

Like the elbow, the knee is crossed by a number of two-joint muscles. The primary actions of the muscles crossing the knee are summarized in Table 8-2.

TABLE 8-2 Muscles of the Knee

MUSCLE	PROXIMAL ATTACHMENT	DISTAL ATTACHMENT	PRIMARY ACTION(S) ABOUT THE KNEE	INNERVATION
Rectus femoris	Anterior inferior iliac spine (ASIS)	Patella	Extension	Femoral (L ₂ -L ₄)
Vastus lateralis	Greater trochanter and lateral linea aspera	Patella	Extension	Femoral (L ₂ -L ₄)
Vastus intermedius	Anterior femur	Patella	Extension	Femoral (L ₂ -L ₄)
Vastus medialis	Medial linea aspera	Patella	Extension	Femoral (L ₂ -L ₄)
Semitendinosus	Medial ischial tuberosity	Proximal medial tibia at pes	Flexion and medial rotation	Sciatic (L ₅ -S ₂)
Semimembranosus	Lateral ischial tuberosity	Proximal medial tibia	Flexion and medial rotation	Sciatic (L ₅ -S ₂)
Biceps femoris		Posterior lateral condyle of tibia, head of fibula	Flexion and lateral rotation	Sciatic (L ₅ -S ₂)
(long head)	Ischial tuberosity			
(short head)	Lateral linea aspera			
Sartorius	Anterior superior iliac spine	Proximal medial tibia at pes	Assists with flexion and lateral rotation of thigh	Femoral (L ₂ , L ₃)
Gracilis	Anterior, inferior symphysis pubis	Proximal medial tibia at pes	Adduction of thigh, flexion of lower leg	Obturator (L ₂ , L ₃)
Popliteus	Lateral condyle of the femur	Posterior medial tibia	Medial rotation and flexion	Tibial (L ₄ , L ₅)
Gastrocnemius	Posterior medial and lateral femoral condyles	Tuberosity of the calcaneus via the Achilles tendon	Flexion	Tibial (S ₁ , S ₂)
Plantaris	Distal posterior femur	Tuberosity of the calcaneus	Flexion	Tibial (S ₁ , S ₂)

TABLE 8-3

Muscles of the Ankle and Foot

MUSCLE	PROXIMAL ATTACHMENT	DISTAL ATTACHMENT	PRIMARY ACTION(S)	INNERVATION
Tibialis anterior	Upper two-thirds lateral tibia	Medial surface of first cuneiform and first metatarsal	Dorsiflexion, inversion	Deep peroneal (L ₄ -S ₁)
Extensor digitorum longus	Lateral condyle of tibia, head of fibula, and upper two-thirds anterior fibula	Second and third phalanges of the four lesser toes	Toe extension, dorsiflexion, eversion	Deep peroneal (L ₄ -S ₁)
Peroneus tertius	Lower third anterior fibula	Dorsal surface of fifth metatarsal	Dorsiflexion, eversion	Deep peroneal (L ₄ -S ₁)
Extensor hallucis longus	Middle two-thirds of the medial anterior fibula	Dorsal surface of the distal phalanx of the great toe	Dorsiflexion, inversion, and hallux extension	Deep peroneal (L ₄ -S ₁)
Gastrocnemius	Posterior medial and lateral condyles of the femur	Tuberosity of the calcaneus via the Achilles tendon	Plantar flexion	Tibial (S ₁ -S ₂)
Plantaris	Distal, posterior femur	Tuberosity of the calcaneus by the Achilles tendon	Assists with plantar flexion	Tibial (S ₁ -S ₂)
Soleus	Posterior proximal fibula and proximal two-thirds of posterior tibia	Tuberosity of the calcaneus via the Achilles tendon	Plantar flexion	Tibial (S ₁ -S ₂)
Peroneus longus	Head and upper two-thirds of the lateral fibula	Lateral surface of first cuneiform and first metatarsal	Plantar flexion, eversion	Superficial peroneal (L ₄ -S ₁)
Peroneus brevis	Distal two-thirds lateral	Tuberosity of fifth fibula	Plantar flexion, eversion metatarsal	Superficial peroneal (L ₄ -S ₁)
Flexor digitorum longus	Middle third of posterior tibia	Distal phalanx of four lesser toes	Plantar flexion, inversion, toe flexion	Tibial (L ₅ -S ₁)
Flexor hallucis longus	Middle two-thirds of the posterior fibula	Distal phalanx of the great toe	Plantar flexion, inversion, toe flexion	Tibial (L ₄ -S ₂)
Tibialis posterior	Posterior upper two-thirds tibia and fibula and interosseous membrane	Cuboid, navicular, and second to fifth metatarsals	Plantar flexion, inversion	Tibial (L ₅ -S ₁)

involved. Turning the sole of the foot outward is termed *eversion*. The muscles primarily responsible for eversion are the peroneus longus and the peroneus brevis, both with long tendons coursing around the lateral malleolus. The peroneus tertius assists.

Pronation and Supination

During walking and running the foot and ankle undergo a cyclical sequence of movements (Figure 8-24). As the heel contacts the ground, the rear portion of the foot typically inverts to some extent. When the

TABLE 7-1
Muscles of the Shoulder

MUSCLE	PROXIMAL ATTACHMENT	DISTAL ATTACHMENT	PRIMARY ACTION(S)	INNERVATION
Deltoid	Outer third of the clavicle, top of the acromion, and scapular spine	Deltoid tuberosity of the humerus		Axillary (C ₅ , C ₆)
(Anterior)			Flexion, horizontal adduction, medial rotation	
(Middle)			Abduction, horizontal abduction	
(Posterior)			Extension, horizontal abduction, lateral rotation	
Pectoralis major		Lateral aspect of the humerus just below the head		
(Clavicular)	Medial two-thirds of the clavicle		Flexion, horizontal adduction, medial rotation	Lateral pectoral (C ₅ -T ₁)
(Sternal)	Anterior sternum and cartilage of 1 st six ribs		Extension, adduction, horizontal adduction, medial rotation	Medial pectoral (C ₅ -T ₁)
Supraspinatus	Supraspinous fossa	Greater tuberosity of the humerus	Abduction, assists with lateral rotation	Suprascapular (C ₅ , C ₆)
Coracobrachialis	Coracoid process of the scapula	Medial anterior humerus	Flexion, adduction, horizontal adduction	Musculocutaneous (C ₅ -C ₇)
Latissimus dorsi	Lower six thoracic and all lumbar vertebrae, posterior sacrum, iliac crest, lower three ribs	Anterior humerus	Extension, adduction, medial rotation, horizontal abduction	Thoracodorsal (C ₆ -C ₈)
Teres major	Lower, lateral, dorsal scapula	Anterior humerus	Extension, adduction, medial rotation	Subscapular (C ₅ , C ₆)
Infraspinatus	Infraspinous fossa	Greater tubercle of the humerus	Lateral rotation, horizontal abduction	Subscapular (C ₅ , C ₆)
Teres minor	Posterior, lateral border of scapula	Greater tubercle and adjacent shaft of humerus	Lateral rotation, horizontal abduction	Axillary (C ₅ , C ₆)
Subscapularis	Entire anterior surface of scapula	Lesser tubercle of the humerus	Medial rotation	Subscapular (C ₅ , C ₆)
Biceps brachii		Radial tuberosity		Musculocutaneous (C ₅ -C ₇)
(Long head)	Upper rim of the glenoid fossa		Assists with abduction	
(Short head)	Coracoid process of the scapula		Assists with flexion, adduction, medial rotation, and horizontal abduction	
Triceps brachii (Long head)	Just inferior to the glenoid fossa	Olecranon process of the ulna	Assists with extension and adduction	Radial (C ₅ -T ₁)

MOVEMENTS AT THE ELBOW

Muscles Crossing the Elbow

Numerous muscles cross the elbow, including those that also cross the shoulder or extend into the hands and fingers. The muscles classified as primary movers of the elbow are summarized in Table 7-2.

Flexion and Extension

The muscles crossing the anterior side of the elbow are the elbow flexors (Figure 7-21). The strongest of the elbow flexors is the brachialis.

TABLE 7-2
Muscles of the Elbow

MUSCLE	PROXIMAL ATTACHMENT	DISTAL ATTACHMENT	PRIMARY ACTION(S)	INNERVATION
Biceps brachii		Radial tuberosity	Flexion, assists with supination	Musculocutaneous (C ₅ -C ₇)
(Long head)	Upper rim of the glenoid fossa			
(Short head)	Coracoid process of the scapula			
Brachioradialis	Upper two-thirds of the lateral supracondylar ridge of the humerus	Styloid process of the radius	Flexion, pronation from a supinated position to neutral, supination from a pronated position to neutral	Radial (C ₅ , C ₆)
Brachialis	Anterior lower half of the humerus	Anterior coronoid process of ulna	Flexion	Musculocutaneous (C ₅ , C ₆)
Pronator Teres		Lateral midpoint of the radius	Pronation, assists with flexion	Median (C ₆ , C ₇)
(Humeral head)	Medial epicondyle of the humerus			
(Ulnar head)	Coronoid process of the ulna			
Pronator quadratus	Lower fourth of the anterior ulna	Lower fourth of the anterior radius	Pronation	Anterior interosseous (C ₈ , T ₁)
Triceps brachii		Olecranon process of the ulna	Extension	Radial (C ₆ -C ₈)
(Long head)	Just inferior to the glenoid fossa			
(Lateral head)	Upper half of the posterior humerus			
(Medial head)	Lower two-thirds of the posterior humerus			
Anconeus	Posterior, lateral epicondyle of the humerus	Lateral olecranon and posterior ulna	Assists with extension	Radial (C ₇ , C ₈)
Supinator	Lateral epicondyle of the humerus and adjacent ulna	Lateral upper third of the radius	Supination	Posterior interosseous (C ₅ , C ₆)

TABLE 9-1

Muscles of the Spine

MUSCLE	PROXIMAL ATTACHMENT	DISTAL ATTACHMENT	PRIMARY ACTION(S) ABOUT THE HIP	INNERVATION
Prevertebral muscles (rectus capitis anterior, rectus capitis lateralis, longus capitis, longus coli)	Anterior aspect of occipital bone and cervical vertebrae	Anterior surfaces of cervical and first three thoracic vertebrae	Flexion, lateral flexion, rotation to opposite side	Cervical nerves (C ₁ -C ₆)
Rectus abdominis	Costal cartilage of ribs 5-7	Pubic crest	Flexion, lateral flexion	Intercostal nerves (T ₆ -T ₁₂)
External oblique	External surface of lower eight ribs	Linea alba and anterior iliac crest	Flexion, lateral flexion, rotation to opposite side	Intercostal nerves (T ₇ -T ₁₂)
Internal oblique	Linea alba and the lower four ribs	Inguinal ligament, iliac crest, and the lumbodorsal fascia	Flexion, lateral flexion, rotation to same side	Intercostal nerves (T ₇ -T ₁₂ , L ₁)
Splenius (capitis and cervicis)	Mastoid process of the temporal bone, transverse processes of the first three cervical vertebrae	Lower half of the ligamentum nuchae, spinous processes of seventh cervical and upper six thoracic vertebrae	Extension, lateral flexion, rotation to same side	Middle and lower cervical nerves (C ₄ -C ₈)
The suboccipitals (obliquus capitus superior and inferior, rectus capitis posterior major and minor)	Occipital bone, transverse process of the first cervical vertebra	Posterior surfaces of the first two cervical vertebrae	Extension, lateral flexion, rotation to same side	Suboccipital nerve (C ₁)
Erector spinae (spinalis, longissimus, and iliocostalis)	Lower part of the ligamentum nuchae, posterior cervical, thoracic, and lumbar spine, lower 9 ribs, iliac crest, posterior sacrum	Mastoid process of the temporal bone, posterior cervical, thoracic, and lumbar spine, twelve ribs	Extension, lateral flexion, rotation to opposite side	Spinal nerves (T ₁ -T ₁₂)
Semispinalis (capitis, cervicis, and thoracis)	Occipital bone, spinous processes of thoracic vertebrae 2-4	Transverse processes of the thoracic and seventh cervical vertebrae	Extension, lateral flexion, rotation to opposite side	Cervical and thoracic spinal nerves (C ₁ -T ₁₂)
The deep spinal muscles (multifidi, rotatores, interspinales, intertransversarii, levatores costarum)	Posterior processes of all vertebrae, posterior sacrum	Spinous and transverse processes and laminae of vertebrae below those of the proximal attachment	Extension, lateral flexion, rotation to opposite side	Spinal and intercostal nerves (T ₁ -T ₁₂)
Sternocleidomastoid	Mastoid process of the temporal bone	Superior sternum, inner third of the clavicle	Flexion of the neck, extension of the head, lateral flexion, rotation to opposite side	Accessory nerve and C ₂ spinal nerve
Levator scapulae	Transverse processes of the first four cervical vertebrae	Vertebral border of the scapula	Lateral flexion	Spinal nerves (C ₃ -C ₄), dorsal scapular nerve (C ₃ -C ₅)
Scaleni (scalenus anterior, medius, and posterior)	Transverse processes of the cervical vertebrae	Upper two ribs	Flexion, lateral flexion	Cervical nerves (C ₃ -C ₇)
Quadratus lumborum	Last rib, transverse processes of the first four lumbar vertebrae	Iliolumbar ligament, adjacent iliac crest.	Lateral flexion	Spinal nerves (T ₁₂ -L ₄)
Psoas major	Sides of twelfth thoracic and all lumbar vertebrae	Lesser trochanter of the femur	Flexion	Femoral nerve (L ₁ -L ₃)