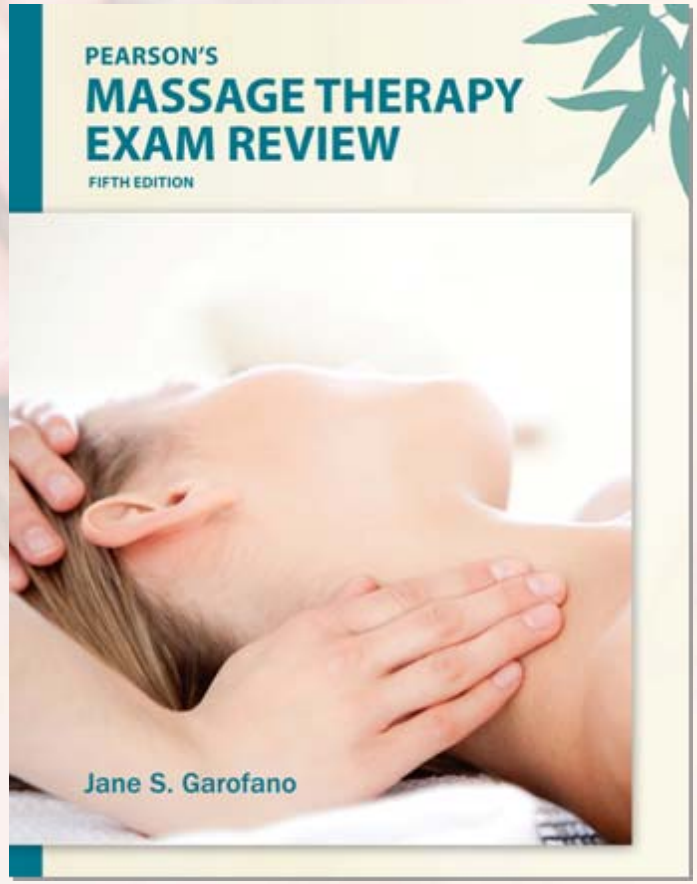
PEARSON'S MASSAGE THERAPY EXAM REVIEW

FIFTH EDITION



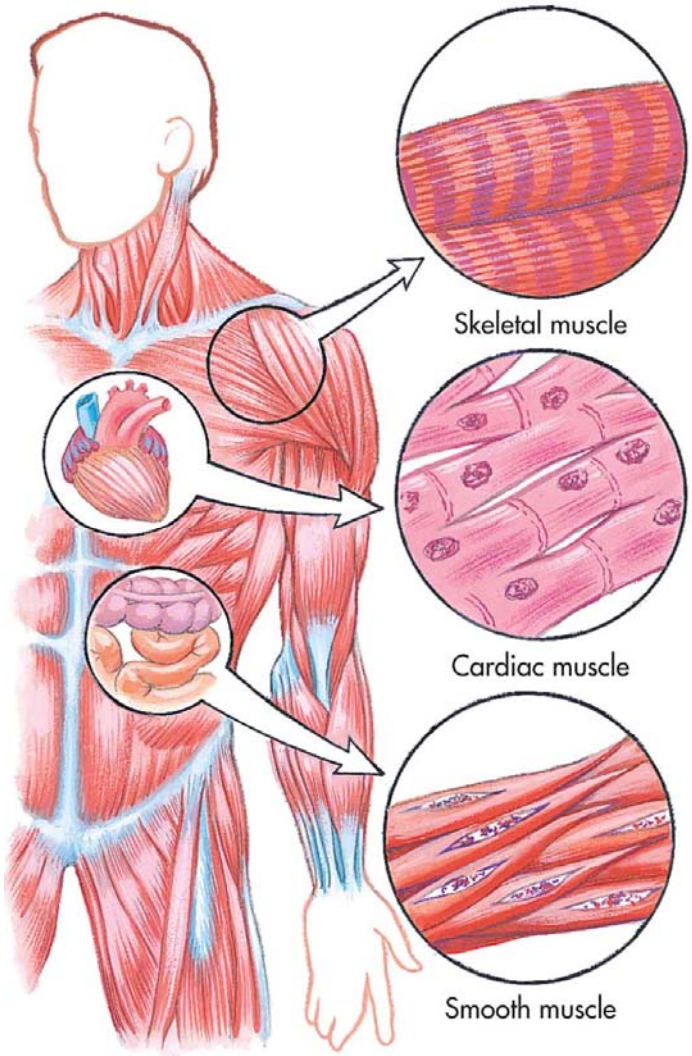
Muscular System

Functions of the Musculoskeletal System

- Gives the body shape
- Protects internal organs
- Provides for movement
- Consists of more than 600 muscles

Types of Muscle

- Skeletal (voluntary) muscle; muscles to be studied
  - Attached to the bones of the body
  - Carries out the automatic muscular functions of the body, digestion, bladder, uterus, blood vessels, diaphragm
- Cardiac muscle
  - Involuntary, heart



Three Types of Muscle. A. Skeletal B. Cardiac C. Smooth

Characteristics of Muscle

- Has ability to stretch (extensibility)
- Returns to resting position (elasticity)
- Transmits stimuli (conductivity)
- Responds to stimuli (excitability)
- Has ability to shorten (contractibility)

General Assessment and Observation of Muscles

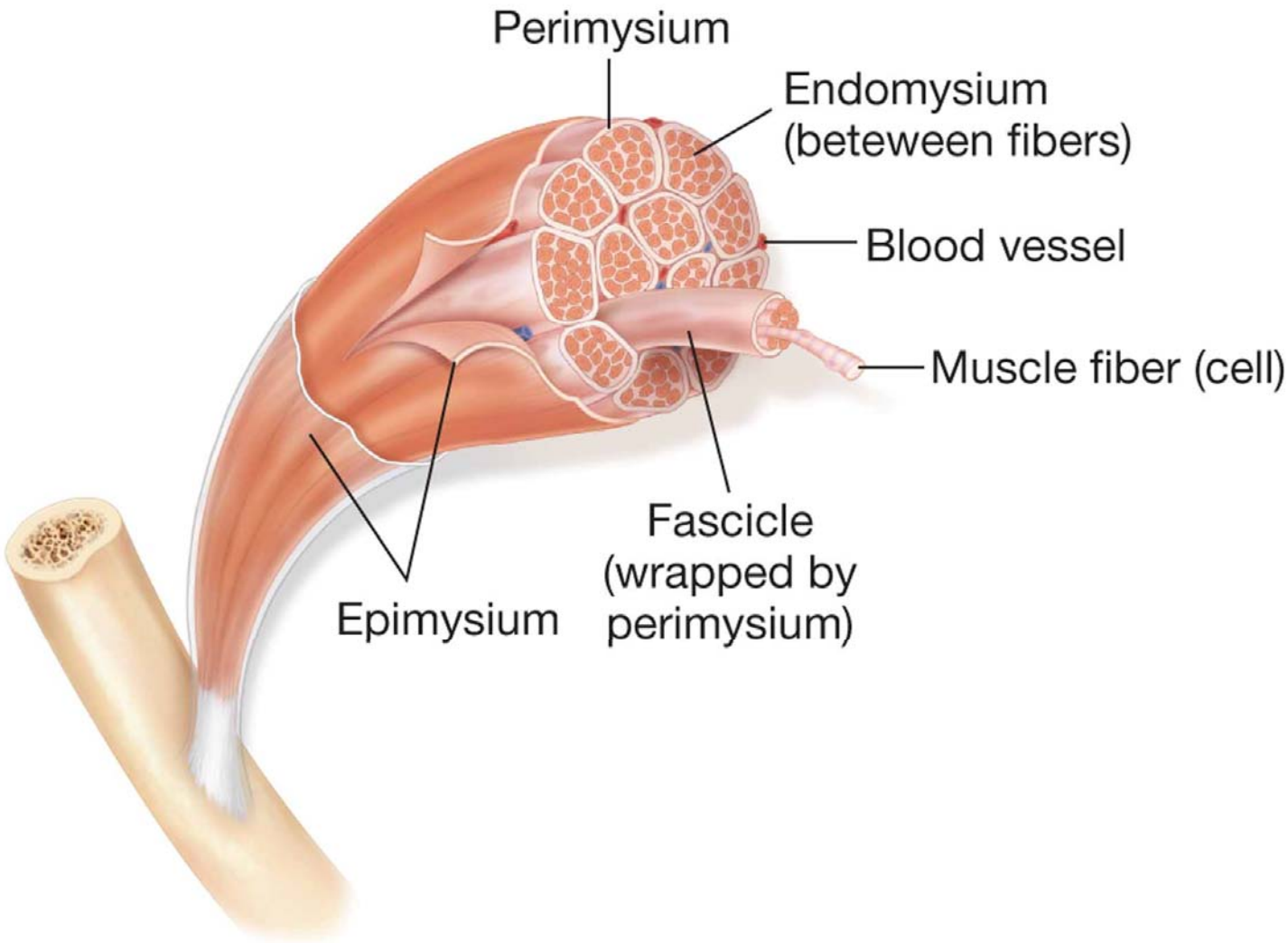
- Range of motion (limited)
- Atrophy
- Numbness/tingling
- Spasms
- Pain/tenderness
- Low back
- Neck pain
- Paralysis
- Tonicity
- Hypertonicity
- Flaccidity

Muscle Deviations

- Hypertonicity
- Flaccidity
- Twitching
- Spasms

Muscle Anatomy

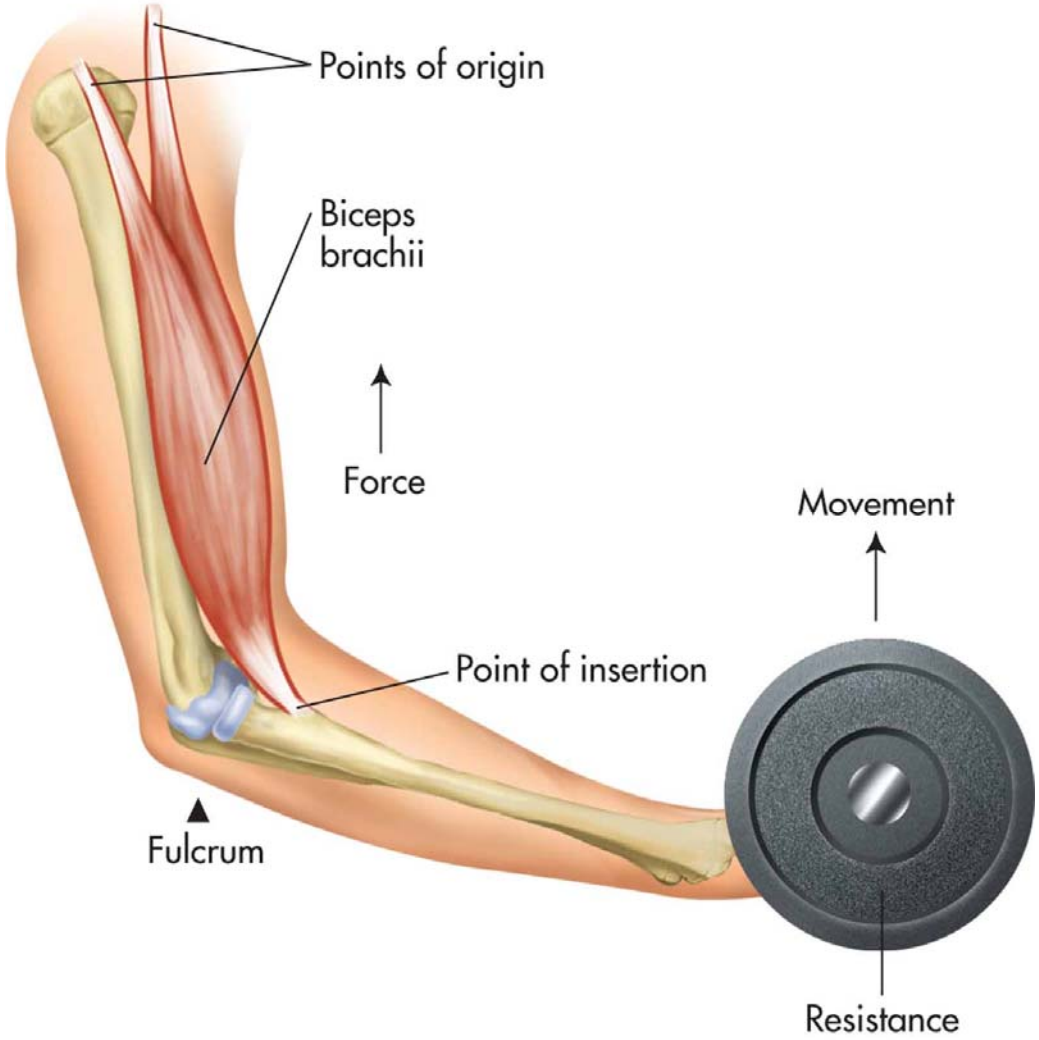
Motor unit	Contractile unit made up of sarcomeres and a neuron that innervates it
Actin protein	Thin filaments of motor unit
Myosin protein	Thick filaments of motor unit with heads for movement
Sarcolemma	Membrane around muscle
Epimycium	Muscle fibers making up connective tissue at the neuromuscular junction where nerve synapse meets muscle



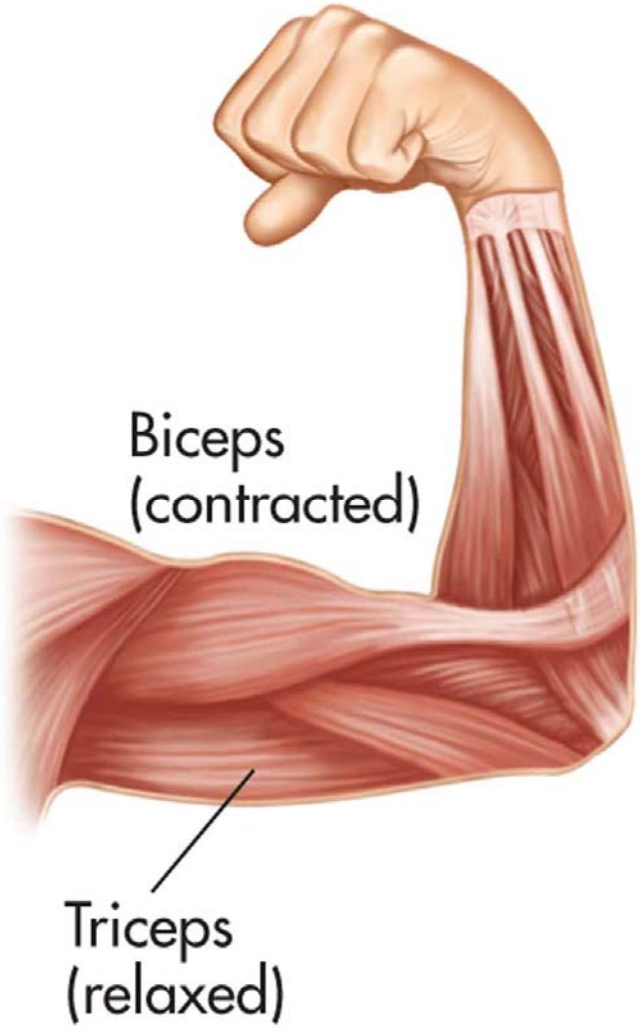
A skeletal muscle is composed of a group of fibers held together by connective tissue called fascia.

Muscle Attachments

Tendon	Dense, fibrous tissue that connects muscle to bone; has high concentration of collagen
Origin	Attachment to more stationary bone of action
Insertion	Attachment to more movable bone of action
Aponeurosis	Sheet of connective tissue
Superficial connective tissue	Areola below the skin attached to muscle



Flexion at the elbow as a 3rd-Class lever system.



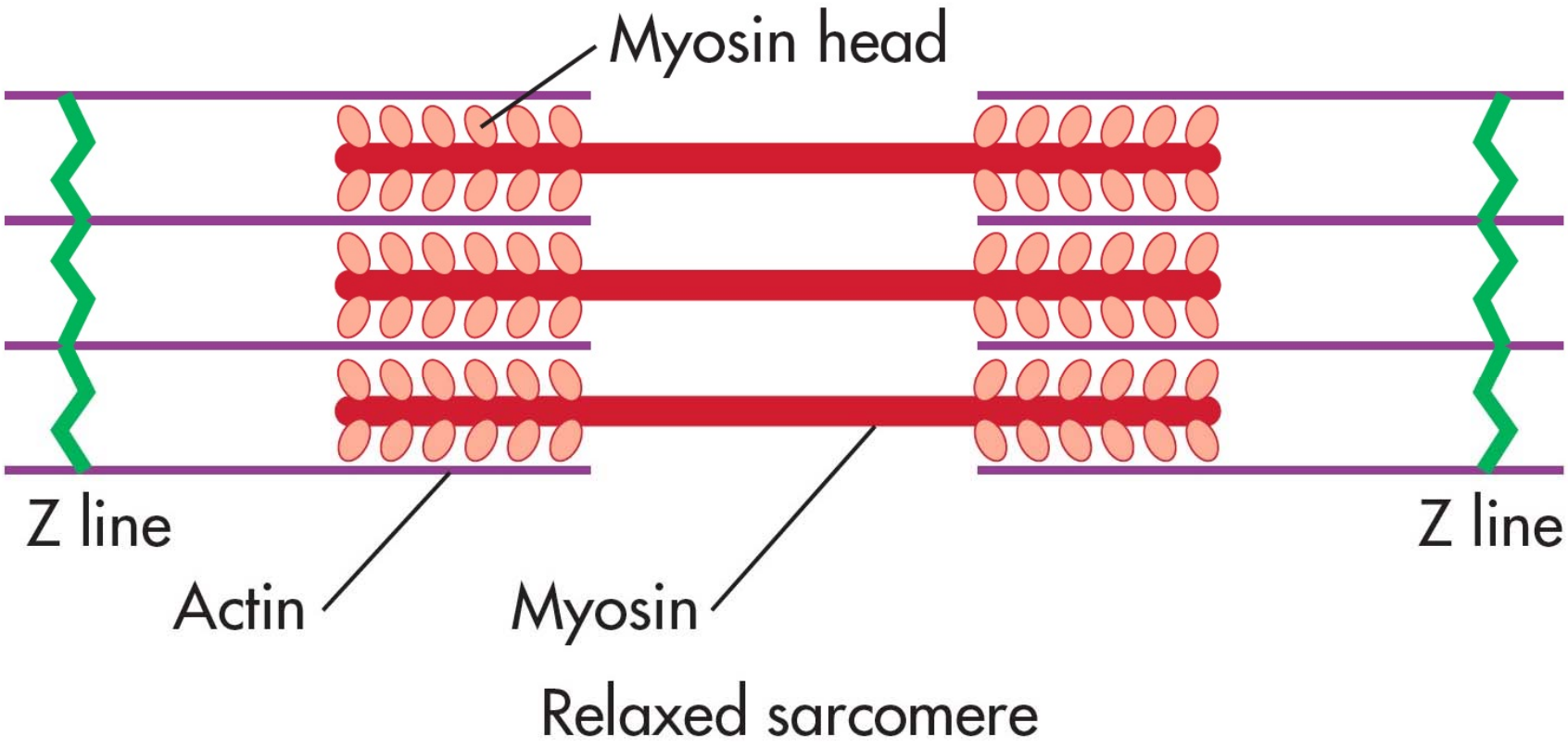
Coordination of muscles to perform movement.

Contraction of Skeletal Muscle

- A motor unit consists of muscle fibers (cells) innervated by a branch from an axon
- Impulses received by brain/spinal cord → stimulate motor unit → release acetylcholine → stimulates muscle fiber to release calcium → causes actin and myosin to bind in presence of adenosine triphosphate (ATP) → causes contraction

Action Potential

- Motor unit responds to nerve stimulation at neuromuscular junction during *latent period*; is followed by release of *neurotransmitter and* NA^+ *ions entering, resulting in muscle contracting;* contracting period; and ending in muscle relaxation and breakdown of neurotransmitter acetylcholine; *relaxation period.*



Relaxed and Contracted Sarcomeres

Types of Muscle Contractions

Muscle twitch	Single muscle contraction in motor unit
Isometric	Contraction without changing length (push against wall)
Isotonic	Contraction with change of length concentric brings origin/insertion of muscle together against pressure
Spasm	Involuntary contraction
Tetanus	Sustained contraction
Contracture	Inability of muscle to relax after contraction
Treppe	Repeated stimulation

Provide origin, insertion, and action of each of the selected muscles:

- Face, Head, and Neck
  - Frontalis
  - Orbicularis oculi
  - Orbicularis oris
  - Buccinator
  - Zygomaticus
  - Masseter
  - Temporalis
  - Platysma
  - Sternocleidomastoid
- Chest and Trunk
  - Pectoralis major
  - Pectoralis minor
  - Serratus anterior
  - Subscapulais
  - Rectus abdominis
  - External oblique
  - Internal oblique
  - Transverse abdominis

Provide origin, insertion, and action of each of the selected muscles:

- Back
  - Levator scapulae
  - Trapezius
    - Upper
    - Middle
    - Lower
  - Rhomboids
    - Major
    - Minor
  - Supraspinatus
  - Infraspinatus
  - Teres minor
  - Teres major
  - Quadratus lumborum
  - Latissimus dorsi

Provide origin, insertion, and action of each of the selected muscles:

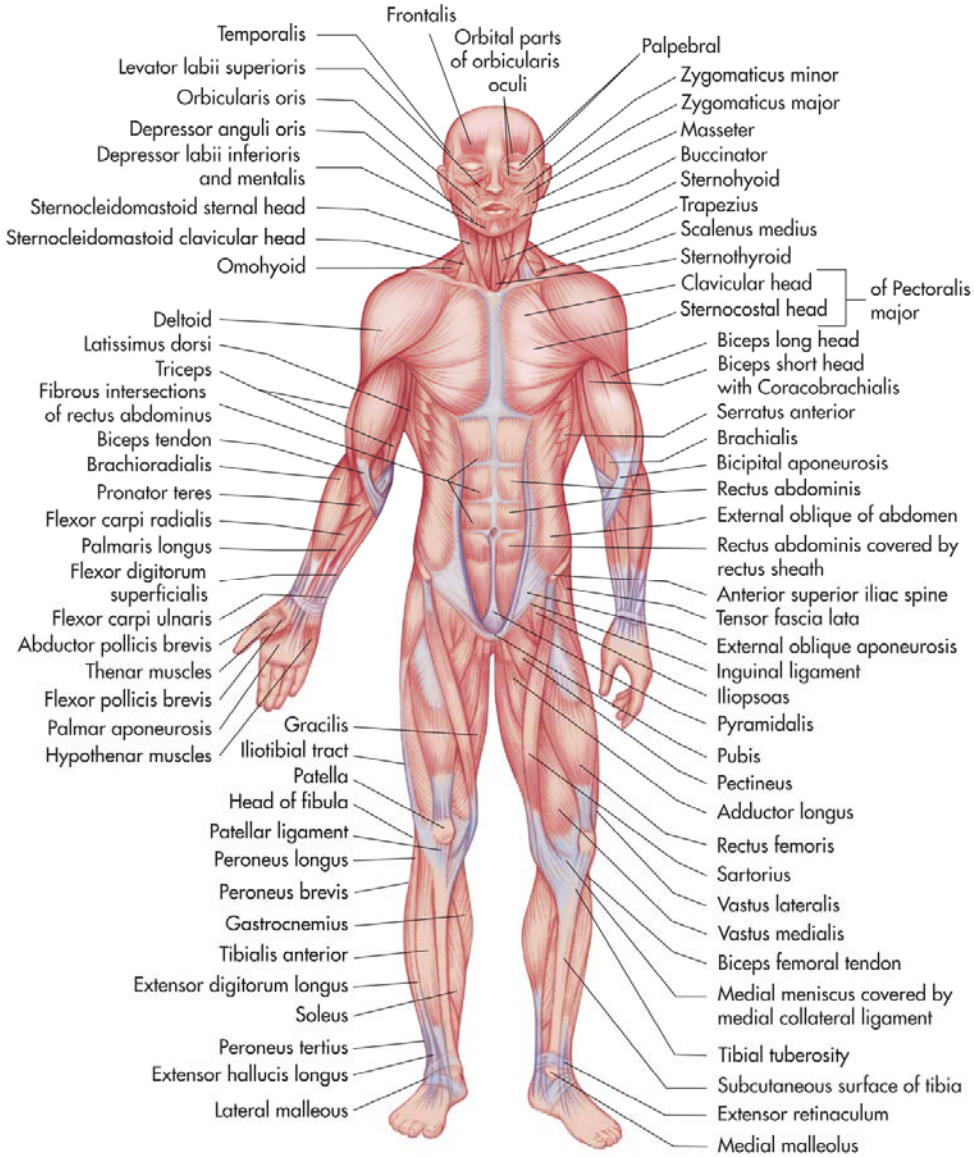
- Shoulders and arms
  - Deltoid
  - Triceps brachii
    - Anterior
    - Middle
    - Posterior
    - Biceps brachii
    - Brachialis
    - Brachioradialis
  - Triceps brachii
    - Long head
    - Lateral head
    - Medial head
    - Pronator
    - Supinator
    - Extensor carpi radialis
    - Extensor carpi ulnaris
    - Flexor carpi radialis
    - Flexor carpi ulnaris

Provide origin, insertion, and action of each of the selected muscles:

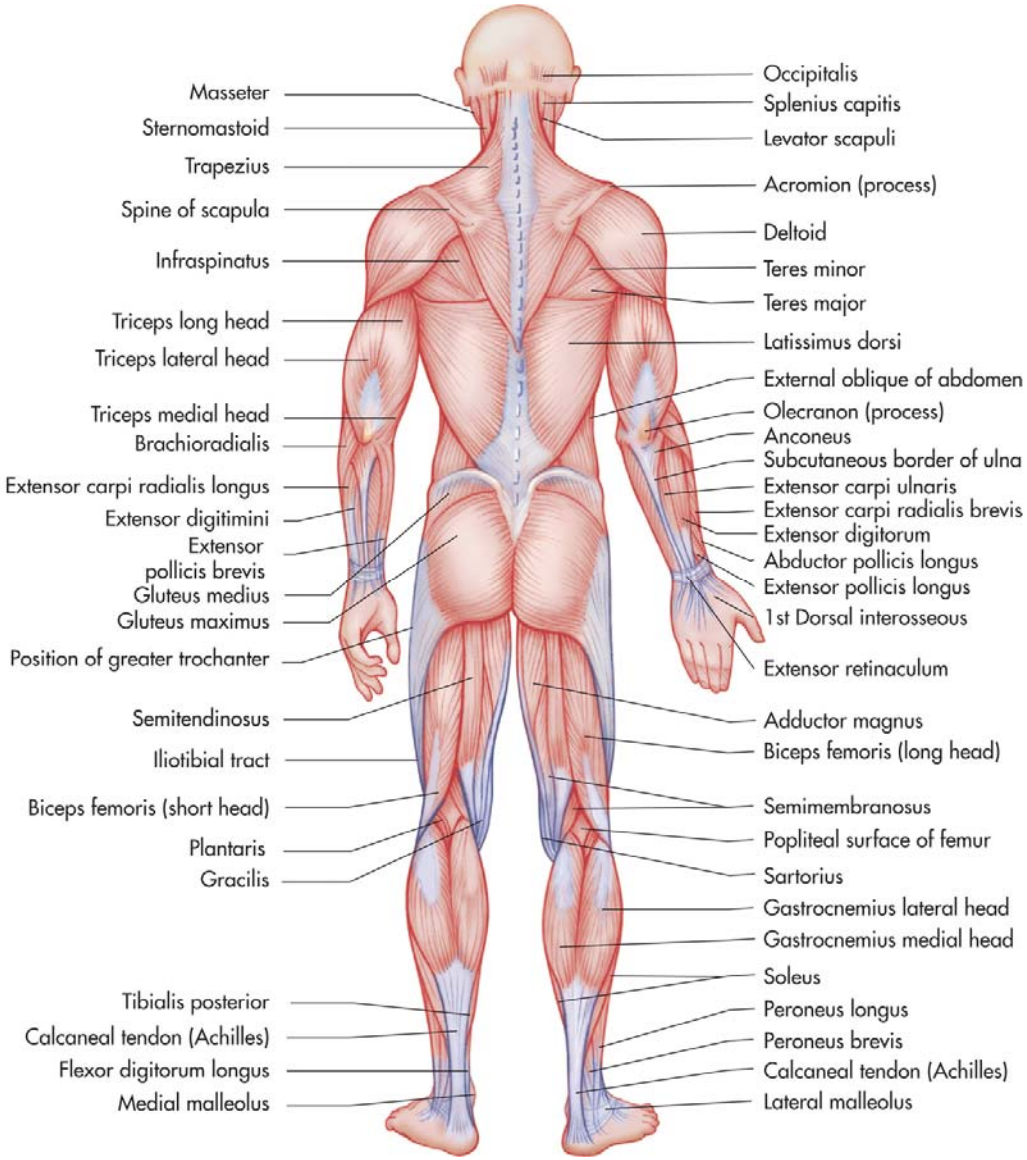
- Hip and thigh
  - Gluteus maximus
  - Gluteus medius
  - Gluteus minimus
  - Piriformis
  - Tensor fascia latae
  - Iliopsoas psoas major
  - Iliacus
  - Sartorius
  - Gracilis
- Quadriceps
  - Rectus femoris
  - Vastus lateralis
  - Vastus medialis
  - Vastus intermedialis
  - Pectineus
  - Adductor longus
  - Adductor brevis
  - Adductor magnus

Provide origin, insertion, and action of each of the selected muscles:

- Hamstrings
  - Biceps femoris
  - Semitendinosus
  - Semimembranosus
- Lower leg
  - Gastrocnemius
  - Soleus
  - Popliteus
  - Tibialis anterior
  - Extensor hallucis longus
  - Peroneus longus
  - Peroneus brevis
  - Flexor hallucis longus



Major Anterior Muscles and Related Structures



Major Posterior Muscles and Related Structures

KINESIOLOGY
MUSCLE MOVEMENT

Body Movements

- Adduction — moving body part toward midline
- Circumduction — rotation of extremity from shoulder to hand
- Flexion — bending movement, decreasing angle

Body Movements

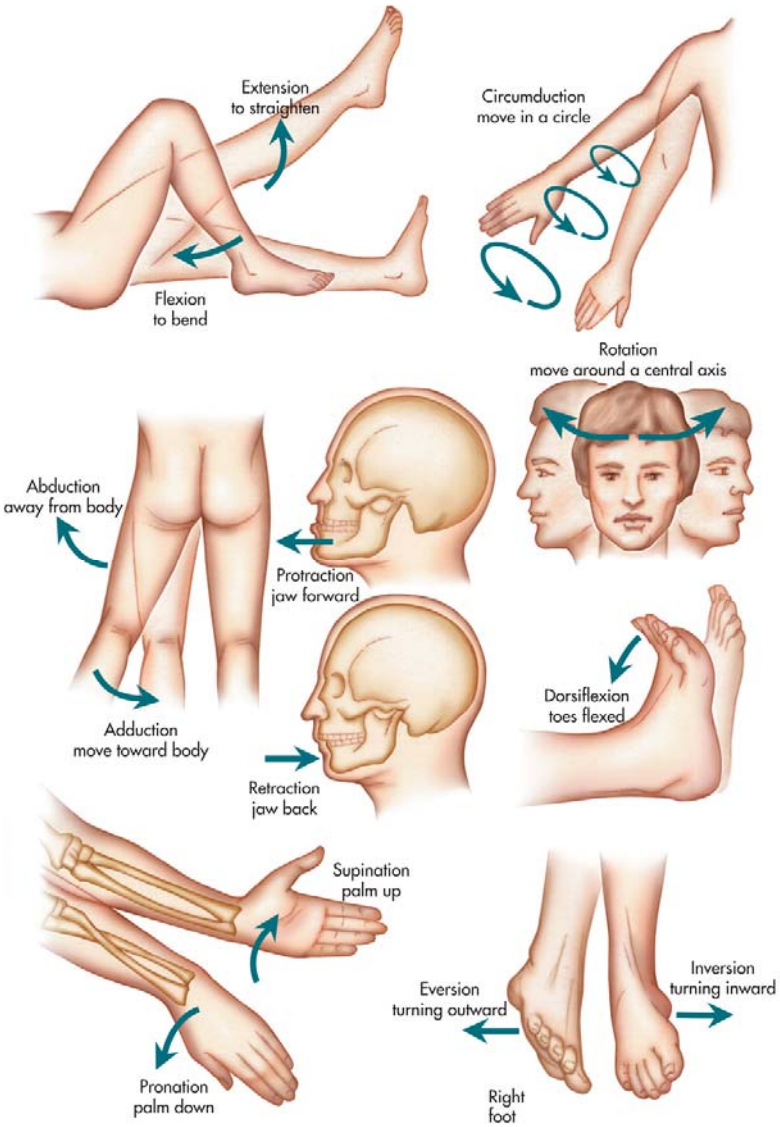
- Extension — straightening movement, increasing angle
- Lateral flexion — side bending, ear to shoulder

Body Movements

- Plantar flexion — pointing foot to floor
- Dorsiflexion — pointing toes to ceiling
- Pronation — palms turned down
- Supination — palms turned up
- Inversion — soles of feet face each other
- Eversion — soles of feet face laterally
- Protraction — moving shoulder forward

Body Movements

- Retraction — moving shoulder backward
- Elevation — lifting shoulder upward
- Depression — moving shoulder downward



Body Movement

Range of Motion (ROM)

- Active
  - Client moves
- Passive
  - You move the client
    - End feel
      - Soft (full range)
      - Hard (shortened range)

Muscles That Move the Head

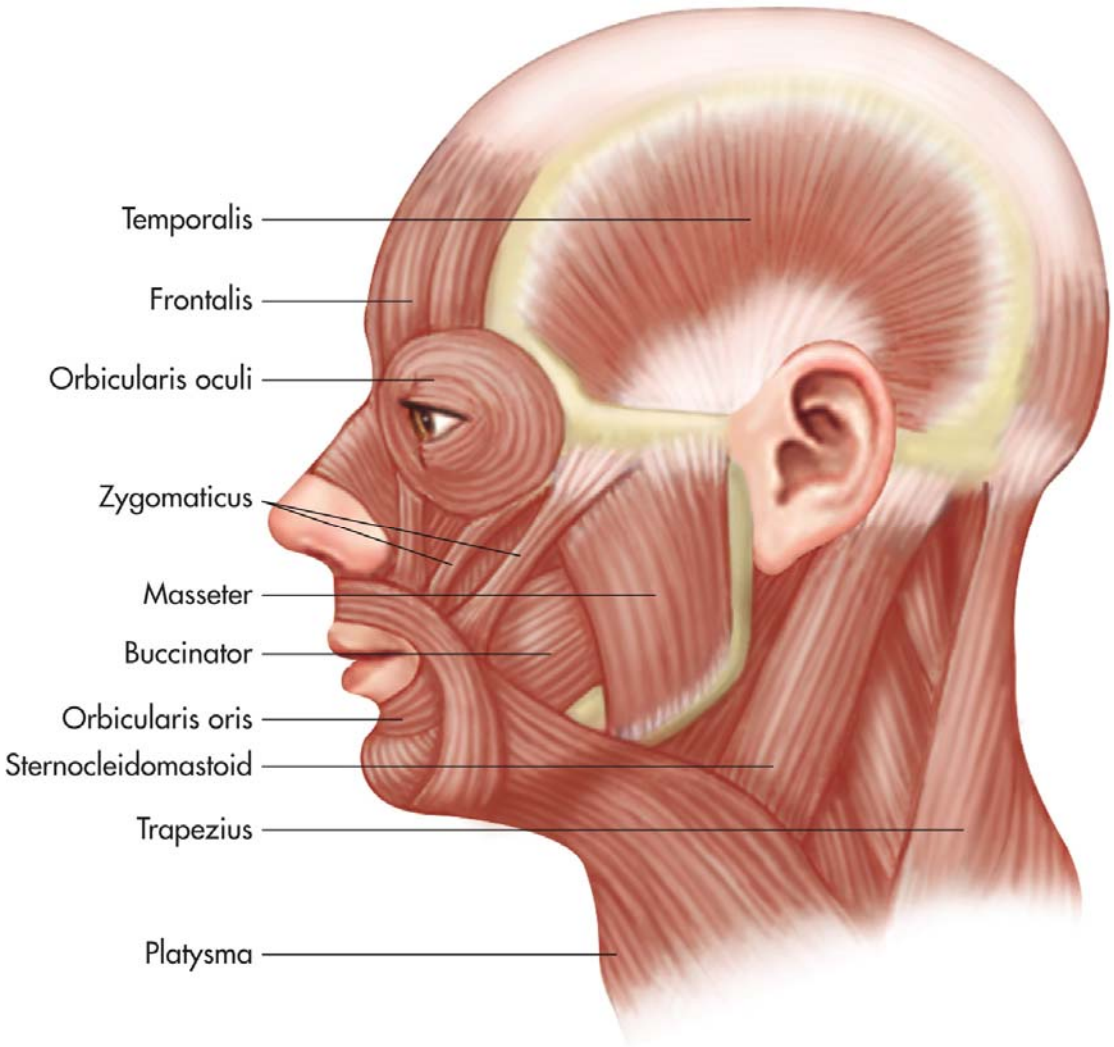
- Flexors — bring the chin to the chest; antagonists to the extensors
  - Sternocleidomastoid
  - Scalenes
- Extensors — bring the head backward; antagonists to the flexors
  - Splenius capitis
  - Splenius cervicis

Muscles That Move the Head

- Rotation of head — to same side
  - Splenius capitis
  - Sternocleidomastoid
  - Scalenes (unilaterally)
- Lateral flexion — bring ear toward shoulder; unilateral
  - Sternocleidomastoid
  - Scalenes
  - Splenius capitis

Muscles That Move the Head

- Mandible protraction
  - Masseter
- Mandible retraction
  - Temporalis



Skeletal Facial Muscles

Muscles That Move the Scapula

- Upward rotators — Raise humerus; antagonists to downward rotators
  - Upper trapezius
  - Lower trapezius
  - Serratus anterior

Muscles That Move the Scapula

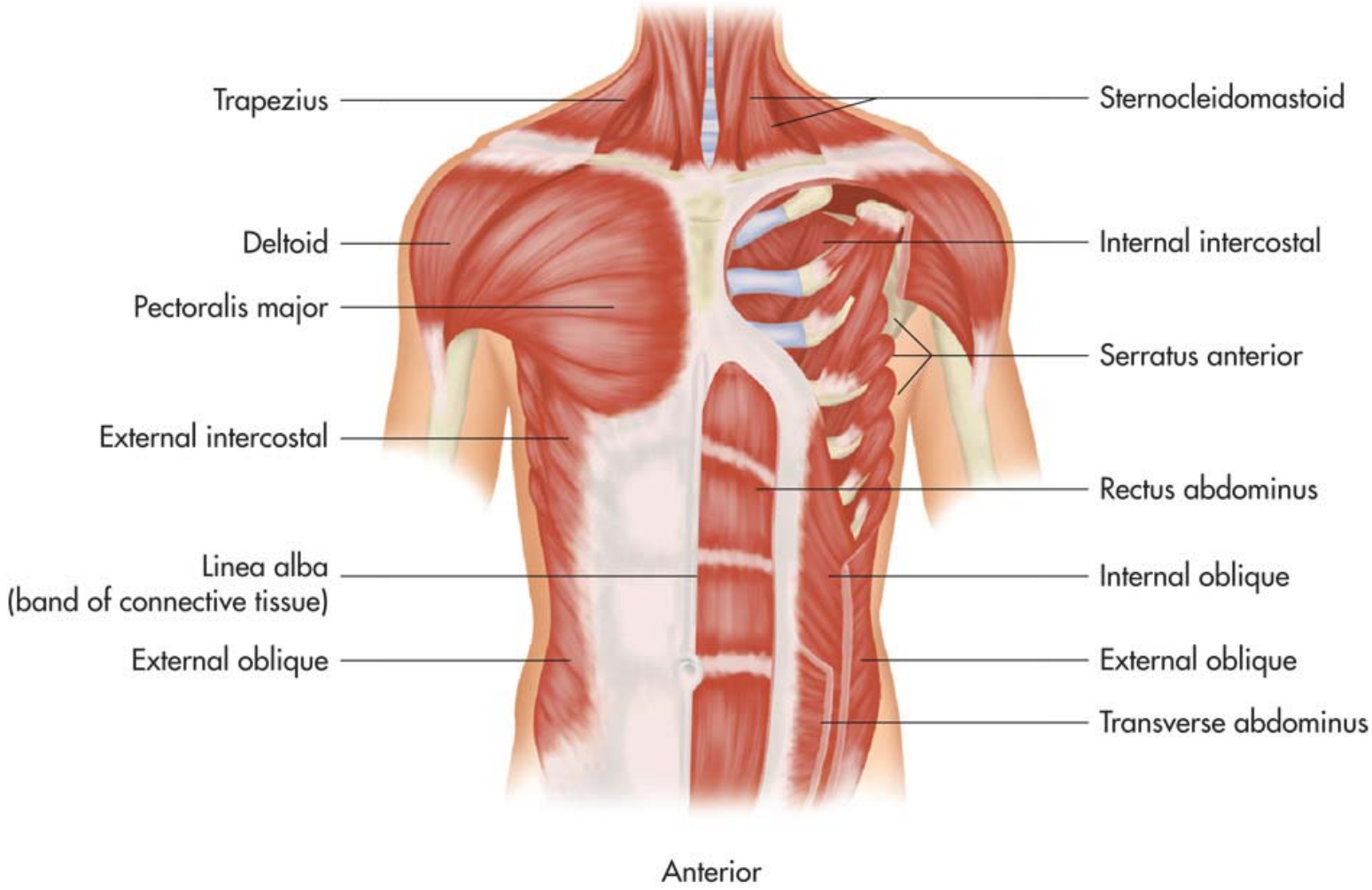
- Downward rotators — Drop humerus; antagonists to upward rotators
  - Levator scapula
  - Rhomboids
  - Pectoralis minor

Muscles That Move the Scapula

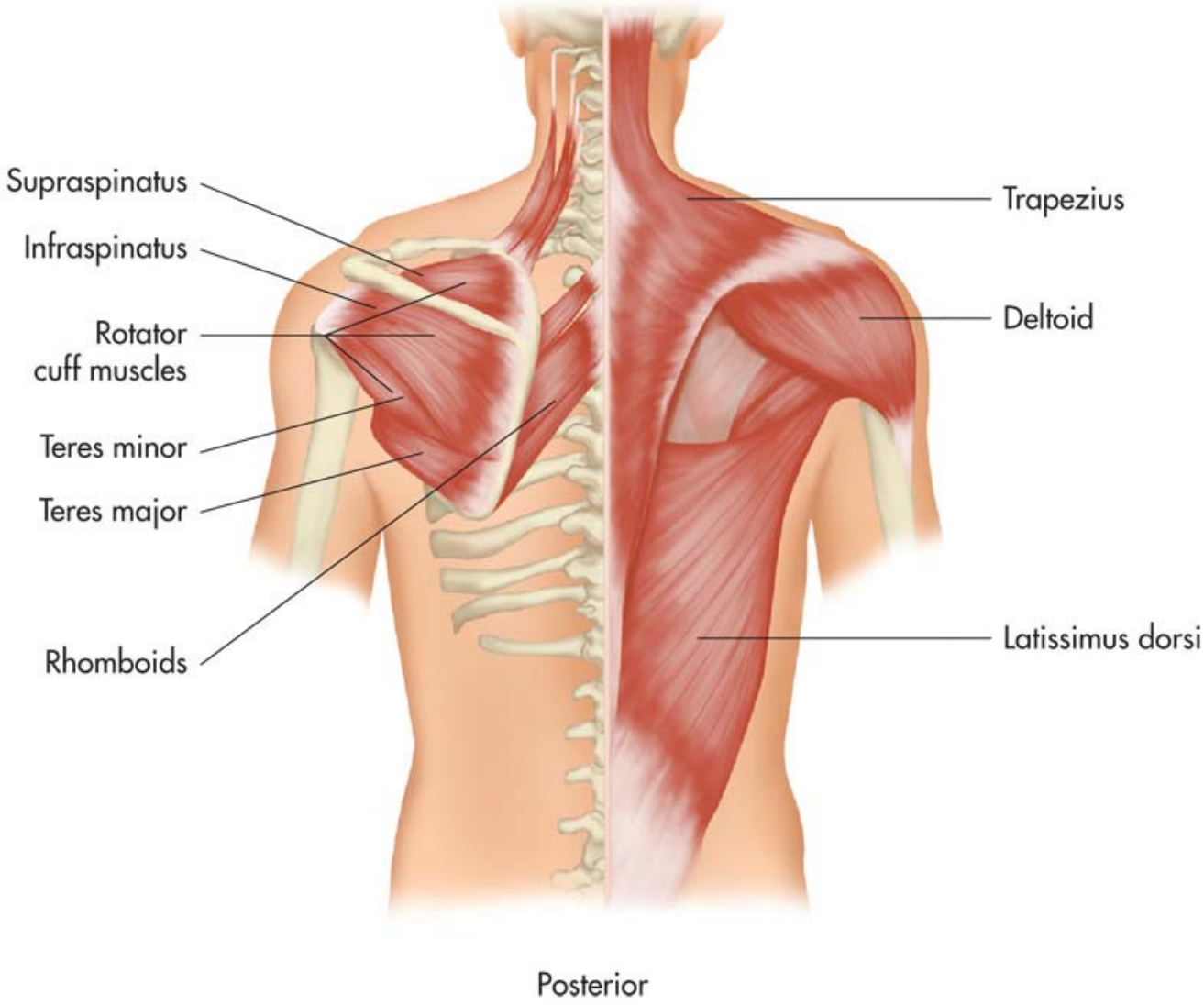
- Abductors — move scapulas together
  - Serratus anterior
  - Pectoralis minor
- Elevators — raise shoulders; antagonists to depressors
  - Upper trapezius
- Depressors — drop shoulders; antagonists to elevators
  - Pectoralis minor

Muscles That Move the Scapula

- Protractors — roll shoulders forward; antagonists to elevators
  - Serratus anterior
  - Pectoralis minor
- Retractors — roll shoulders back; antagonists to protractors
  - Middle trapezius
  - Rhomboids



Skeletal Muscles of the Anterior and Posterior Trunk



Skeletal Muscles of the Anterior and Posterior Trunk

Muscles That Move the Humerus

- Flexors — raise the arm overhead; antagonists to extensors
  - Anterior deltoid
  - Pectoralis major
  - Coracobrachialis
  - Biceps (short head)
  - Triceps
  - Pectoralis major

Muscles That Move the Humerus

- Extensors — straighten the arm; antagonists to flexors
  - Latissimus dorsi
  - Teres major
  - Posterior deltoid
  - Infraspinatus
  - Teres minor

Muscles That Move the Humerus

- Adductors — bring the arm toward the body; antagonists to abductors
  - Pectoralis major
  - Coracobrachialis
  - Latissimus dorsi
  - Teres major

Muscles That Move the Humerus

- Rotator cuff
  - S—Superaspinatus
  - I—Infraspinatus
  - T—Teres minor
  - S—Subscapularis
- Abductors — move arm away from the body; antagonists to adductors
  - Supraspinatus
  - Middle deltoid

Muscles That Move the Humerus

- Internal (medial) rotators — roll the head of the humerus forward; antagonists to external rotators
  - Anterior deltoid
  - Pectoralis major
  - Subscapularis
  - Teres major
  - Latissimus dorsi

Muscles That Move the Humerus

- External (lateral) rotators — roll the head of the humerus back; antagonists to internal rotators
  - Infraspinatus
  - Teres minor
  - Posterior deltoid

Muscles That Move the Elbow

- Flexors — bring forearm toward upper arm; antagonists to extensors
  - Brachialis
  - Biceps
  - Brachioradialis
- Extensors — straighten elbow; antagonists to flexors
  - Triceps
  - Anconeus

Muscles That Move the Forearm

- Supinators — turn palms up; antagonists to pronators
  - Biceps
  - Supinator
- Pronators — turn palms down; antagonists to supinators
  - Pronator teres
  - Pronator quadratus

Muscles That Move the Forearm

- Rotator cuff
  - Supraspinatus
  - Infraspinatus
  - Teres minor
  - Subscapularis

Muscles That Move the Wrist

- Flexors — move fingers toward palm; antagonists to extensors
  - Flexor carpi radialis
  - Flexor carpi ulnaris
  - Palmaris longus

Muscles That Move the Wrist

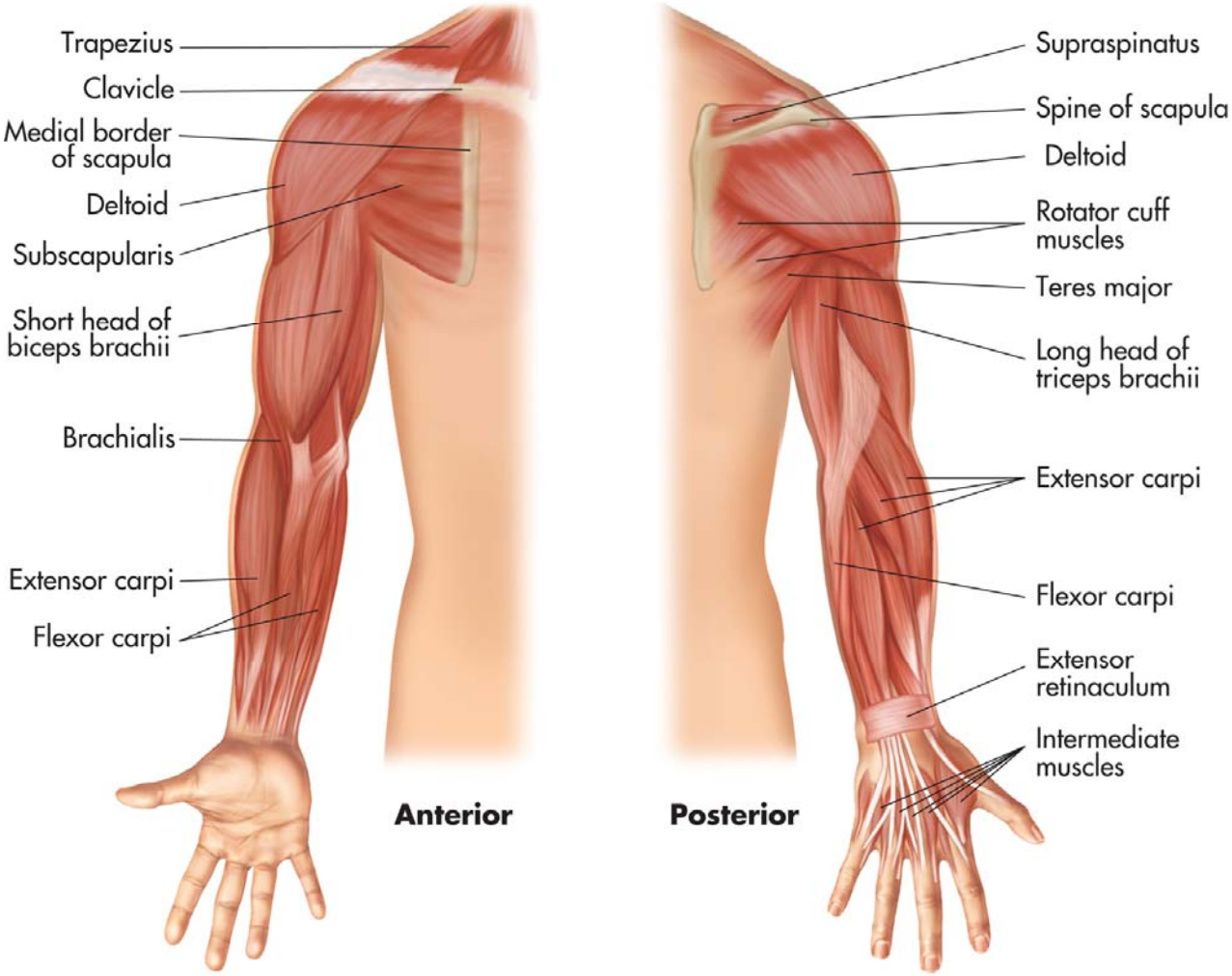
- Extensors — move fingers away from palm; antagonists to flexors
  - Extensor carpi radialis longus
  - Extensor carpi radialis brevis
  - Extensor carpi ulnaris

Muscles That Move the Wrist

- Adductors — move hand toward the body; antagonists to abductors
  - Extensors carpi ulnaris
  - Flexor carpi ulnaris
- Abductors — move hand away from the body; antagonists to adductors
  - Flexor carpi radialis
  - Extensor carpi radialis longus

Muscles That Move the Fingers

- Flexors — move fingers toward palm; antagonists to extensors
  - Flexor digitorum superficialis/profundus
  - Flexor pollicis longus (flexes thumb)
- Extensors — straighten the hand; antagonists to flexors
  - Extensor digitorum
  - Extensor digiti minimi
  - Extensor pollicis longus/brevis



Skeletal Muscles of the Shoulder, Arm, and Hand

Muscles That Move the Ribs

- Elevators — raise the ribs during inspiration; antagonists to depressors
  - External intercostals
  - Scalenes (forced inspiration)
  - Sternocleidomastoid (SCM)
  - Pectoralis minor (accessory respiratory muscle)
  - Quadratus lumborum

Muscles That Move the Ribs

- Depressors — lower the ribs during expiration; antagonists to elevators
  - Internal intercostals
  - Rectus abdominus
  - Quadratus lumborum

Muscles That Move the Trunk

- Flexors — make the body bend forward; antagonists to extensors
  - Rectus abdominis
  - External oblique
  - Internal oblique
- Extensors — make the trunk stay upright; antagonists to flexors
  - Erector spinae (transversospinalis)

Muscles That Move the Trunk

- Rotation of trunk — to opposite side
  - External oblique
  - Transversospinalis
  - Internal oblique
- Lateral flexion — side bending
  - External oblique (unilaterally)
  - Internal oblique (unilaterally)
  - Quadratus lumborum

Muscles That Move the Femur

- Hip flexors — bring the femur upward; antagonists to extensors
  - Iliopsoas (psoas)
  - Pectineus
  - Tensor fasciae latae
  - Adductors (brevis, longus, magnus)
  - Rectus femoris
  - Sartorius

Muscles That Move the Femur

- Hip extensors — bring the femur back to neutral; antagonists to flexors
  - Gluteus maximus
  - Hamstrings (semimembranosus, semitendinosus, biceps femoris)

Muscles That Move the Femur

- Abductors — lift leg away from the midline; antagonists to adductors
  - Gluteus medius
  - Gluteus minimus
  - Tensor fasciae latae
  - Sartorius

Muscles That Move the Femur

- Adductors — bring leg toward the midline; antagonists to abductors
  - Adductors (brevis, longus, magnus)
  - Gracilis
  - Pectineus

Muscles That Move the Femur

- External (lateral) rotators — antagonists to internal rotators
  - Piriformis
  - Gluteus maximus
  - Iliopsoas
  - Sartorius

Muscles That Move the Femur

- Internal (medial) rotators — antagonists to external rotators
  - Gluteus medius
  - Gluteus minimus
  - Tensor fasciae latae
  - Pectineus
  - Adductors (brevis, longus, magnus)

Muscles That Move the Knee

- Flexors — bend the knee; antagonists to extensors
  - Hamstrings (semimembranosus, semitendinosus, biceps femoris)
  - Sartorius
  - Gracilis
  - Gastrocnemius
  - Plantaris
  - Popliteus

Muscles That Move the Knee

- Extensors — straighten the knee; antagonists to flexors
  - Quadriceps (rectus femoris; vastus lateralis, medialis, and intermedialis)
  - Tensor fascia latae

Muscles That Move the Ankle

- Dorsiflexors — bring toes toward the leg; antagonists to plantar flexors
  - Tibialis anterior
  - Extensor digitorum longus
  - Extensor hallucis longus
  - Peroneus

Muscles That Move the Ankle

- Plantar flexors — toes away from the leg; antagonists to dorsiflexors
- Soleus
- Gastrocnemius
- Plantaris

Muscles That Move the Ankle

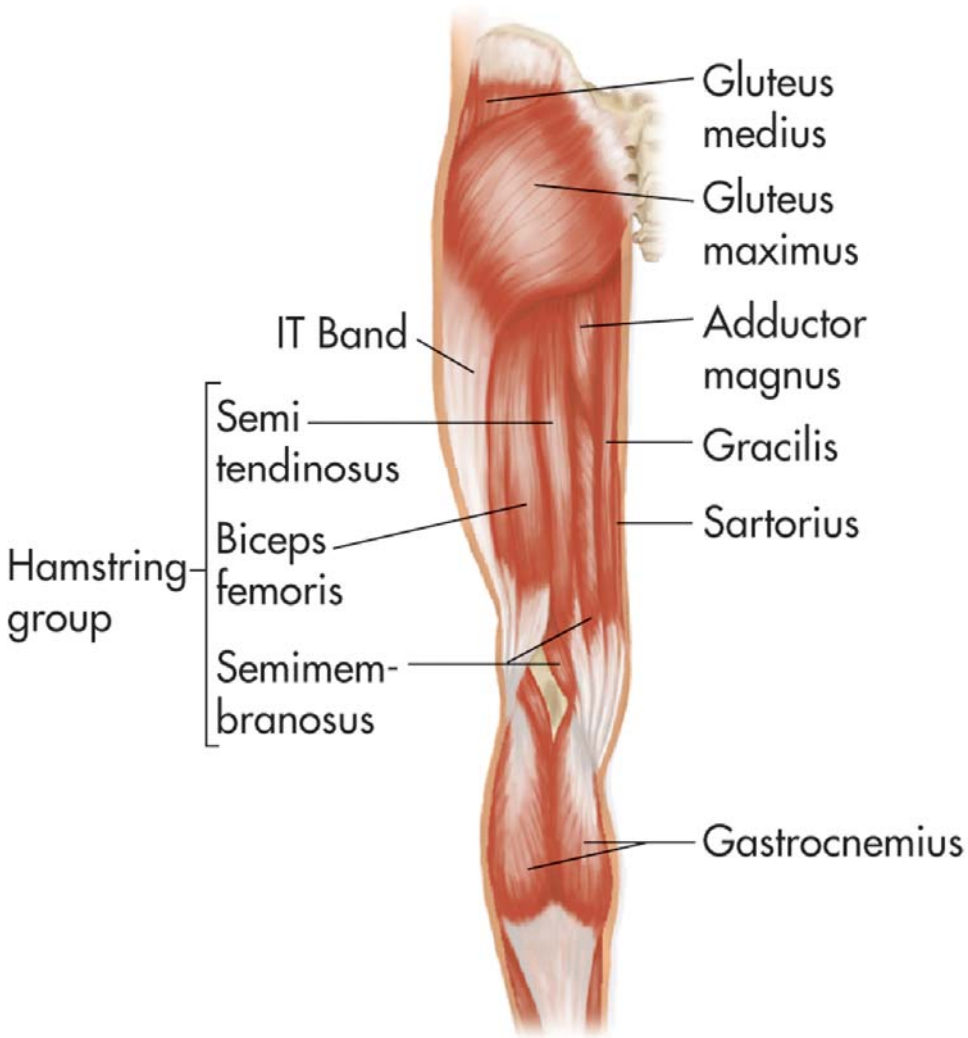
- Peroneus longus and brevis
- Tibialis posterior
- Flexor hallucis longus
- Flexor digitorum longus

Muscles That Move the Ankle

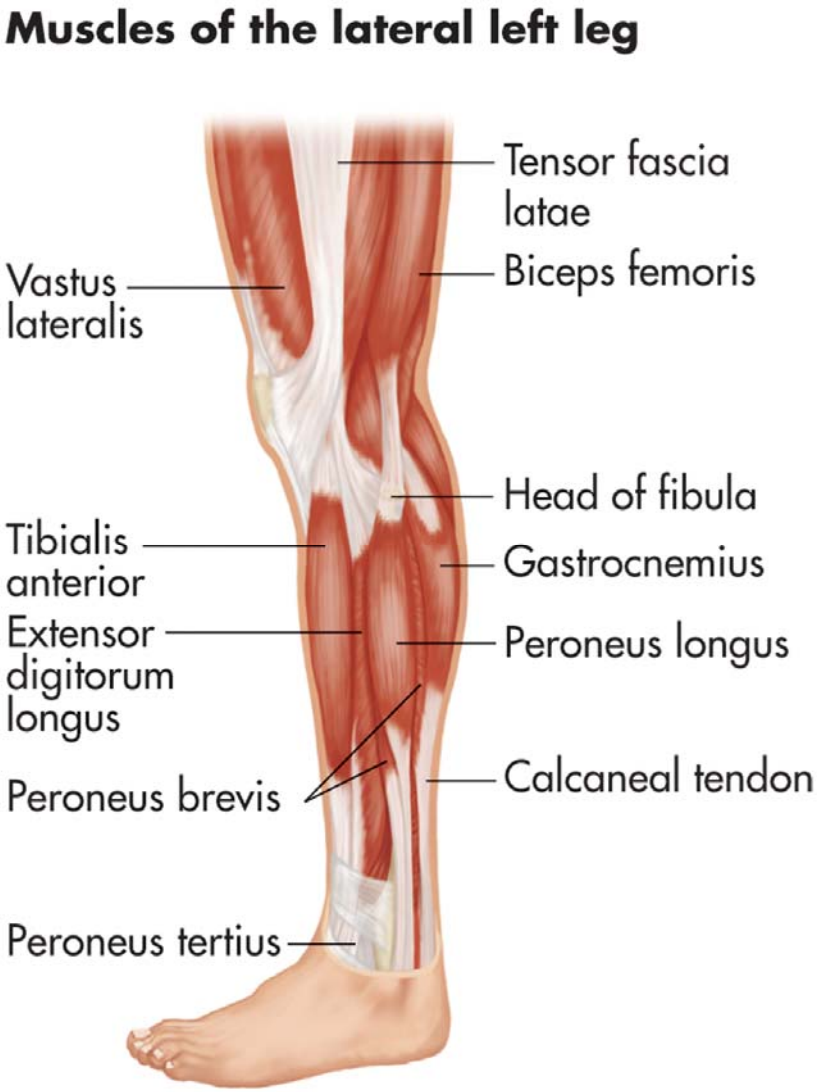
- Invertors — antagonists to evertors
  - Tibialis anterior
  - Tibialis posterior
- Evertors — antagonists to invertors
  - Peroneus longus
  - Peroneus brevis
  - Peroneus tertius

Muscles That Move the Toes

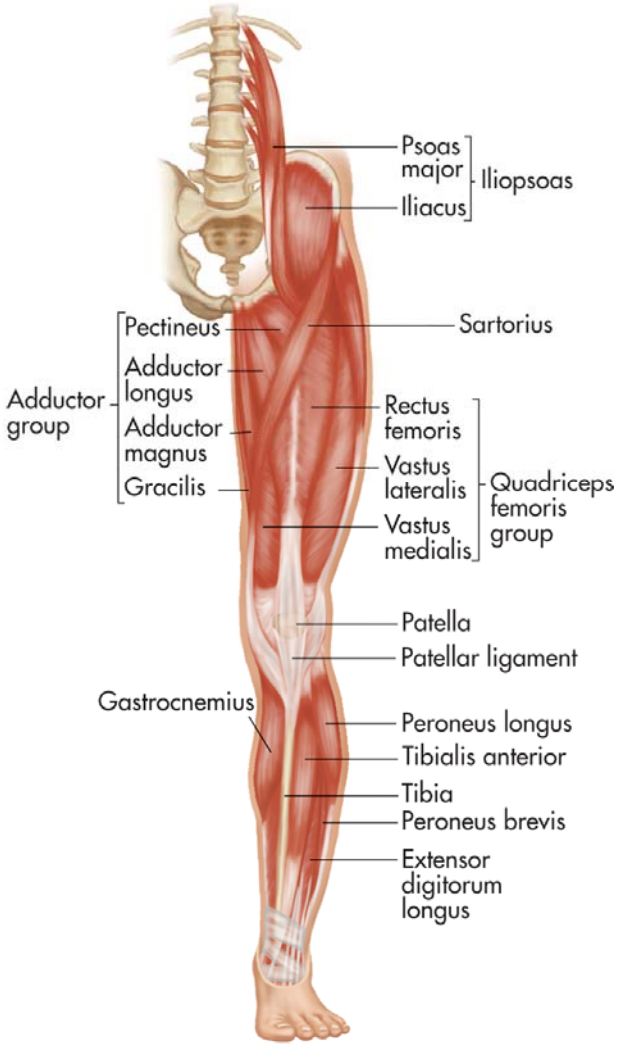
- Flexors — point the toes toward the floor; antagonists to extensors
  - Flexor digitorum longus
  - Flexor hallucis
- Extensors — bring the toes toward the body; antagonists to flexors
  - Extensor digitorum longus
  - Extensor hallucis longus



Skeletal Muscles of the Hip and Leg



Skeletal Muscles of the Hip and Leg



Skeletal Muscles of the Hip and Leg

Diseases and Conditions

- Spasm (cramp)—involuntary contraction of skeletal muscle
- Tendinitis—inflammation of tendon attached to muscle
- Sciatica—muscle pain related to the sciatic nerve
- Hypertrophy—muscle over development

Diseases and Conditions

- Fibromyalgia—painful, tender spots in muscles, fatigue, numbness, and tingling in extremities
- TMJ—temporal mandibular joint pain
- Torticollis—wryneck caused by sternocleidomastoid (SCM) syndrome, muscle strain causing tilting of neck
- Atrophy—with no activity and no use, muscle diminishes

Diseases and Conditions

- Flaccidity—no muscle tone
- Muscle strain—injury to the muscle fibers
- Myalgia—muscle pain
- Myasthenia gravis—autoimmune, weakness of skeletal muscles due to lack of release of acetylcholine

Diseases and Conditions

- Muscular dystrophy—muscle atrophy and degeneration
- Shin splint—involves anterior tibialis and periosteum around tibia

Benefits of Massage on Muscular System

- Relaxes muscle
- Improves muscle tone and elasticity
- Improves rehabilitation of muscle injury and function
- Relieves muscle spasms, pain, and soreness
- Releases metabolic waste
- Stimulates circulation

Benefits of Massage on Muscular System

- Improves athletic performance
- Relieves trigger point activity