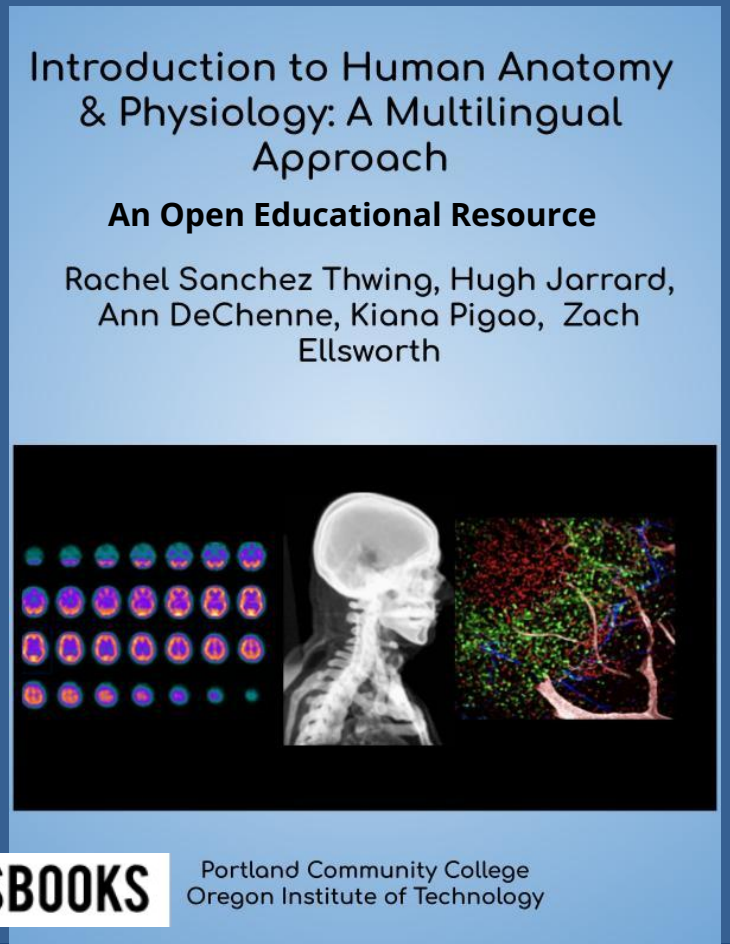
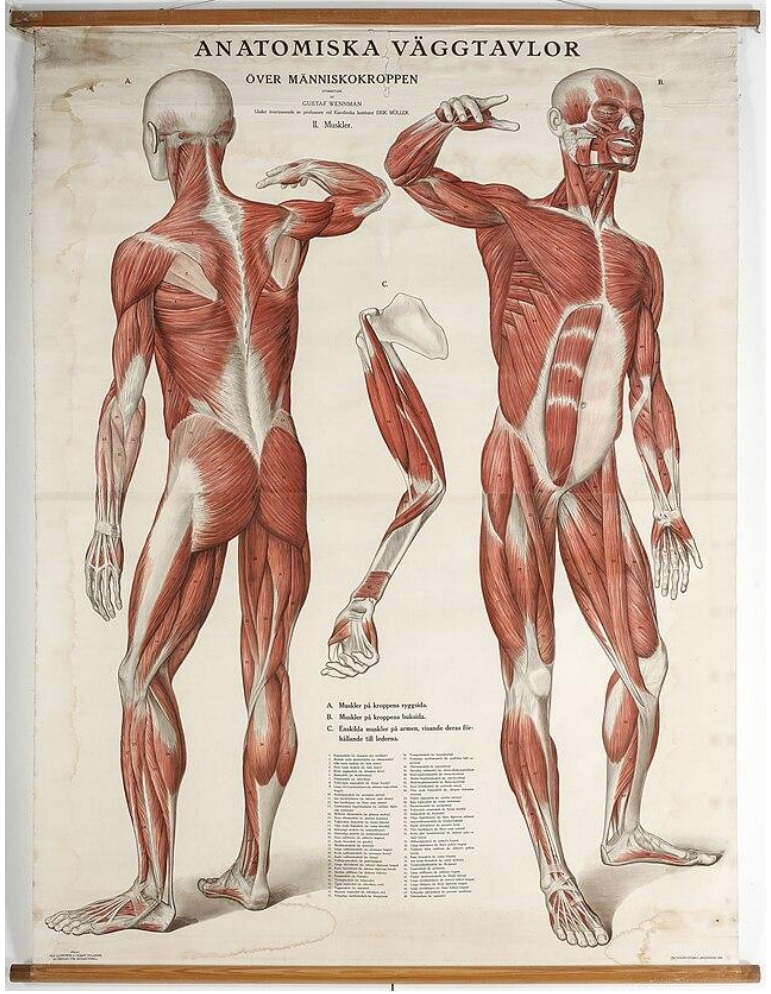
Muscular System: Functions





Anatomical Poster By Gustaf Wennman - 1920, Public Domain, via Wikimedia Commons

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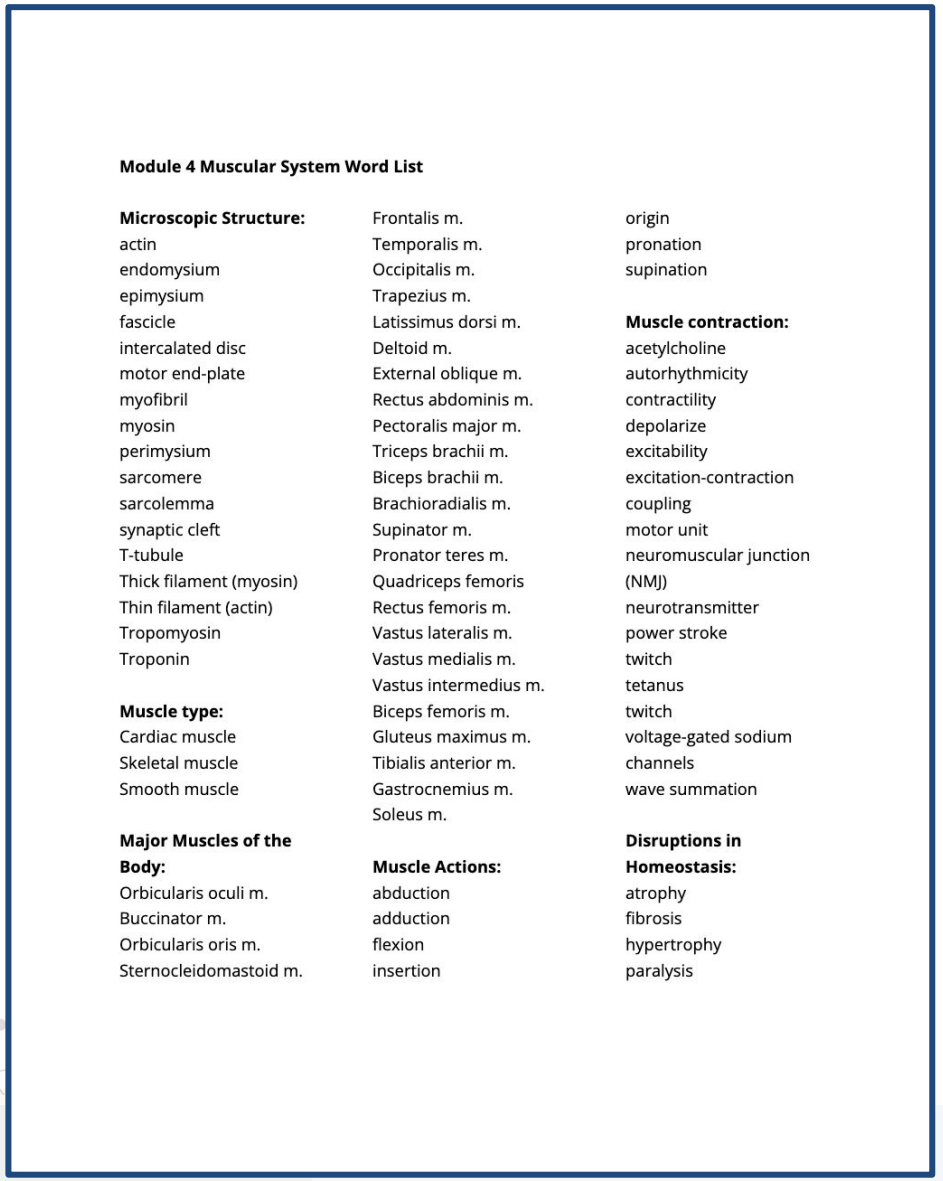
Lesson 1: Functions of the Muscular System

Learning Objectives:

- Describe the three types of muscle and their primary functions
- For skeletal muscle, describe how the muscular and skeletal systems work together to create movement
- Describe the major motions of the body
- Describe how the structure of muscle matches its function in numerous behaviors:
    - including movement, peristalsis through various tubes, speech, heartbeat, sphincter control, blinking, swallowing, reflexes

See the Muscular System Wordlist!

- Can be found in accompanying materials to this lecture
- Materials are available in English, Spanish, Russian, Vietnamese, Filipino, East African French, Kiswahili (Swahili) and Chinese.



Module 4 Muscular System Word List

Microscopic Structure:
actin
endomysium
epimysium
fascicle
intercalated disc
motor end-plate
myofibril
myosin
perimysium
sarcomere
sarcolemma
synaptic cleft
T-tubule
Thick filament (myosin)
Thin filament (actin)
Tropomyosin
Troponin

Muscle type:
Cardiac muscle
Skeletal muscle
Smooth muscle

Major Muscles of the Body:
Orbicularis oculi m.
Buccinator m.
Orbicularis oris m.
Sternocleidomastoid m.
Frontalis m.
Temporalis m.
Occipitalis m.
Trapezius m.
Latissimus dorsi m.
Deltoid m.
External oblique m.
Rectus abdominis m.
Pectoralis major m.
Triceps brachii m.
Biceps brachii m.
Brachioradialis m.
Supinator m.
Pronator teres m.
Quadriceps femoris
Rectus femoris m.
Vastus lateralis m.
Vastus medialis m.
Vastus intermedius m.
Biceps femoris m.
Gluteus maximus m.
Tibialis anterior m.
Gastrocnemius m.
Soleus m.

Muscle Actions:
abduction
adduction
flexion
insertion
origin
pronation
supination

Muscle contraction:
acetylcholine
autorhythmicity
contractility
depolarize
excitability
excitation-contraction coupling
motor unit
neuromuscular junction (NMJ)
neurotransmitter
power stroke
twitch
tetanus
twitch
voltage-gated sodium channels
wave summation

Disruptions in Homeostasis:
atrophy
fibrosis
hypertrophy
paralysis

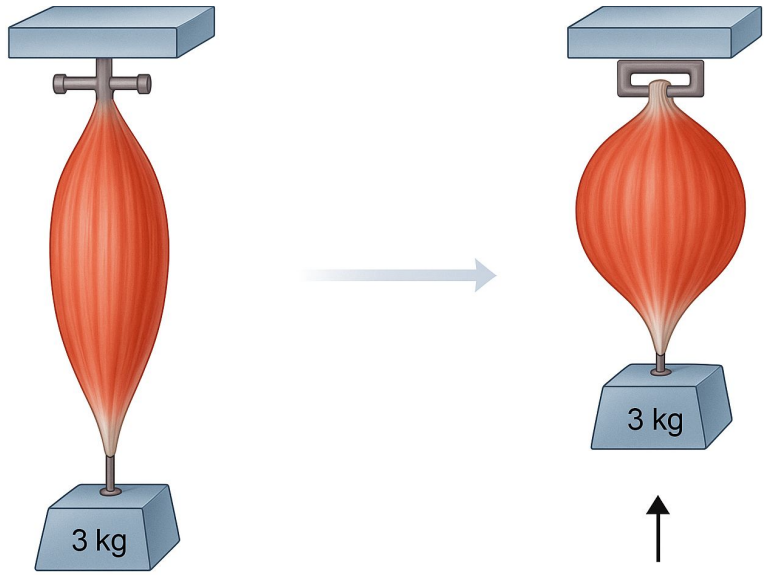
How do Muscles Move the Body?

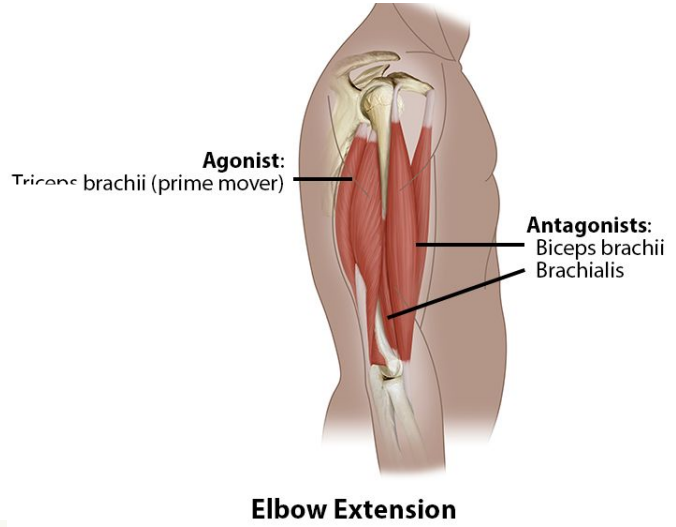
All muscles only contract

- they cannot `push' or extend

Bidirectional Movement occurs through antagonistic pairs

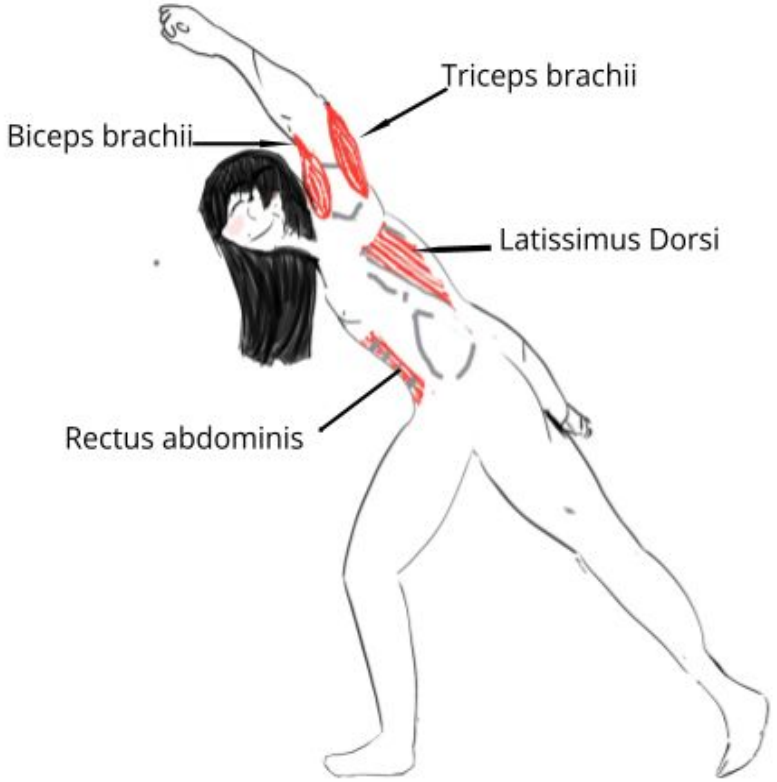
- each muscle contracts in `opposite' directions



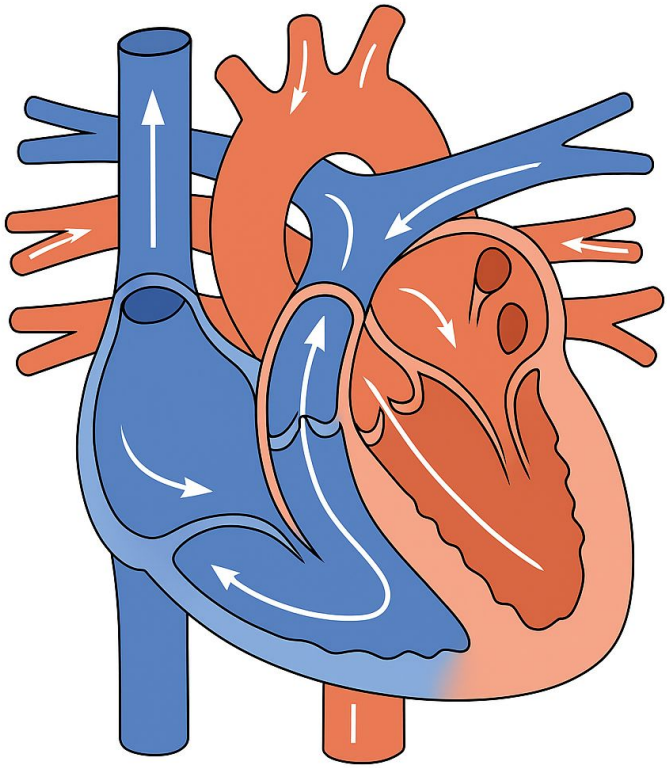


Contracted muscle adapted from Isotonic Contraction, CC BY-SA 3.0, via Nursing Hero; Modified from Functional Interactions, CC BY-NC-SA 4.0., via Human Anatomy.

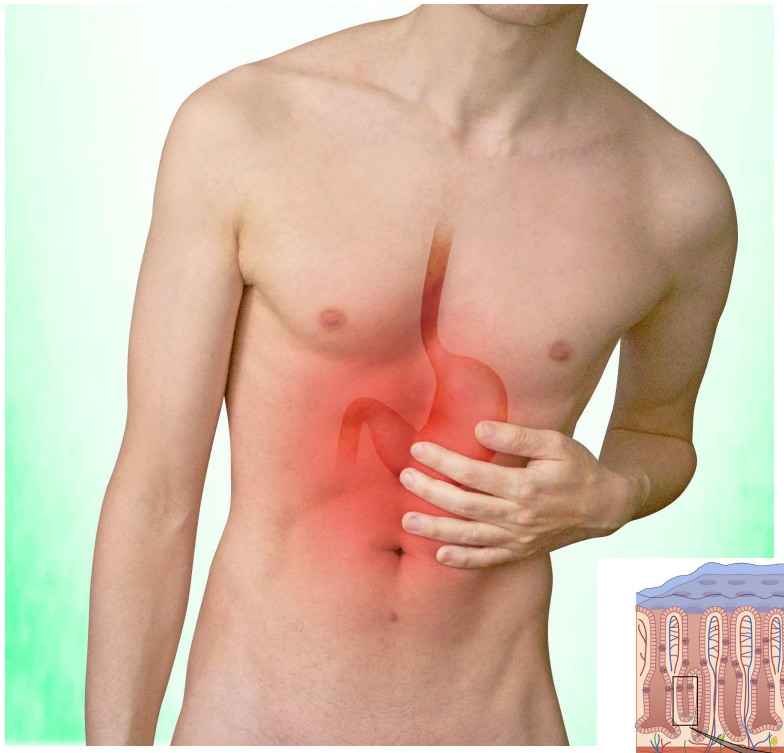
Types of Muscle

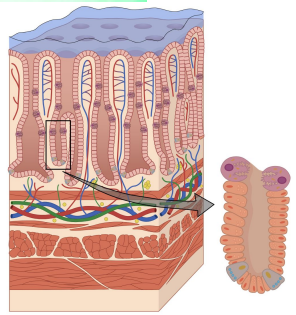


Skeletal



Cardiac





Smooth

Focus on Skeletal Muscle: Attachment

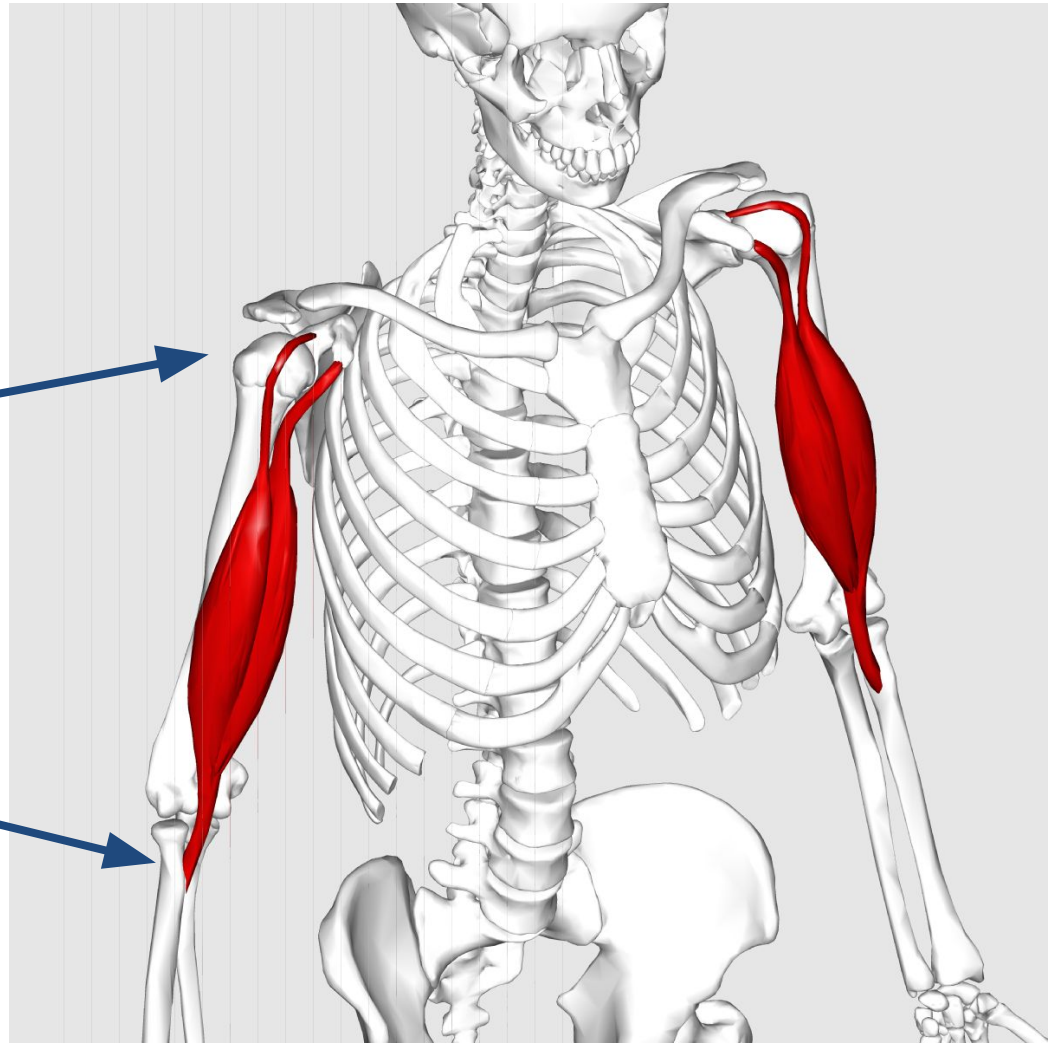
Muscles attach to bones at two sites

Origin

where a muscle starts
(what stays stationary)

Insertion

where a muscle ends
(what it moves)



Biceps Brachii Muscle By Anatomography, CC BY-SA 2.0, via Wikimedia Commons

Muscle Movements: Abduction and Adduction

Abduction

move limb away from body

Adduction

move limb toward body

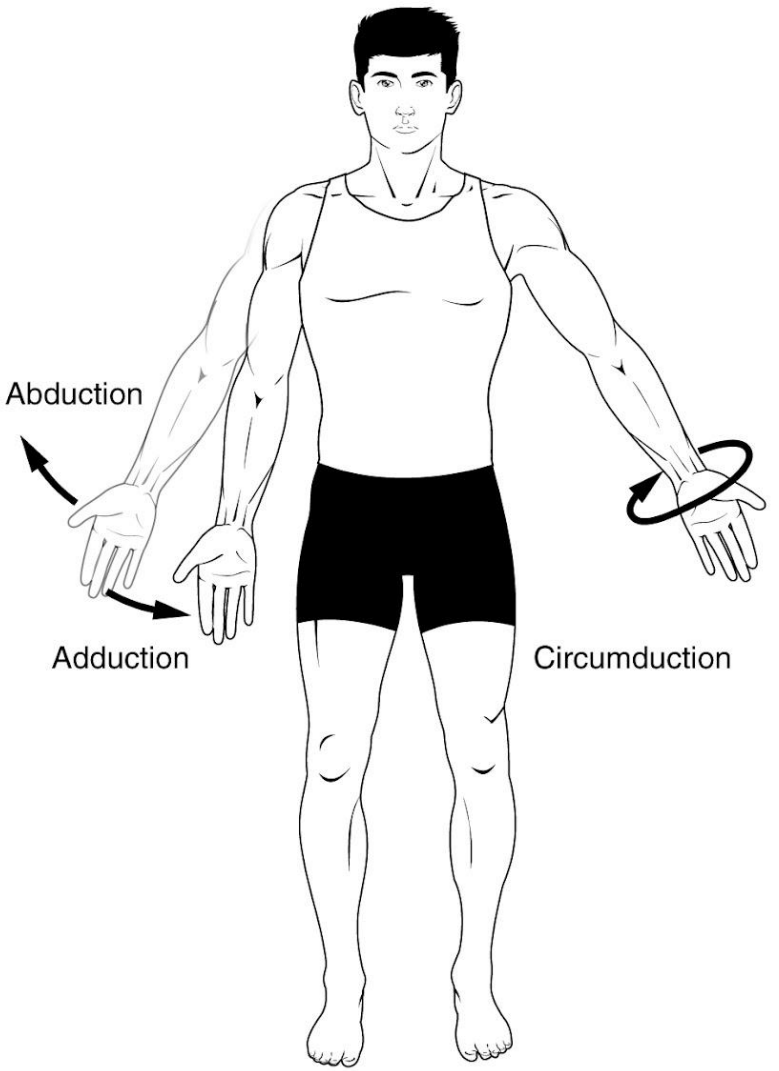


Figure 9.12 **Movements of the Body Part 1** by Openstax Anatomy and Physiology, 2e

Muscle Movements: Flexion and Extension

Flexion

decrease the angle at a joint

Extension

increase the angle at a joint

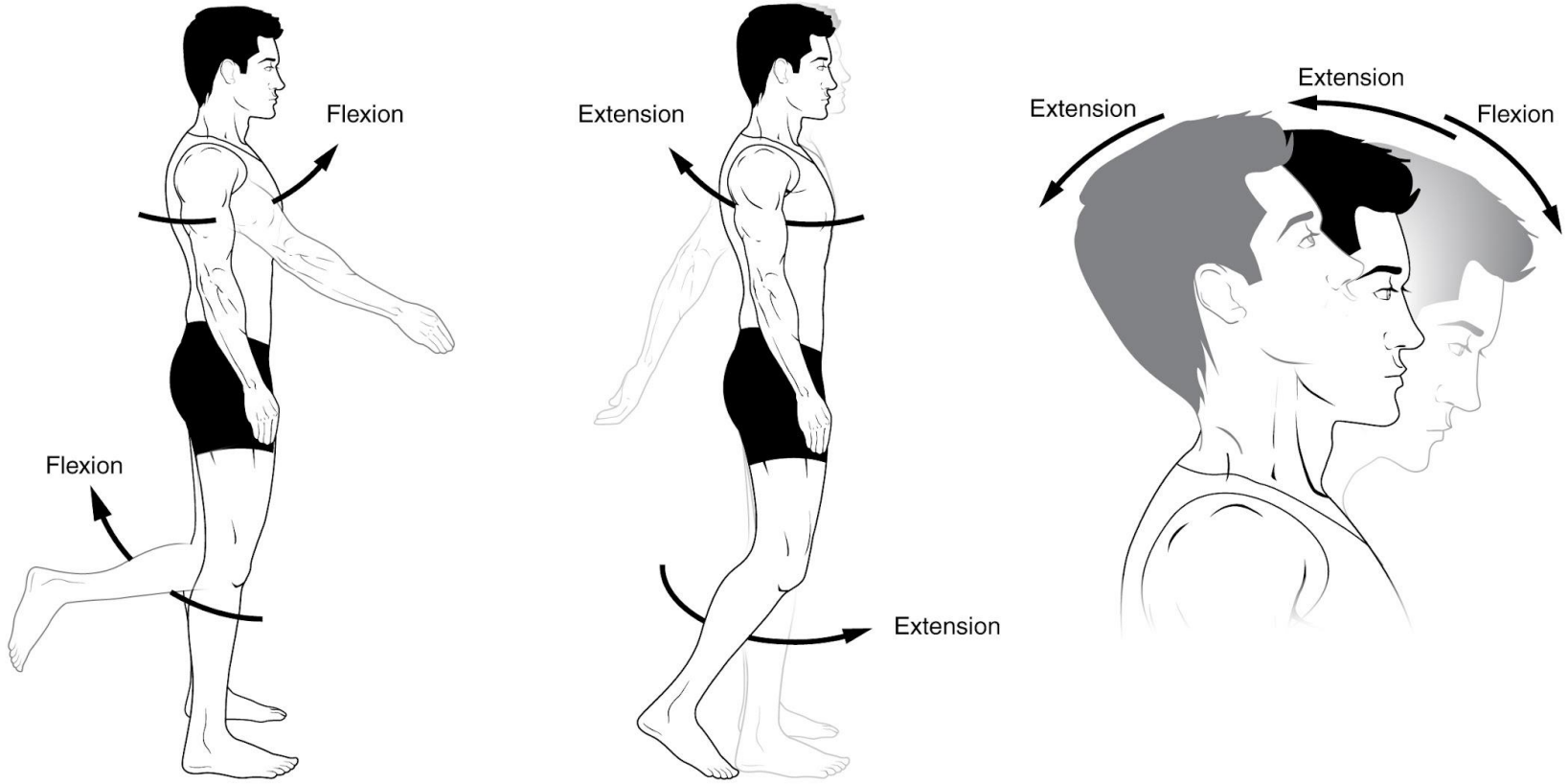


Figure 9.12 **Movements of the Body Part 1** by Openstax Anatomy and Physiology, 2e

Muscle Movements: Pronation and Supination

Pronation

palms facing posteriorly

Supination

palms facing anteriorly,

anatomical position

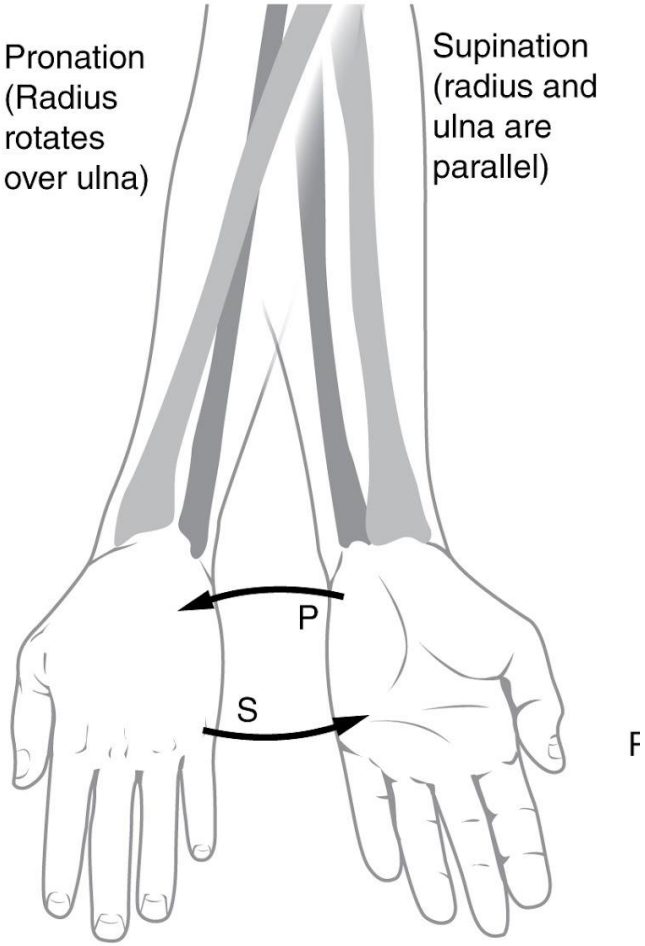


Figure 9.13 Movements of the Body Part 2
by Openstax Anatomy and Physiology, 2e

Structure and Function in Muscle and Behavior

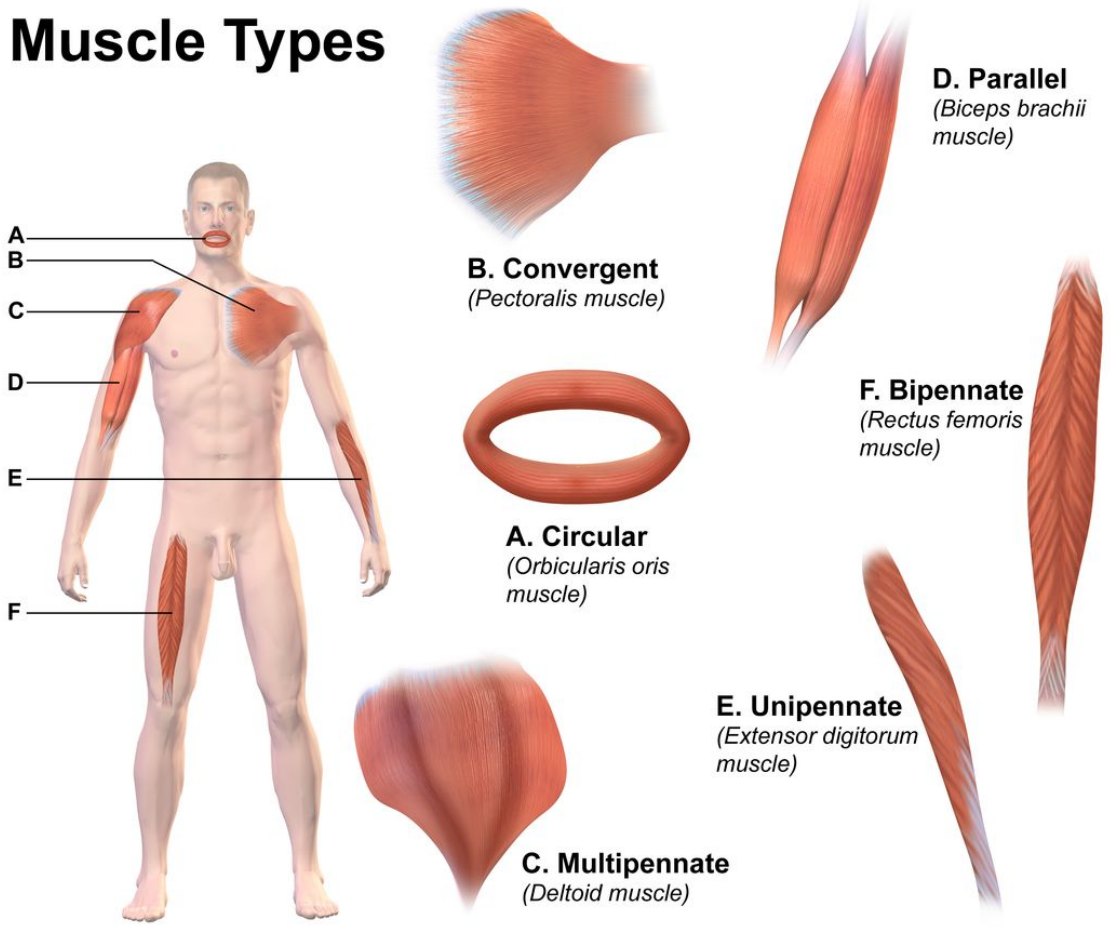
Voluntary Skeletal Muscle is involved in:

- movement, speech, sphincter control

Involuntary Cardiac and Smooth Muscle is involved in

- reflexes
- blinking
- swallowing (initial)

and the shape of muscle matches its function!



Muscle Types By BruceBlaus, CC BY-SA 4.0, via Wikimedia Commons

Lesson 1: Functions of the Muscular System Summary

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