

CPT Domain 1 Webinar: Basic and Applied Science & Nutrition Concepts

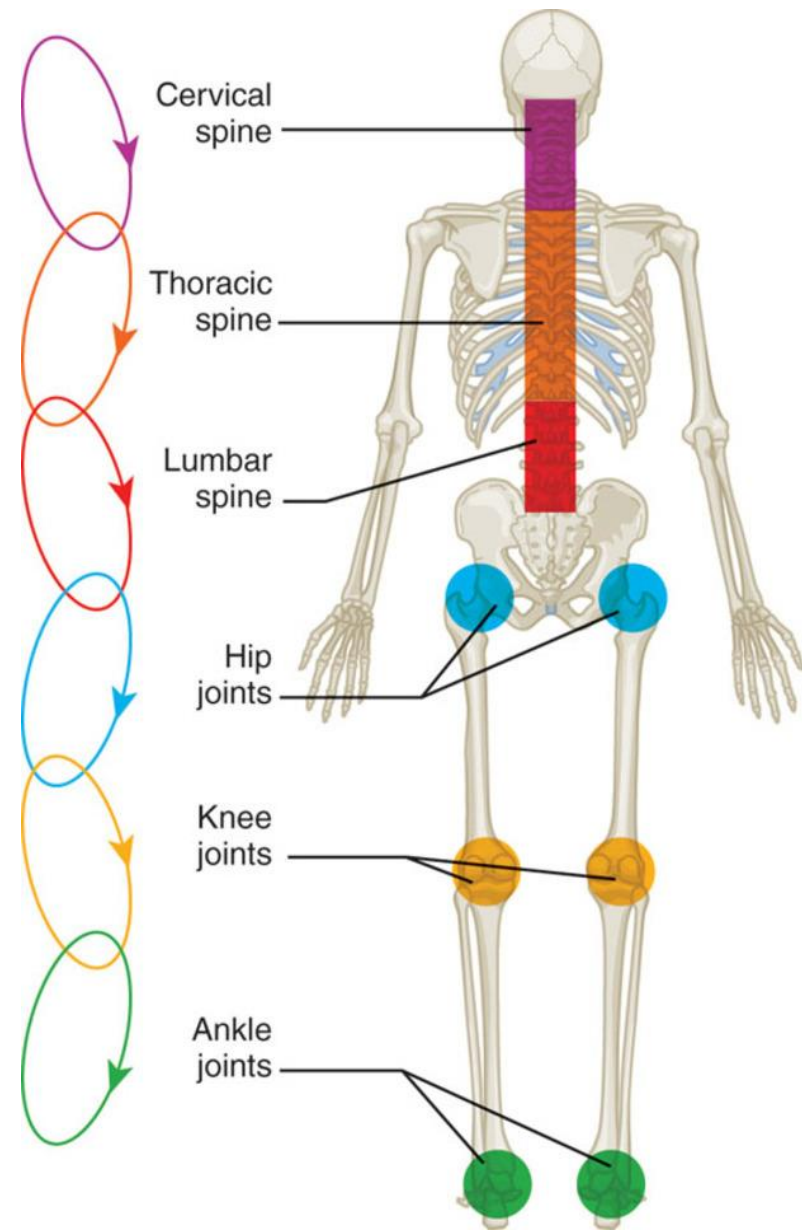
Testing Domains



Domain	Weight	Chapters in Text
Domain 1: Basic and Applied Sciences and Nutritional Concepts	15%	Section 3 Chapters 5,6,7,8,9,10
Domain 2: Client Relations and Behavioral Coaching	15%	3,4
Domain 3: Assessment	16%	11,12
Domain 4: Program Design	20%	21,22,23
Domain 5: Exercise Technique and Training Instruction	24%	13,14,15,16,17,18,19,20
Domain 6: Professional Development and Responsibility	10%	1,2

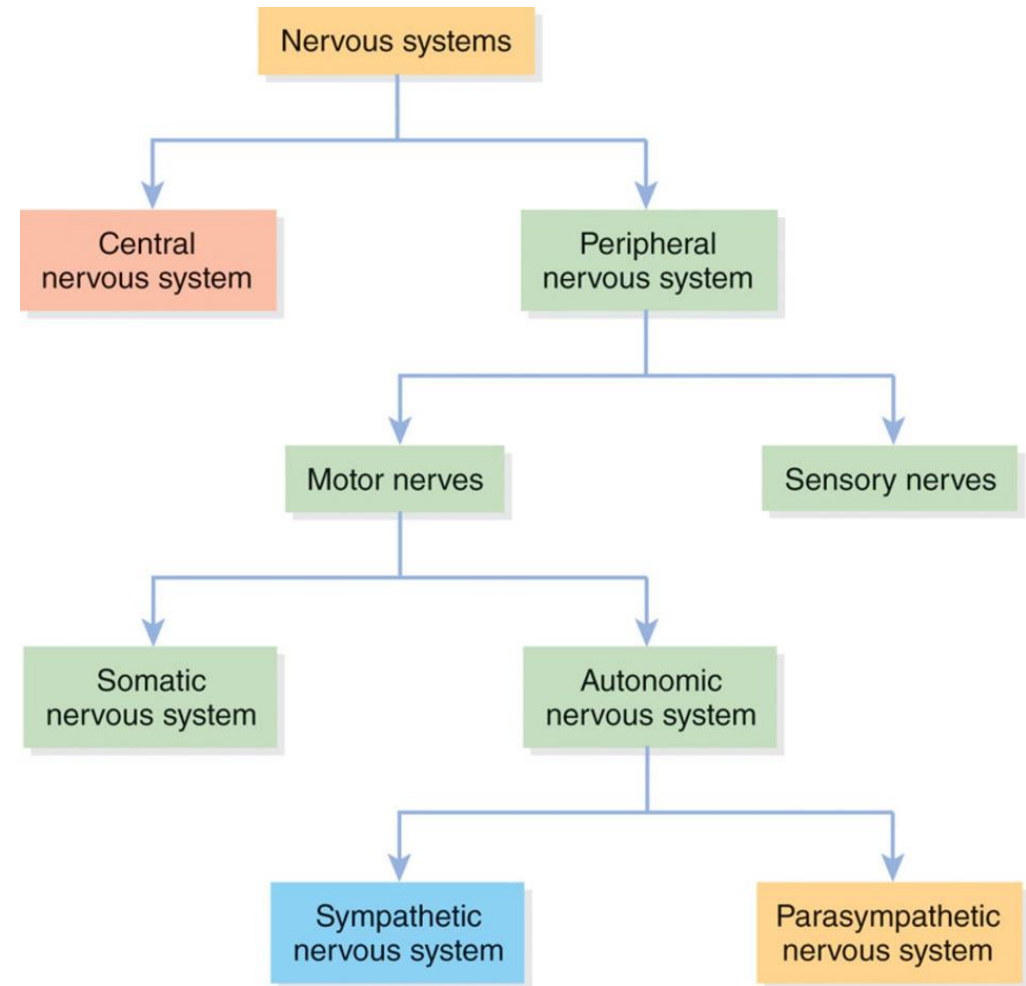
Human Movement System

- The collective components and structures that work together to move the body: muscular, skeletal, and nervous systems.
 - Nervous
 - Skeletal
 - Muscular

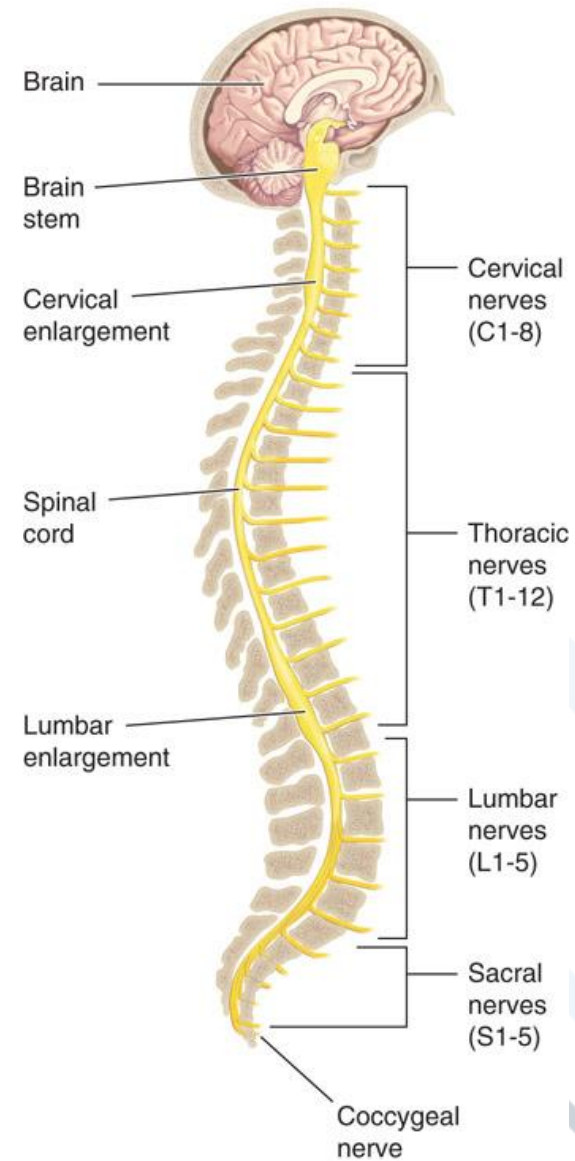


The Nervous System

- Central nervous system (CNS)
 - Brain and spinal cord
- Peripheral nervous system (PNS)
 - Nerves that communicate with the CNS
 - Further Subdivides
- Functions:
 - Sensory
 - Integrative
 - Motor

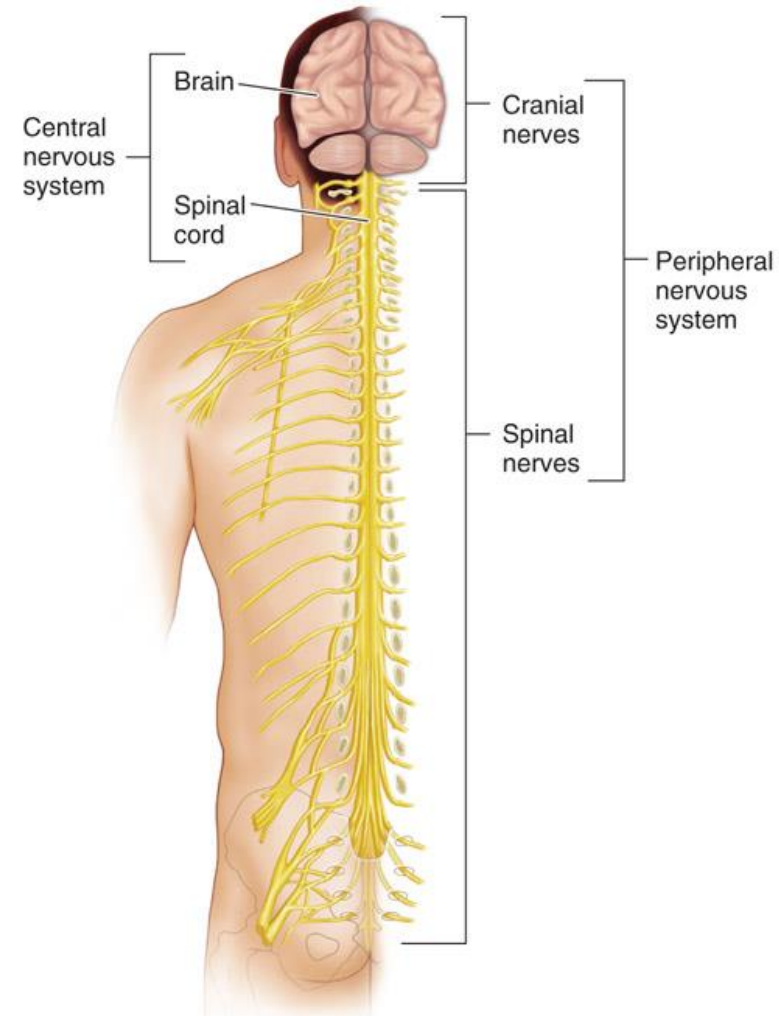


- Brain & The Spinal Cord

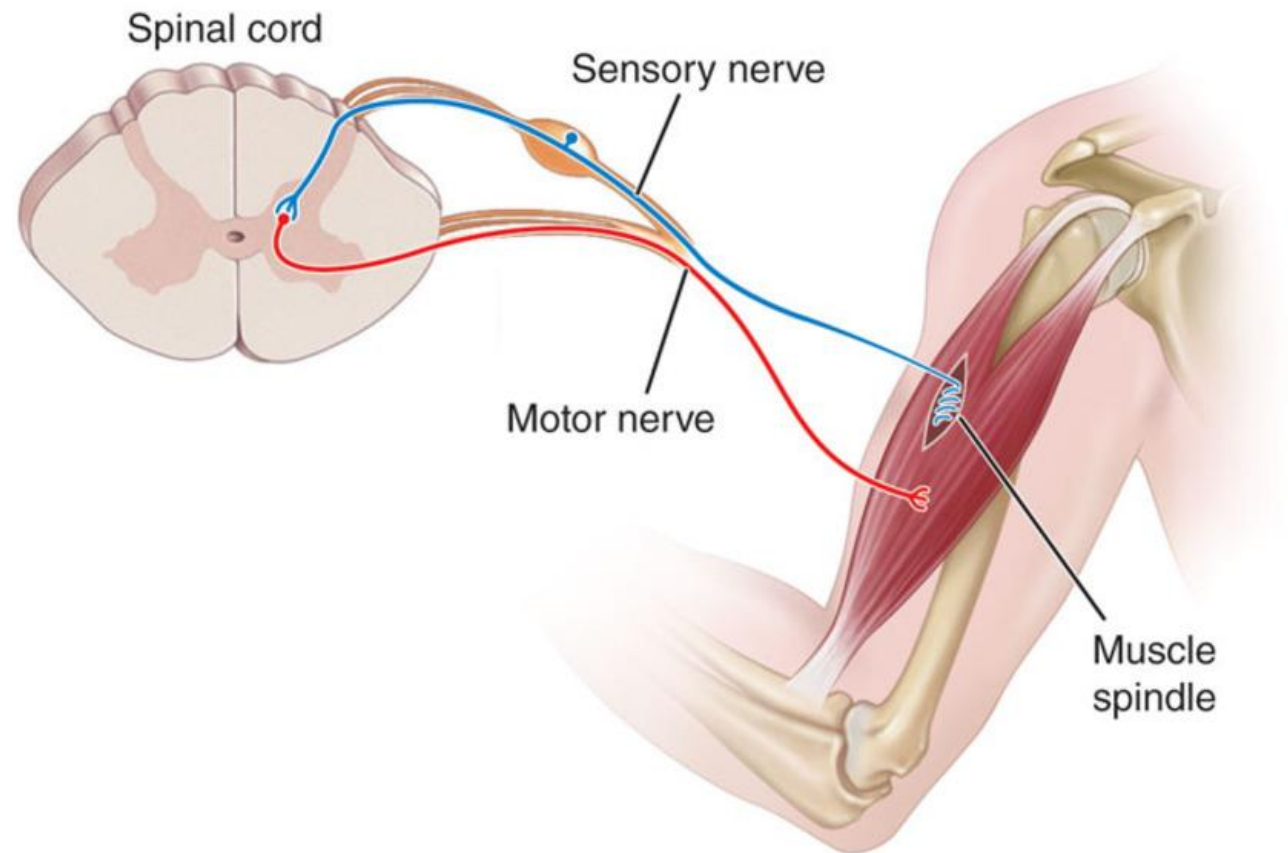


Peripheral Nervous System

- Nerves that communicate with the CNS
- Somatic Nervous System
 - Voluntary Control
- Autonomic Nervous System
 - Involuntary Control
 - Sympathetic
 - Parasympathetic

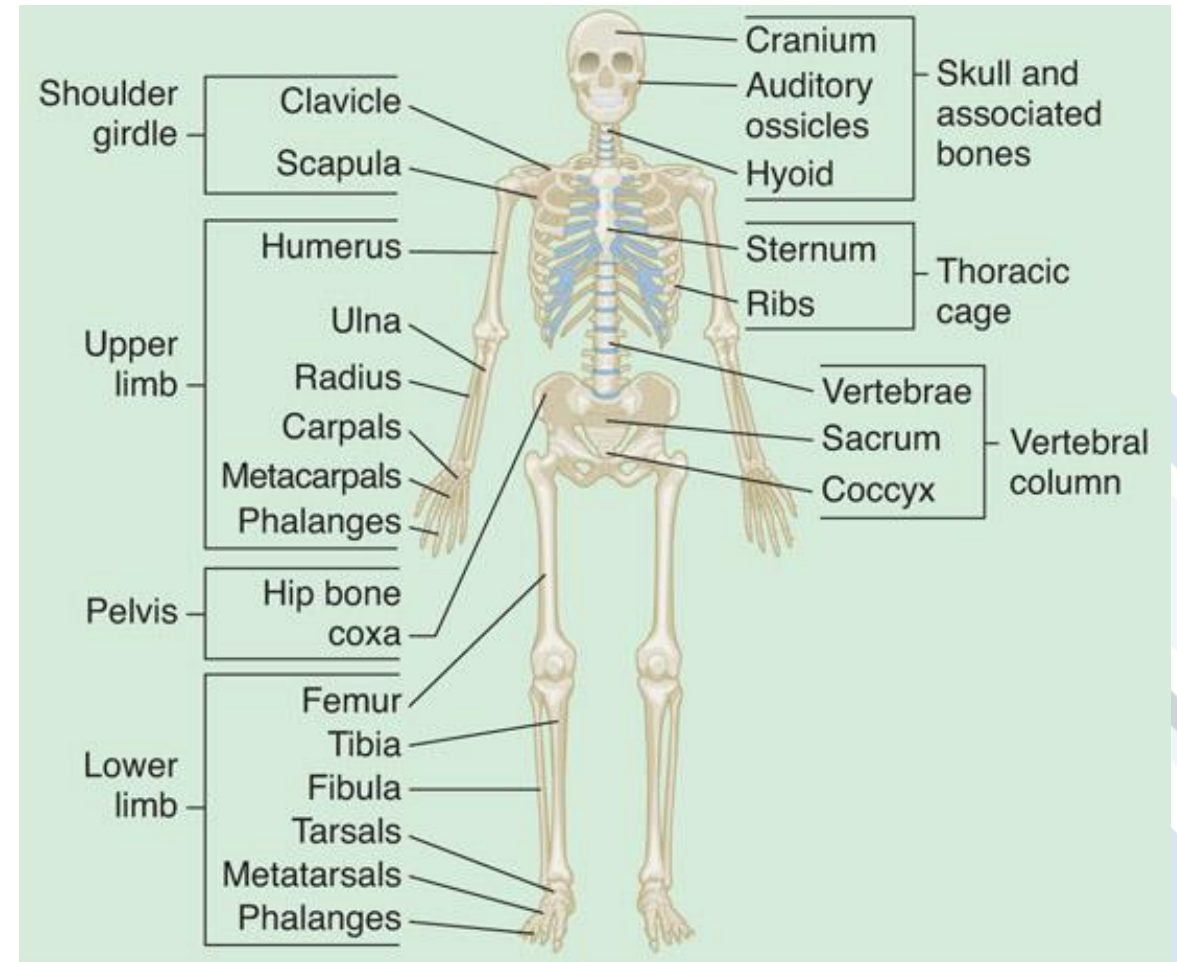


- Muscle Spindle
- Golgi Tendon Organ
- Joint Receptors



The Skeletal System

- Provides the shape and form for our bodies
- Supports and protects our internal organs
- Provides the structure from which movement is created
- Produces blood for the body and stores minerals



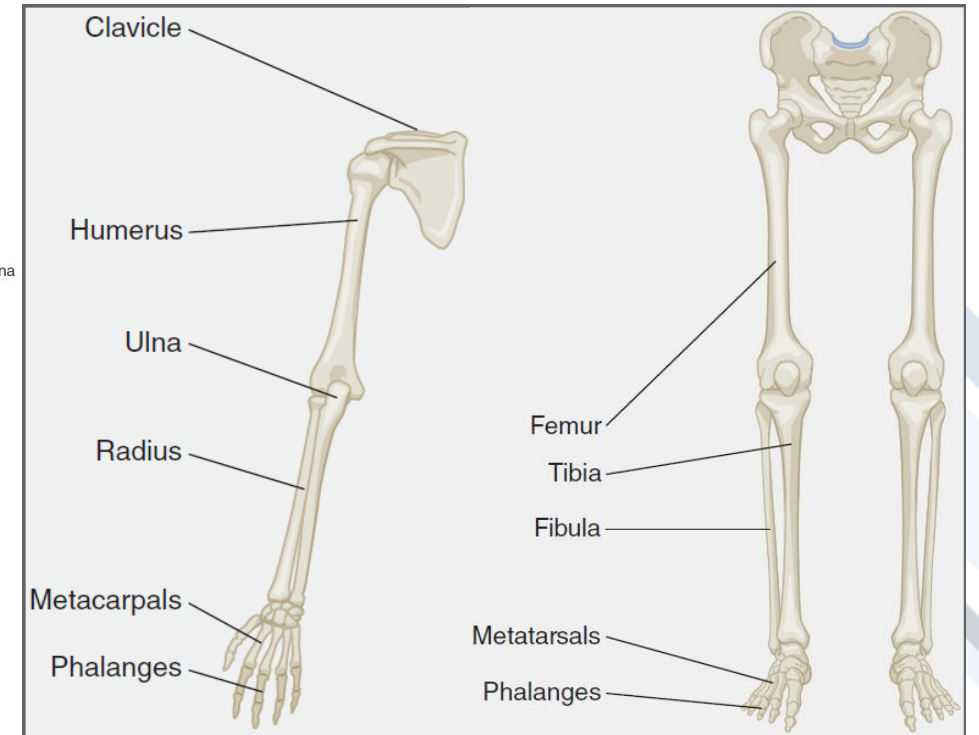
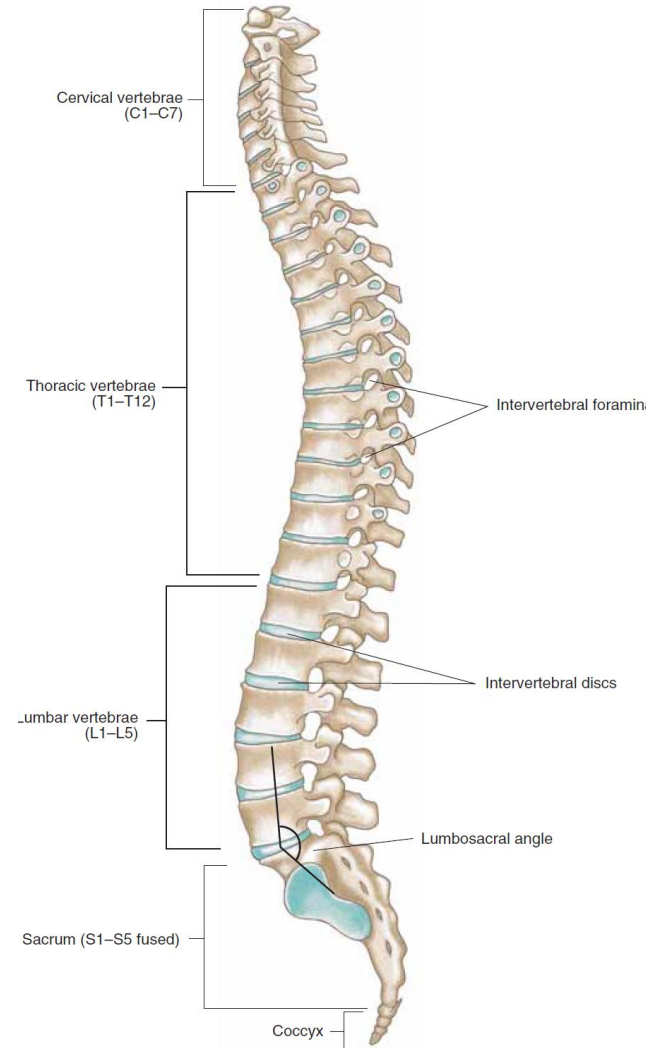
Divisions of the Skeletal System

- Axial Skeleton:

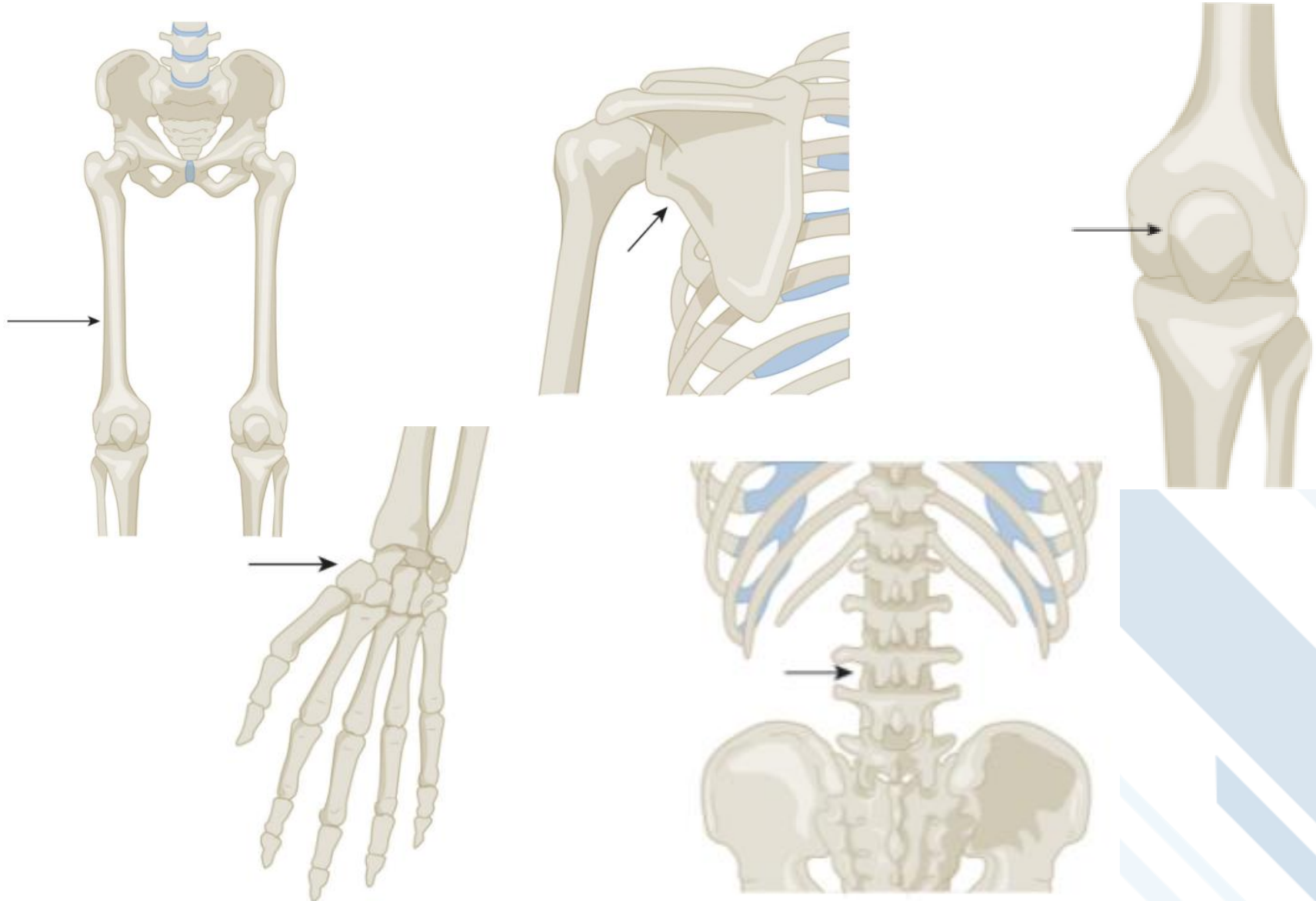
- Skull
- Rib cage
- Vertebral column

- Appendicular Skeleton:

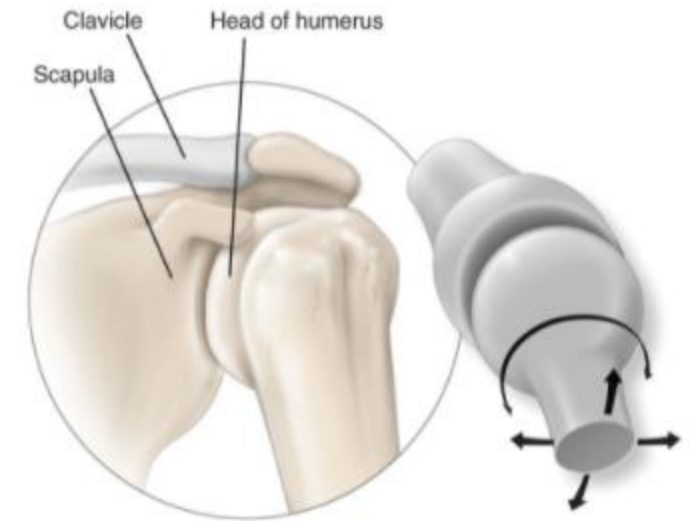
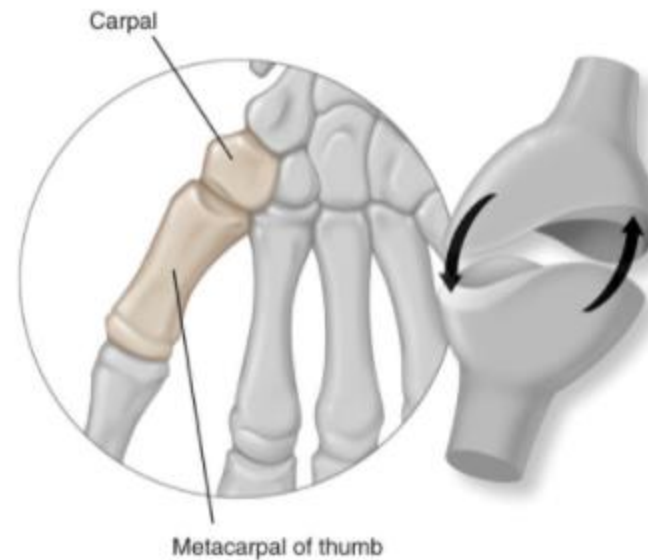
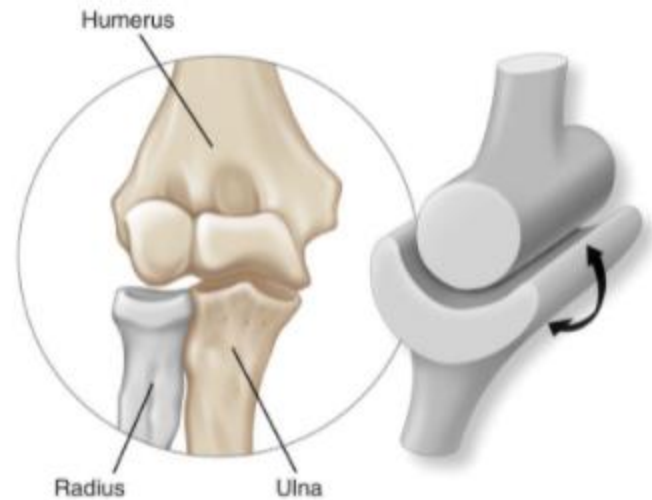
- Upper and lower extremities
- Shoulder and pelvic girdles



- Bone Type:
 - Long
 - Short
 - Flat
 - Irregular
 - Sesamoid

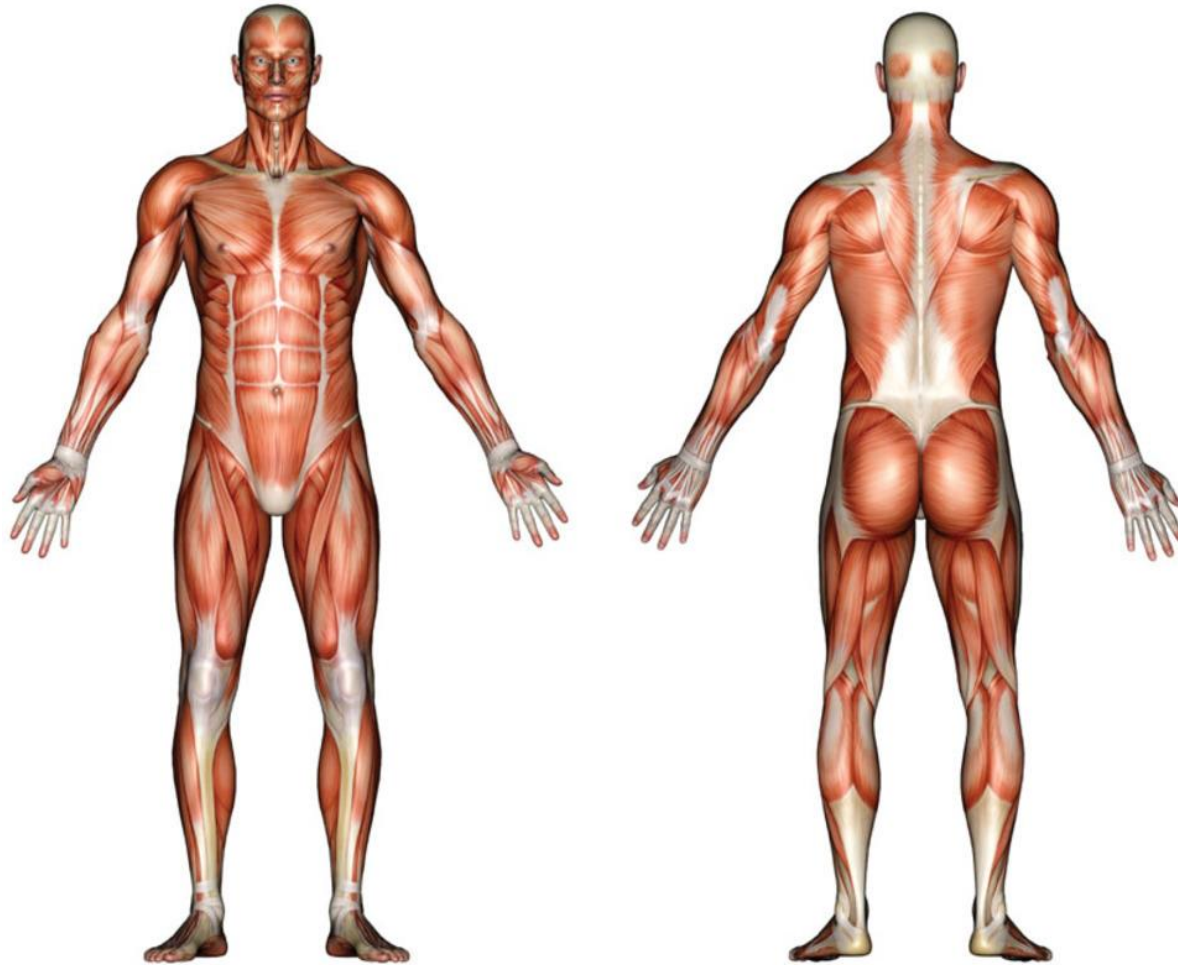


- Allow movement throughout segments of body
- Most common throughout body is Synovial

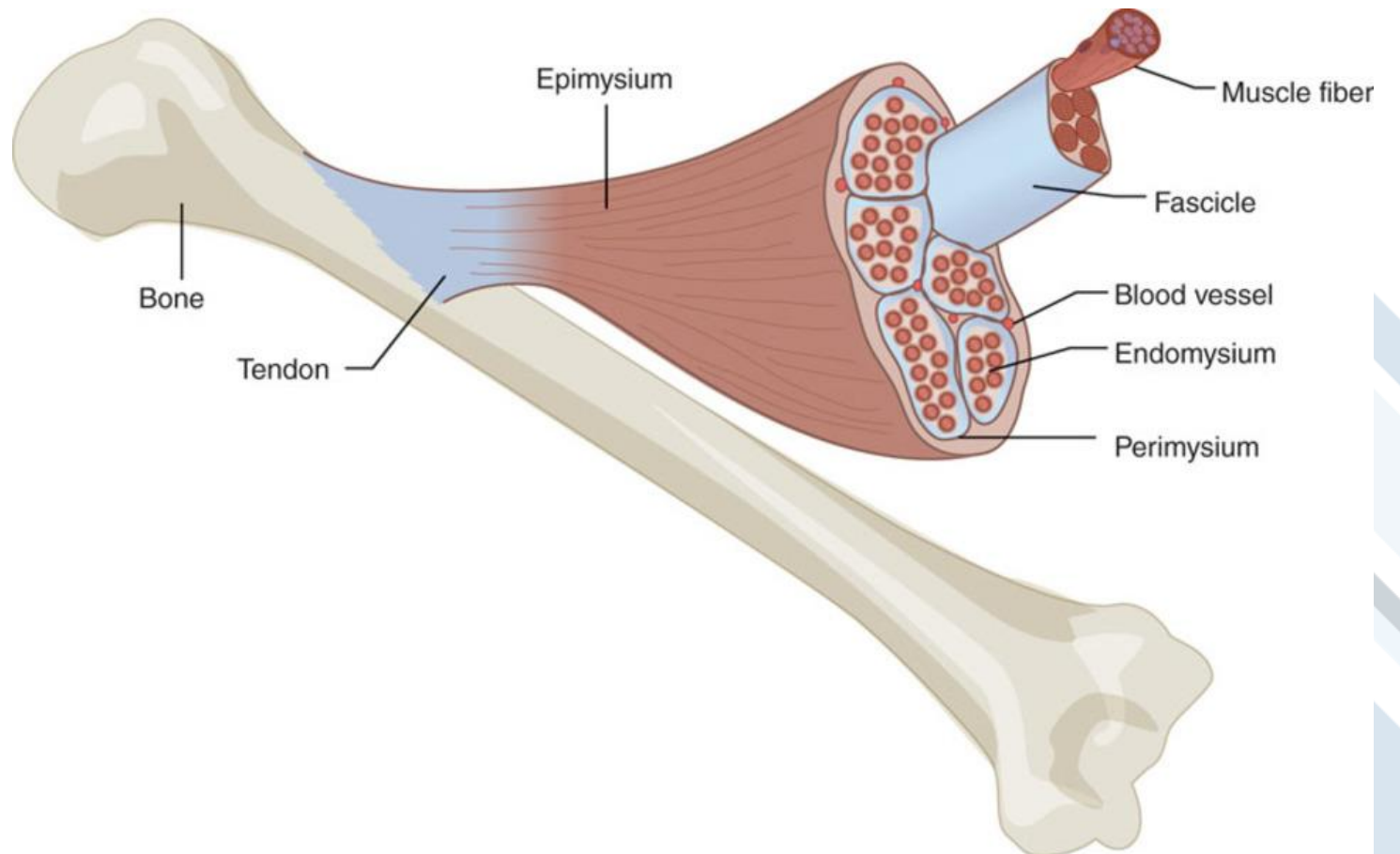


The Muscular System

- Generate forces that move the human body

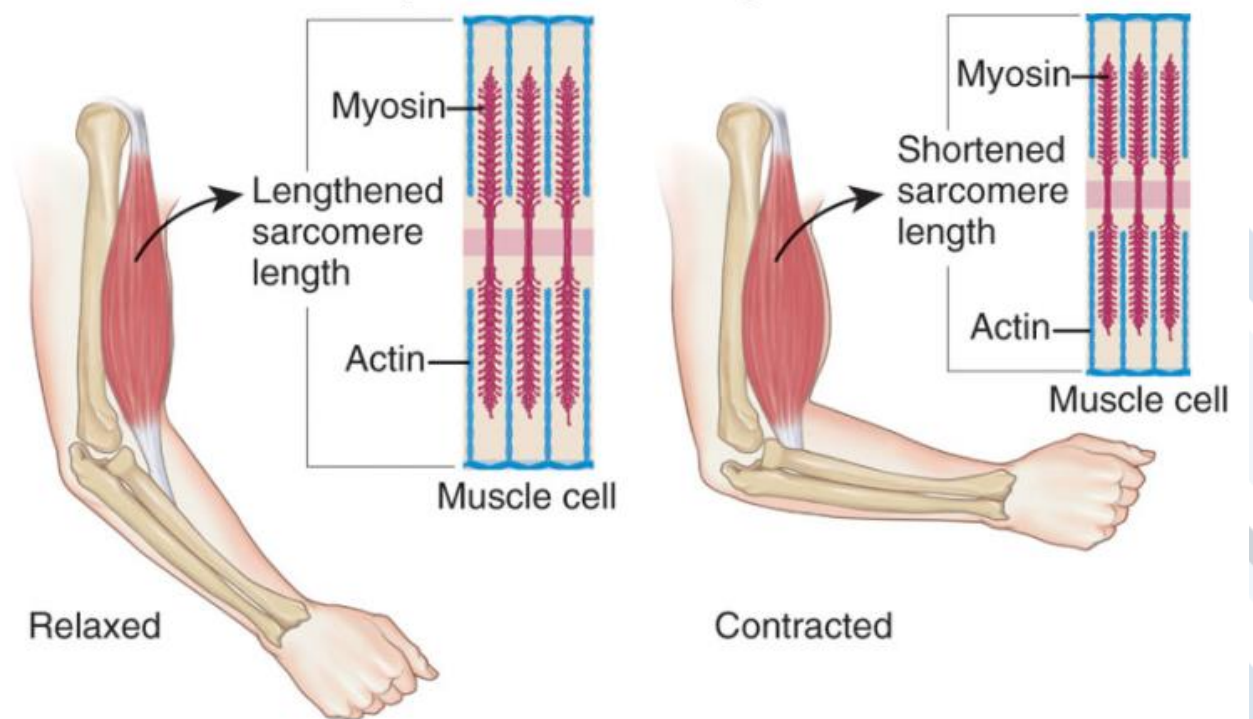


- Epimysium
- Perimysium
- Endomysium
- Fascicle
- Muscle Fiber
 - Sarcomere
 - Actin
 - Myosin



Sliding Filament Theory

- Produce Muscle Contraction
- Excitation-Contraction Coupling
- "All or Nothing" Principle



Muscle Fiber Types



Type I	More capillaries, mitochondria, and myoglobin
	Increased oxygen delivery
	Smaller in size
	Less force produced
	Slow to fatigue
	Long-term contractions (stabilization)
	“Slow twitch”



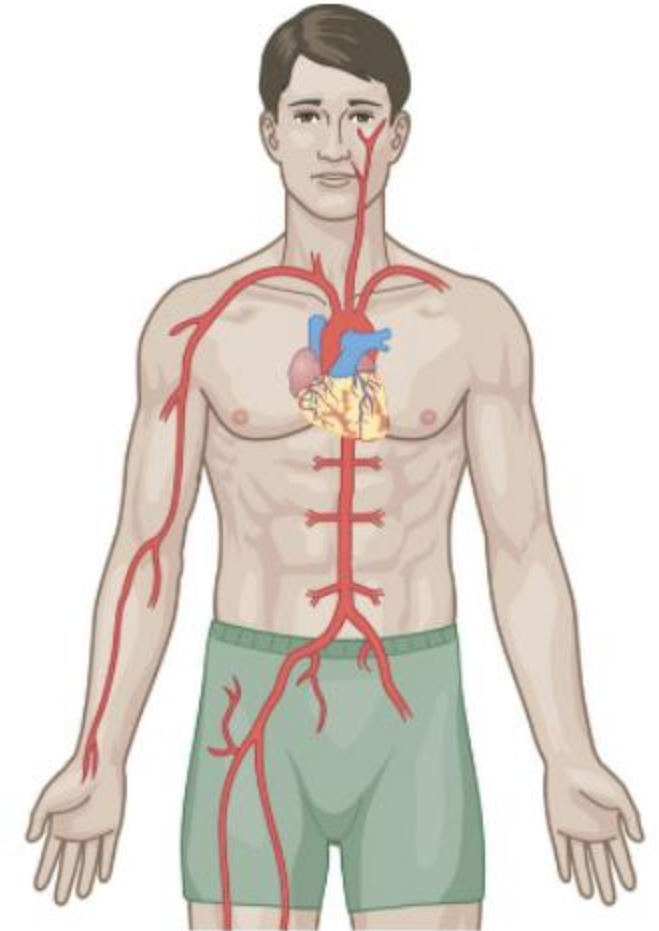
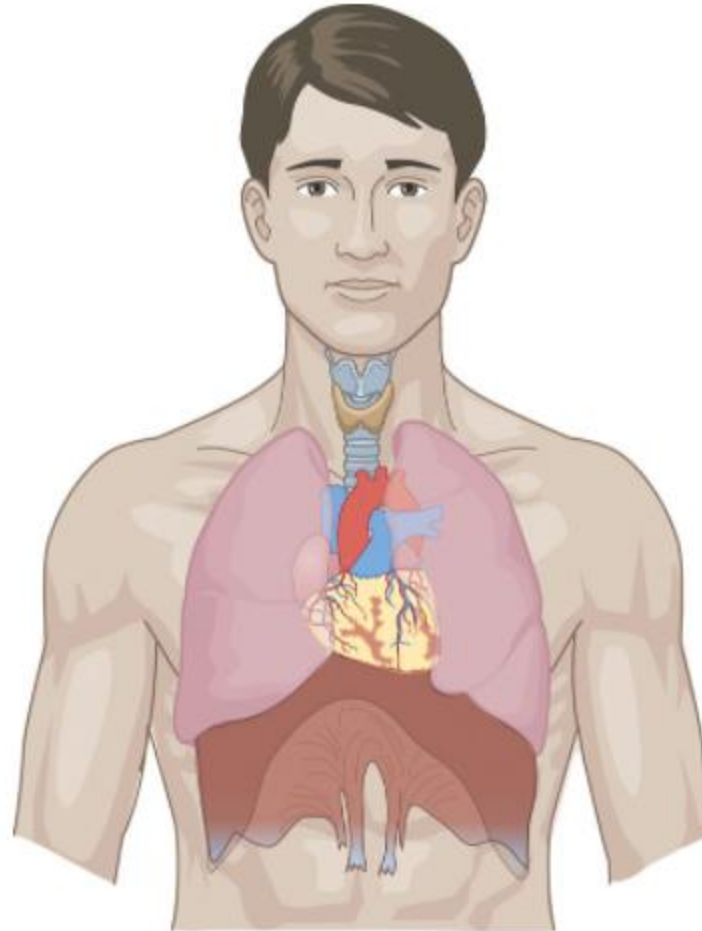
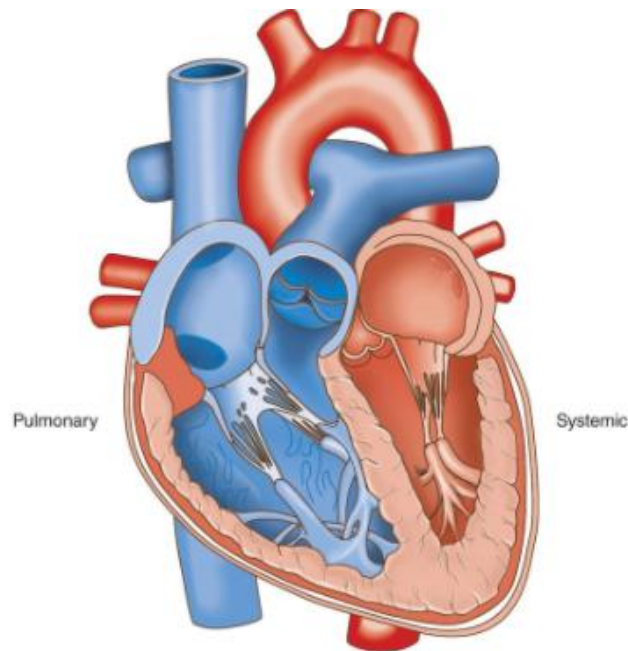
Muscle Fiber Types

Type II	Fewer capillaries, mitochondria, and myoglobin
	Decreased oxygen delivery
	Larger in size
	More force produced
	Quick to fatigue
	Short-term contractions (force and power)
	“Fast twitch”



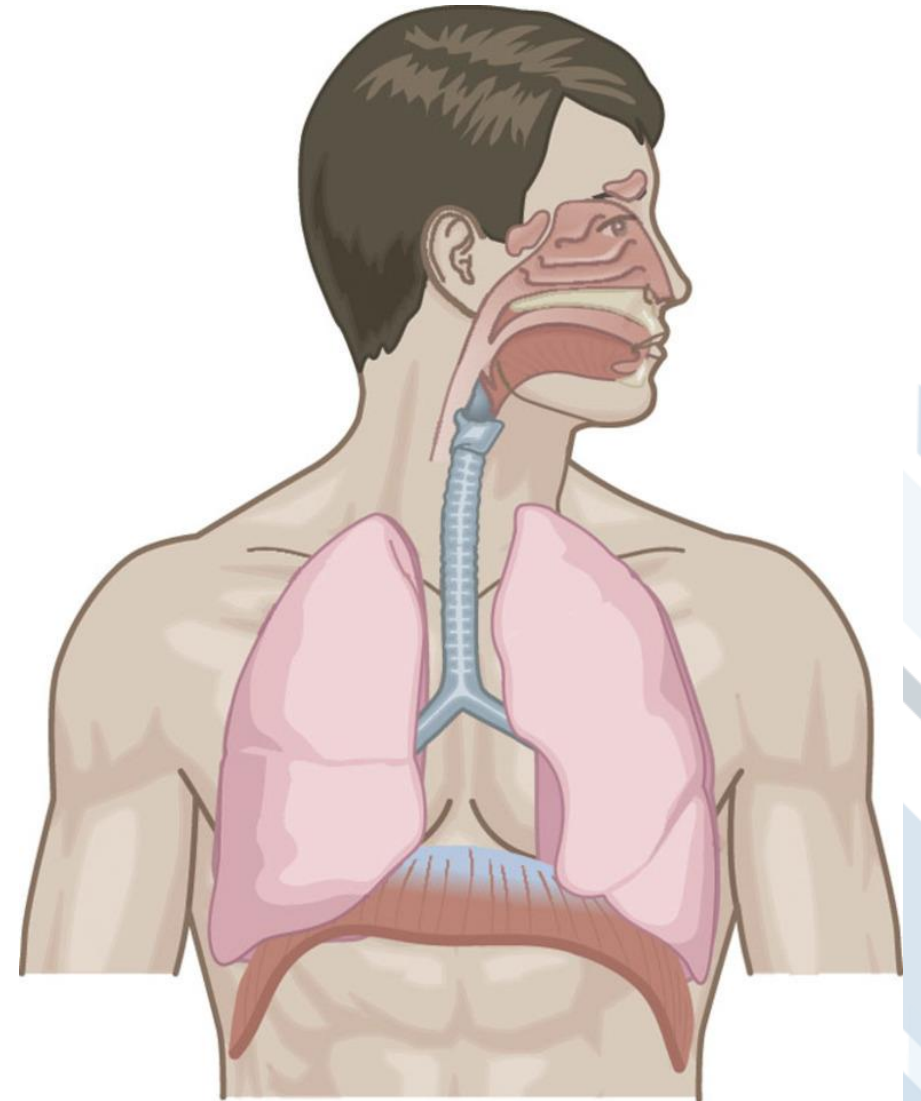
The Cardiorespiratory System

- Structure
 - Cardiovascular
 - Respiratory
- Blood flow



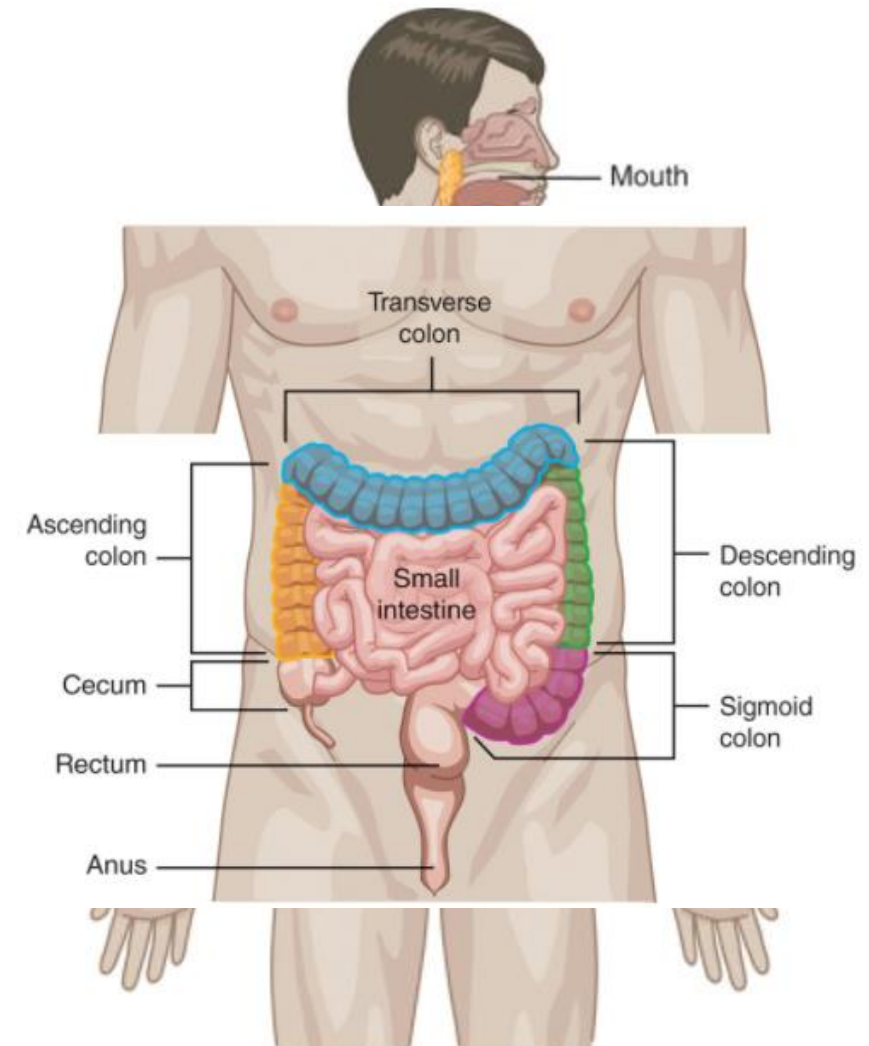
The Respiratory System

- Function:
 - Inhale oxygen and exhale carbon dioxide
- Includes the:
 - Airways
 - Lungs
 - Respiratory muscles



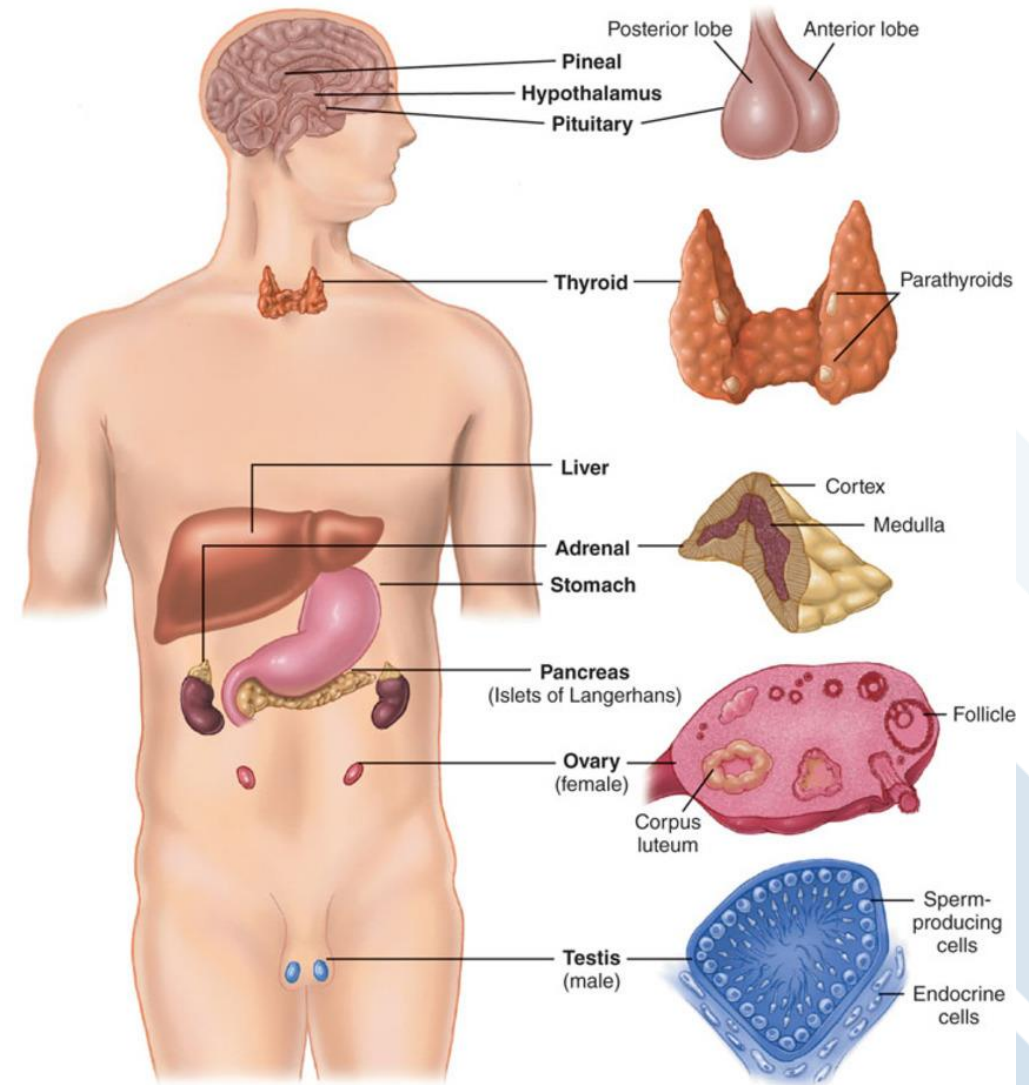
The Digestive System

- Function:
 - Allows the food we eat and liquids we consume to be digested, processed, and absorbed
- Three functional regions:
 1. Head and neck (includes the mouth)
 2. Upper gastrointestinal (GI) tract
 3. Lower GI tract

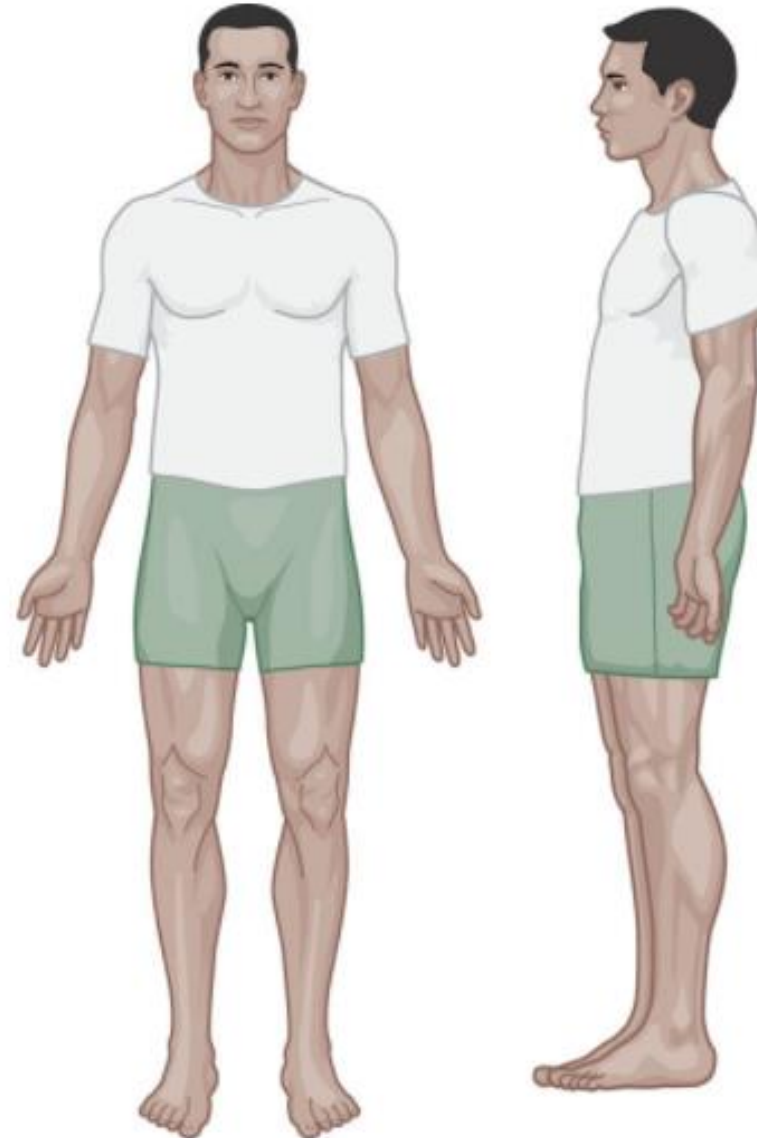


The Endocrine System

- Endocrine Glands
- Hormones:
 - Insulin
 - Glucagon
 - Catecholamines
 - Cortisol
 - Testosterone & Estrogen
 - Growth Hormone
 - Insulin-Like Growth Factors (IGF)
 - Thyroid Hormone

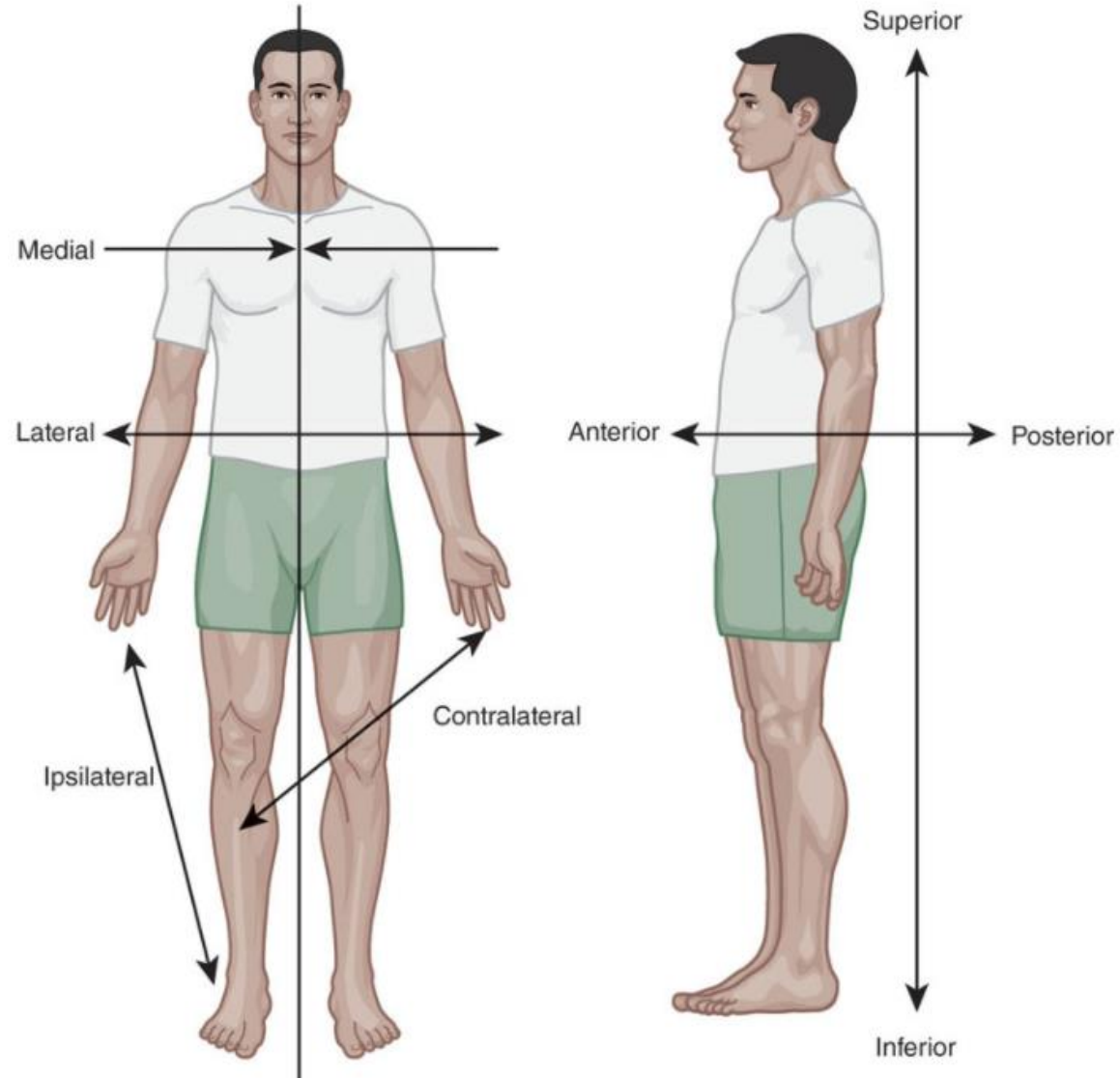


- The position with the body erect, the arms at the sides, and the palms forward. It is the position of reference for anatomic nomenclature.



Anatomic Locations

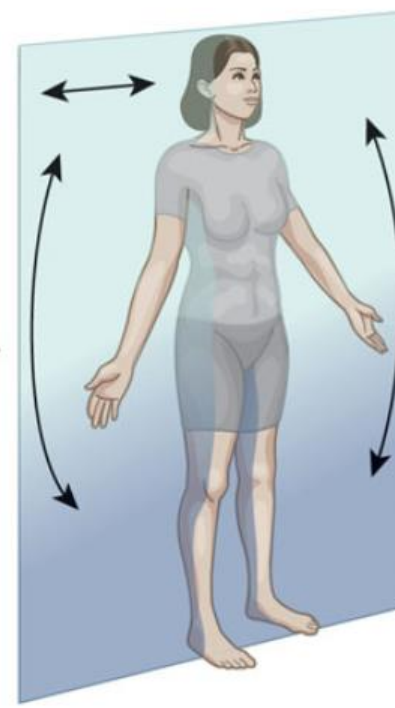
- Anterior
- Superior
- Proximal
- Medial
- Posterior
- Inferior
- Distal
- Lateral



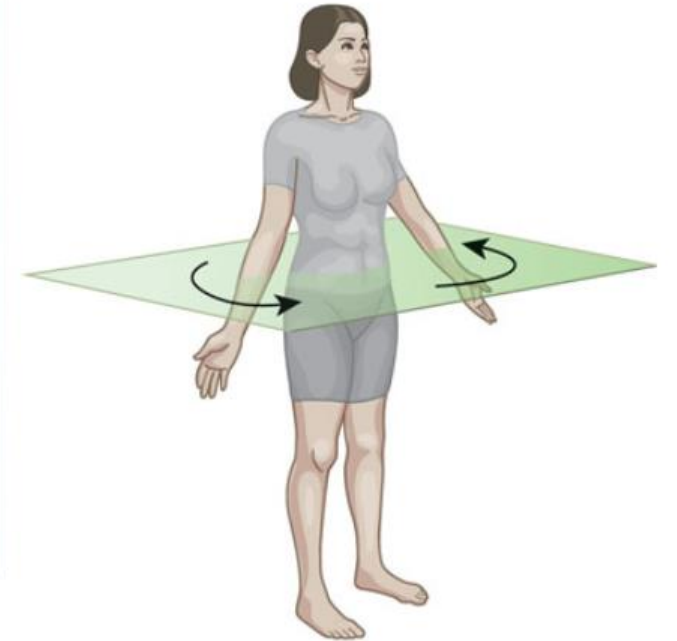
- Sagittal plane:
 - Flexion and Extension
- Frontal plane:
 - Abduction and Adduction
- Transverse plane:
 - Rotation



Sagittal plane

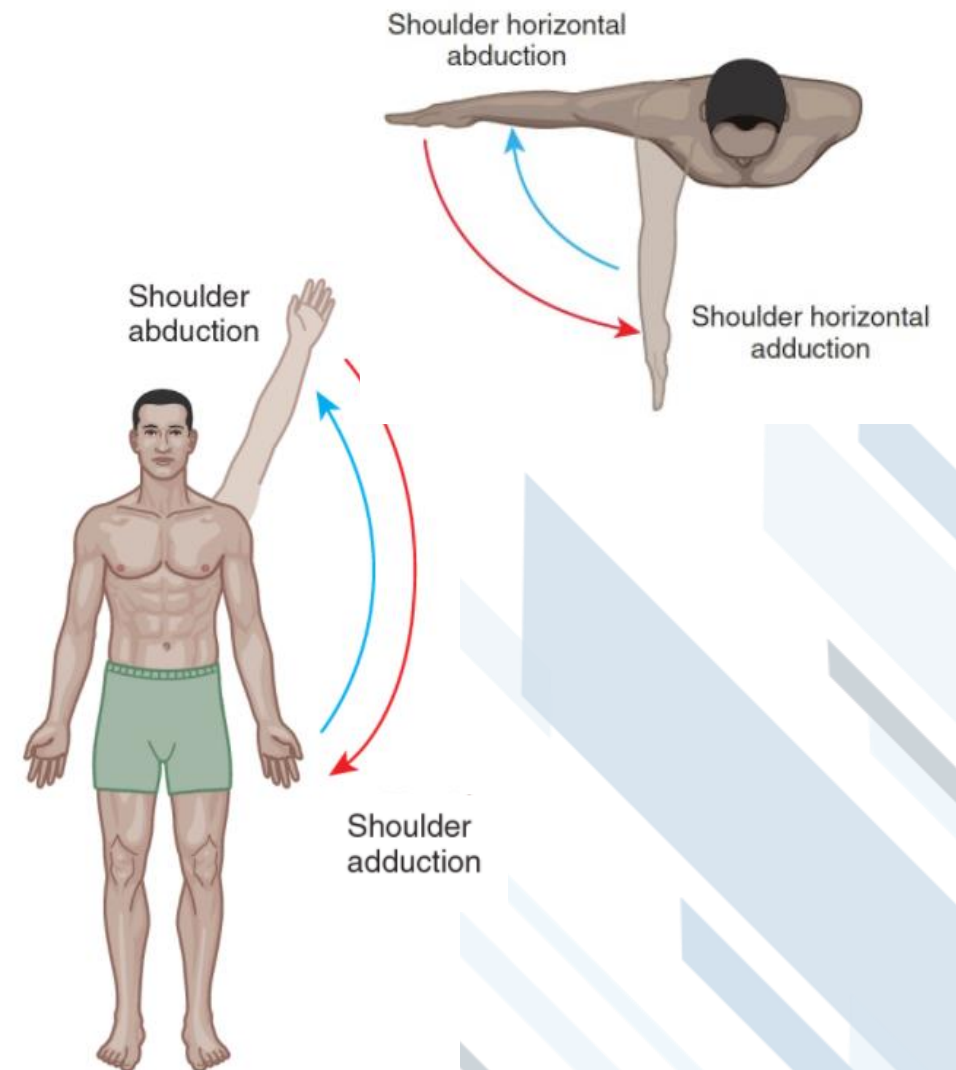
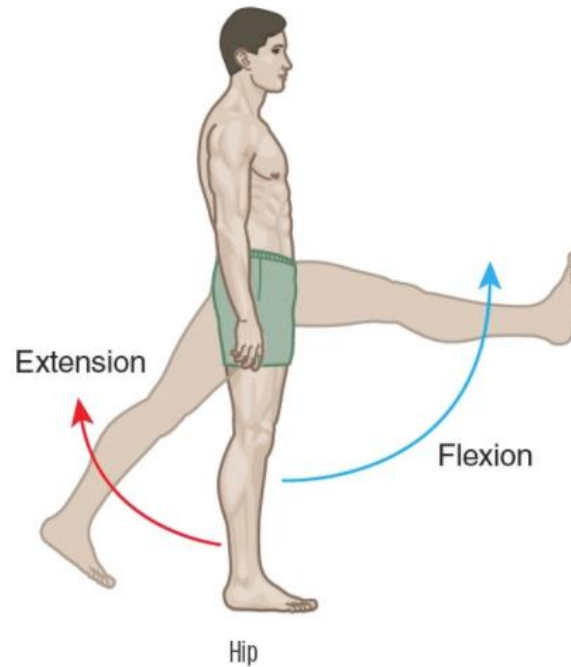


Frontal plane

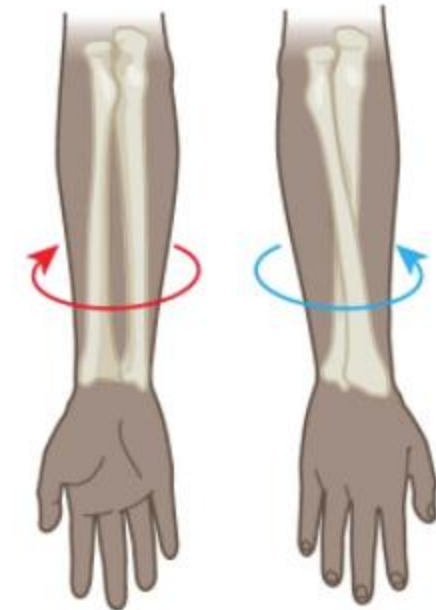
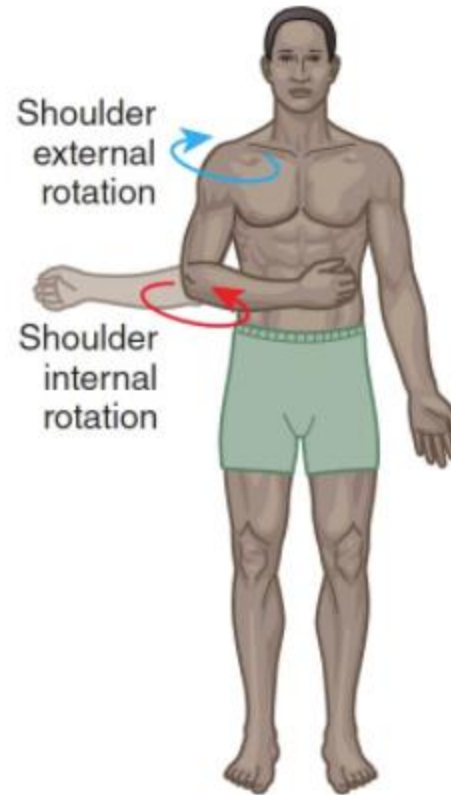


Transverse plane

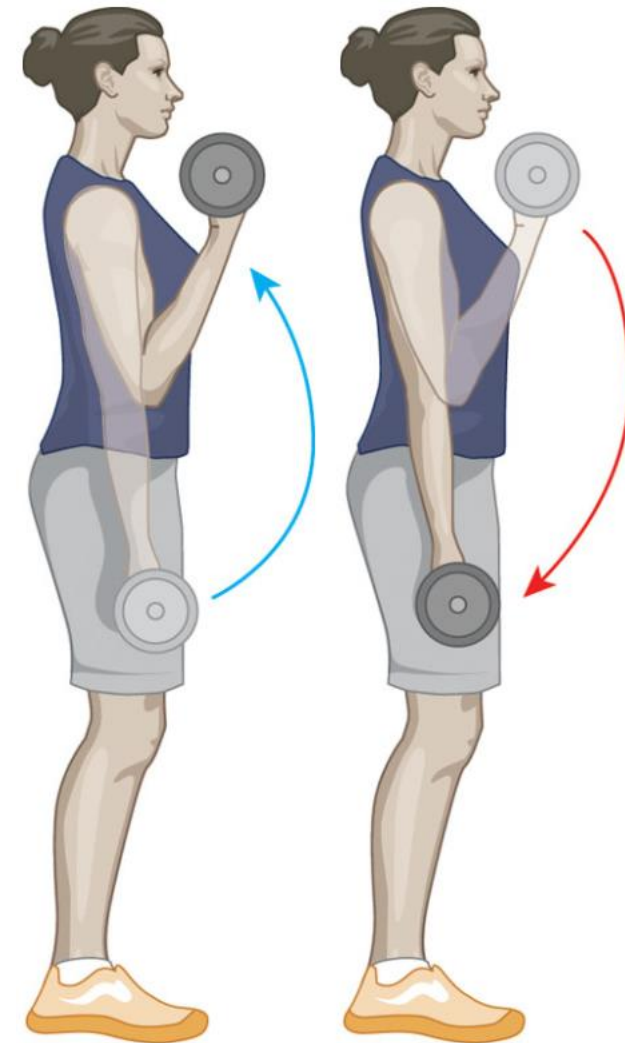
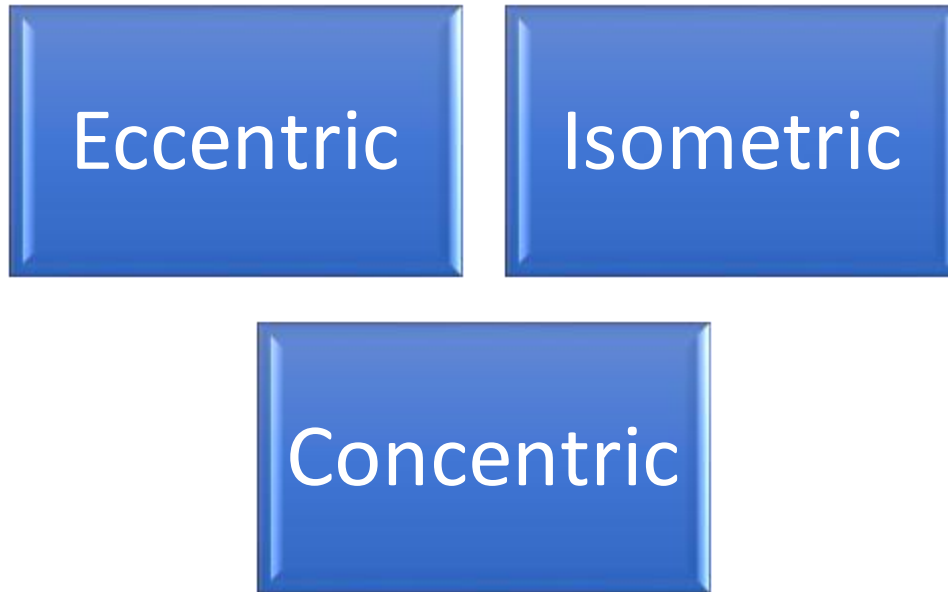
- Flexion
- Extension
- Abduction
- Adduction
- Horizontal abduction
- Horizontal adduction



- Internal Rotation
- External Rotation
- Pronation
- Supination



Muscle Action Spectrum



- Agonists
- Synergists
- Antagonists
- Stabilizers

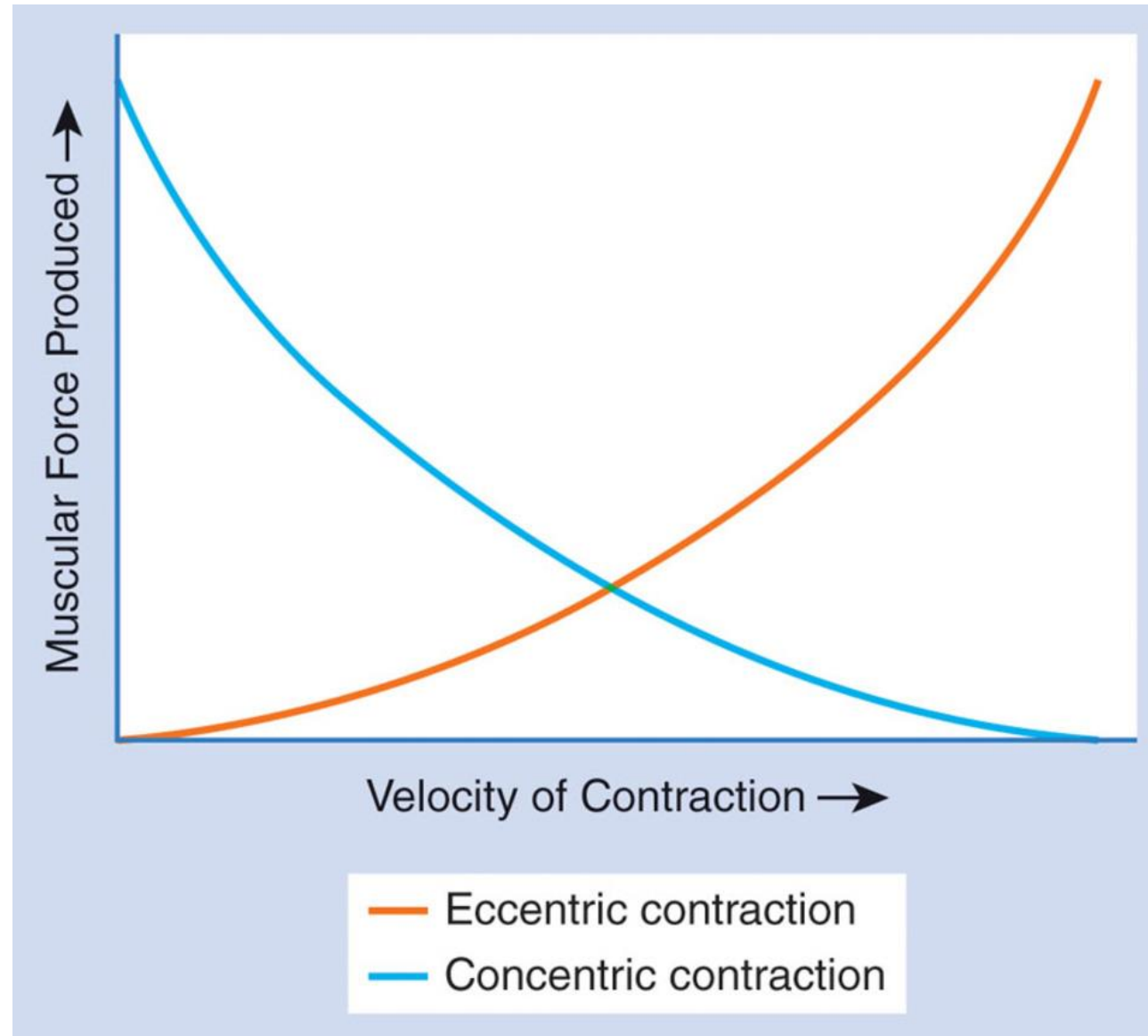


Open-Chain vs Closed-Chain

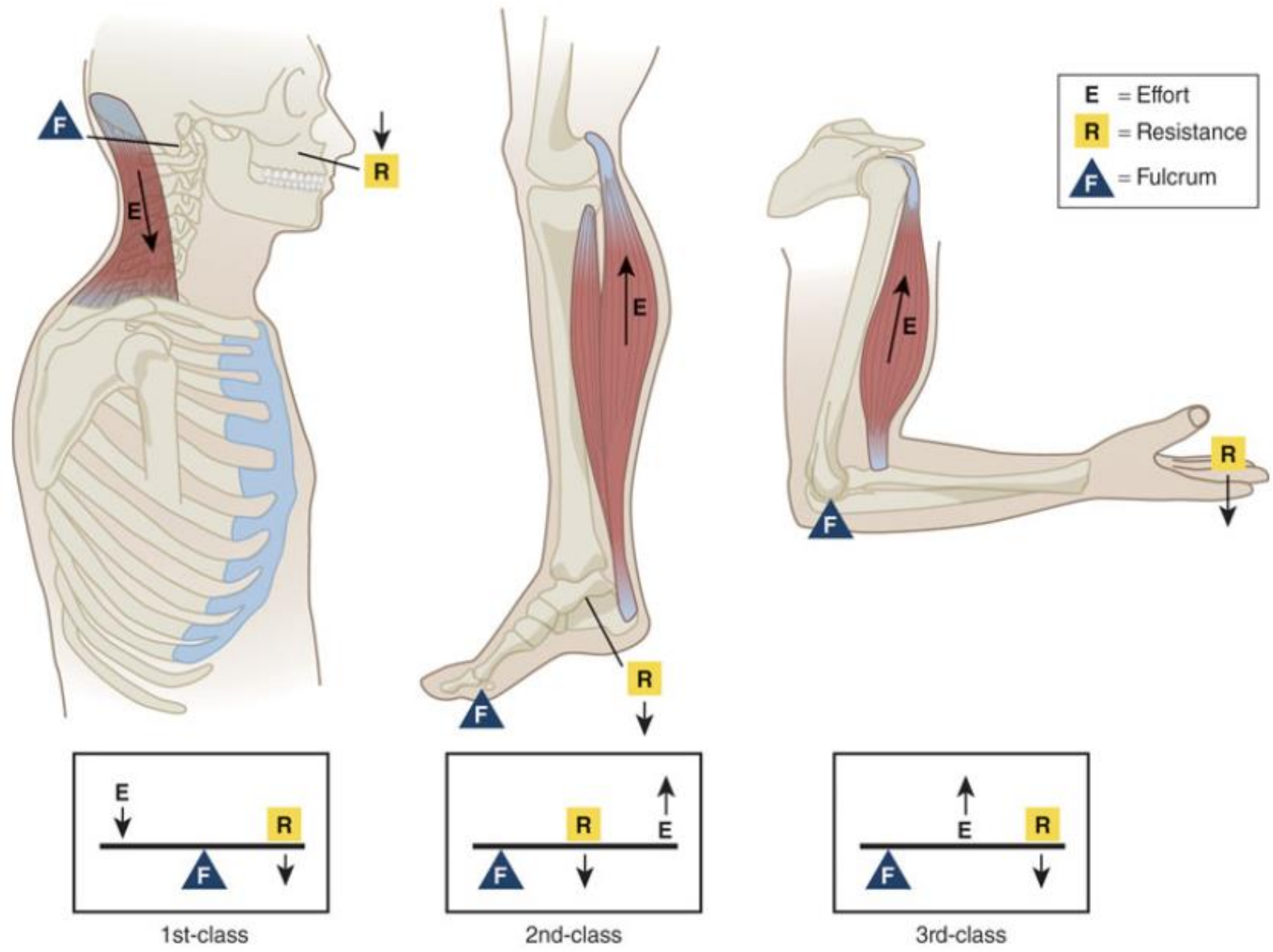
- Closed-Chain
 - Distal segments are fixed
- Open-Chain
 - Distal Segments are free to move in space



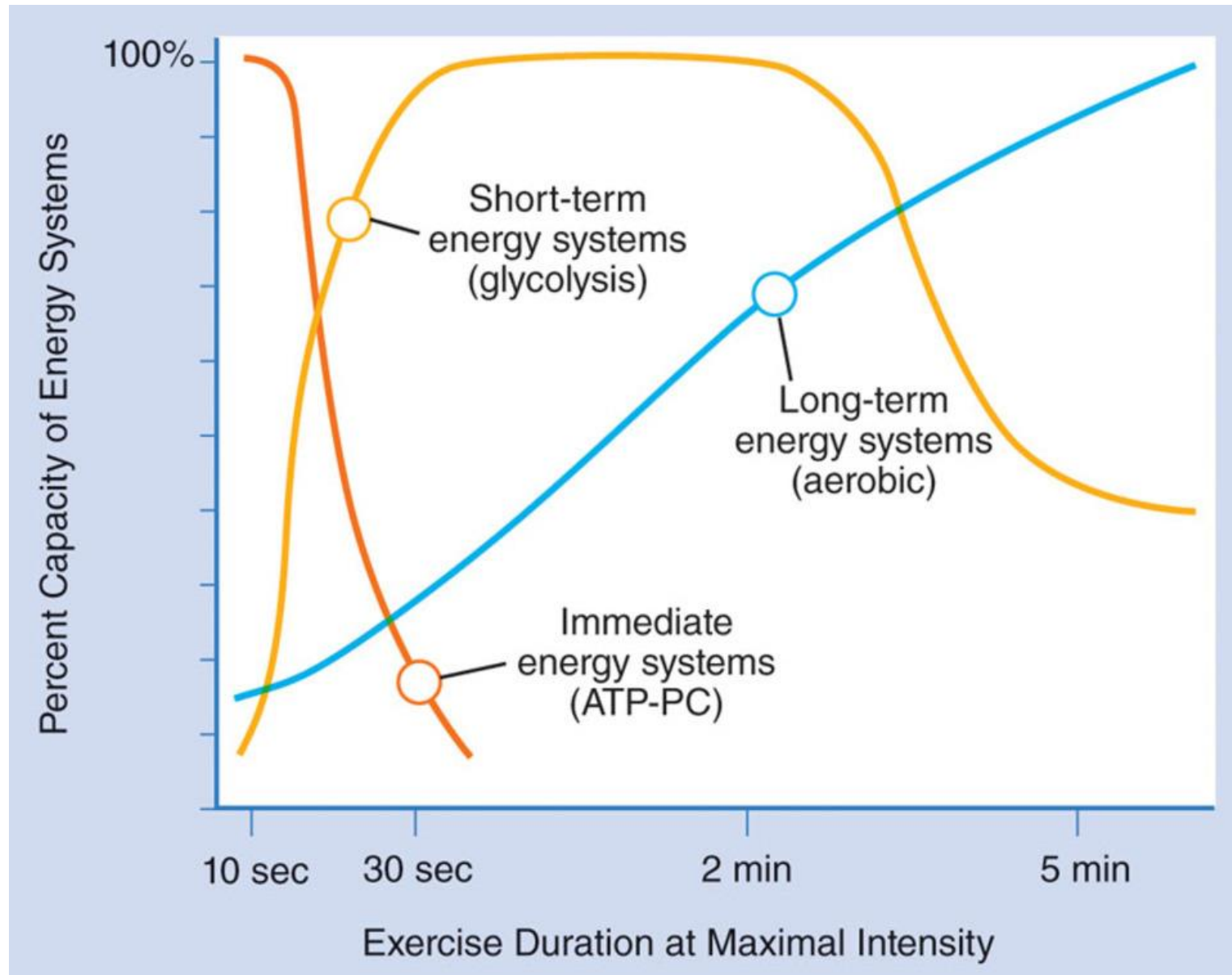
Force-Velocity Curve



Levers

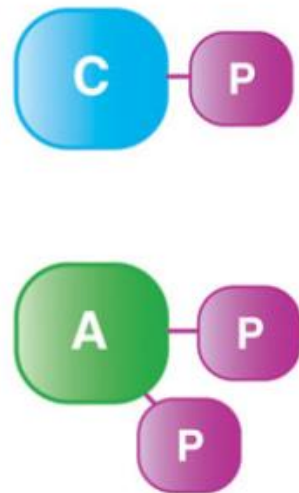


- ATP-PC
- Glycolysis
- Oxidative

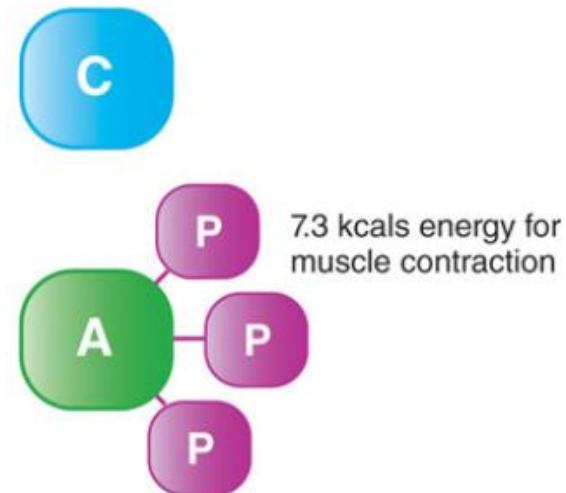


- High intensity
- Short durations
 - Less efficient, 10 – 15 seconds of energy
- High capacity for force output

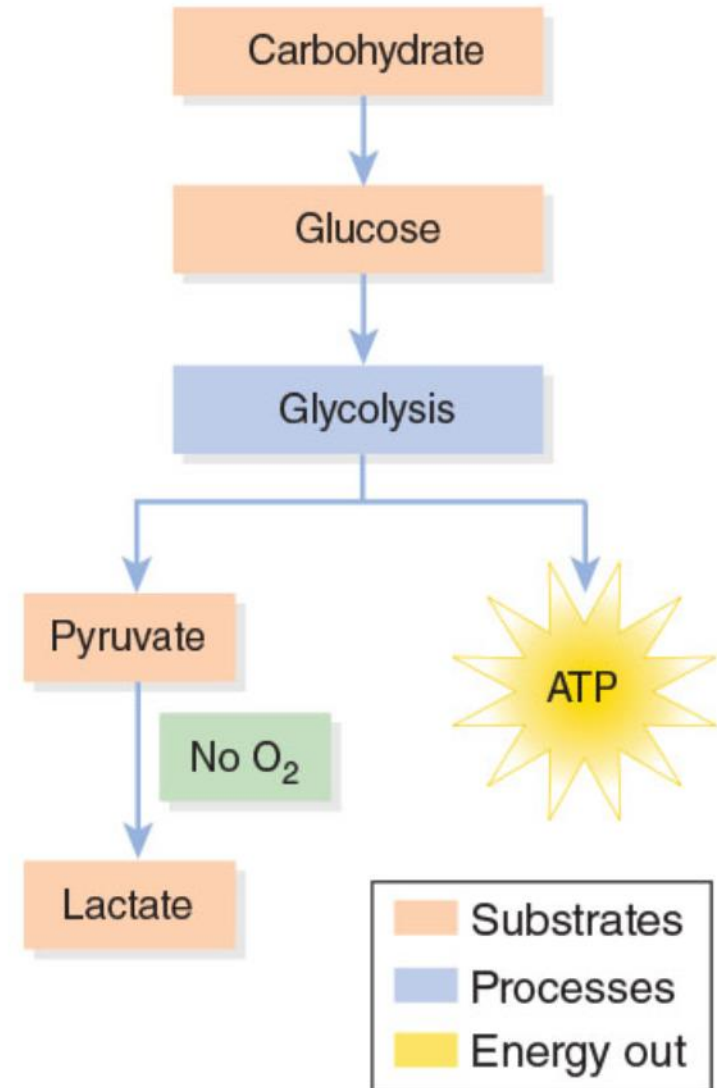
Creatine phosphate + adenosine diphosphate



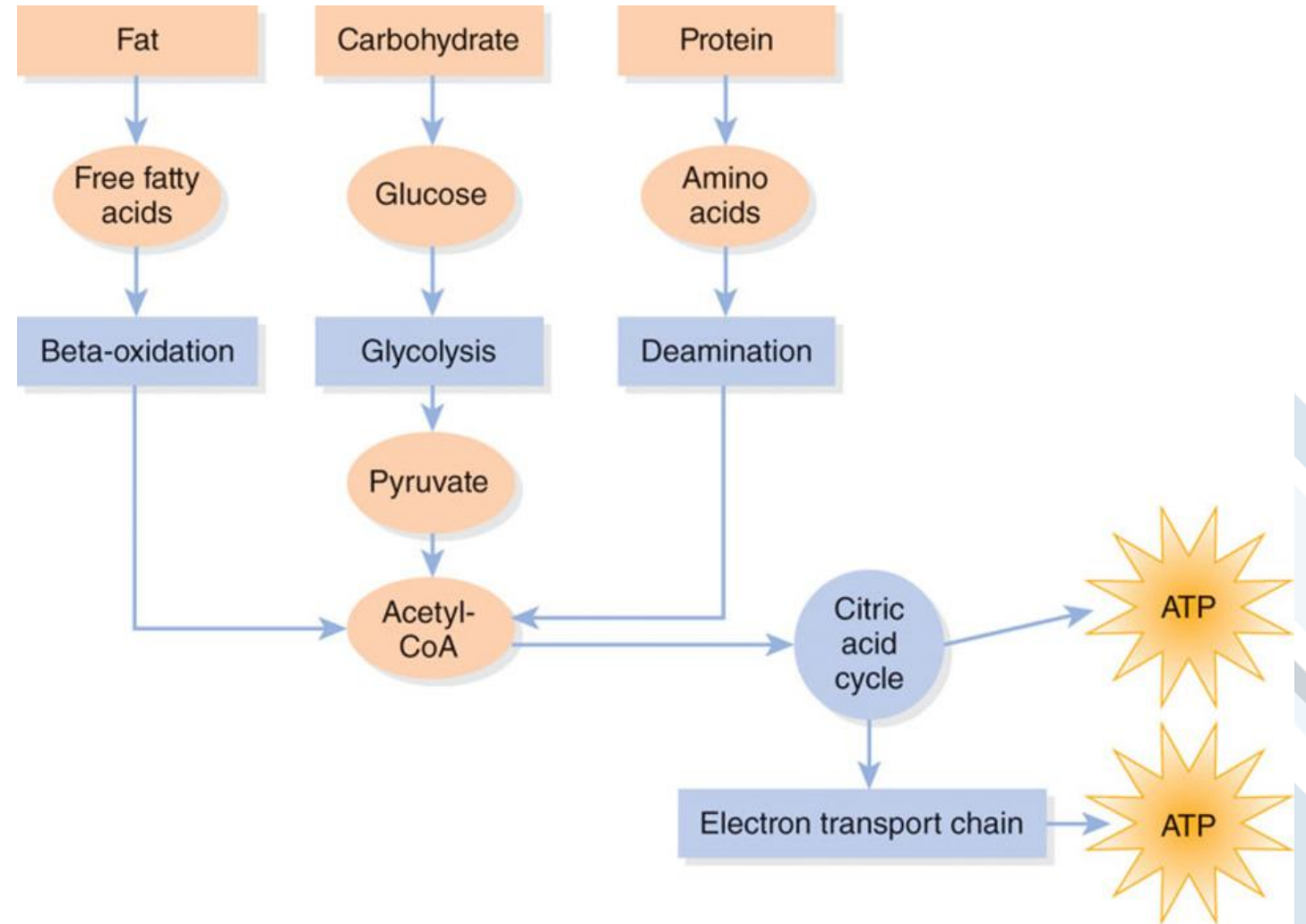
Creatine + adenosine triphosphate



- Intermediate intensity
- Moderate duration
 - More efficient, 30-60 seconds of energy
- Moderate capacity for force output



- Low intensity
- Long durations
 - Very efficient, high capacity for energy
- Low capacity for force output



A top-down photograph of a healthy meal and fitness gear on a light-colored wooden surface. The meal includes a sandwich on whole-grain bread with lettuce and cheese, a red apple, a purple grape, and a yellow juice bottle. In the foreground, there are black weight plates, one marked "2KG", and a red athletic shoe. A white curved line separates the image from the dark blue background on the right.

Nutrition Concepts

- Protein
- Carbohydrates
- Fats

Energy-Yielding Nutrient	Energy per Gram
Protein	4 calories
Carbohydrate	4 calories
Lipid	9 calories
Alcohol (energy yielding but not considered a macronutrient)	7 calories

- Function
- Structure
- Dietary protein
- Proteins – 4 calories
 - RDA is 0.8g/kg of body weight
 - 10 – 35% total calories



- Function
- Structure
- Dietary carbohydrates
- Carbohydrates – 4 calories
 - 45 – 65% total calories

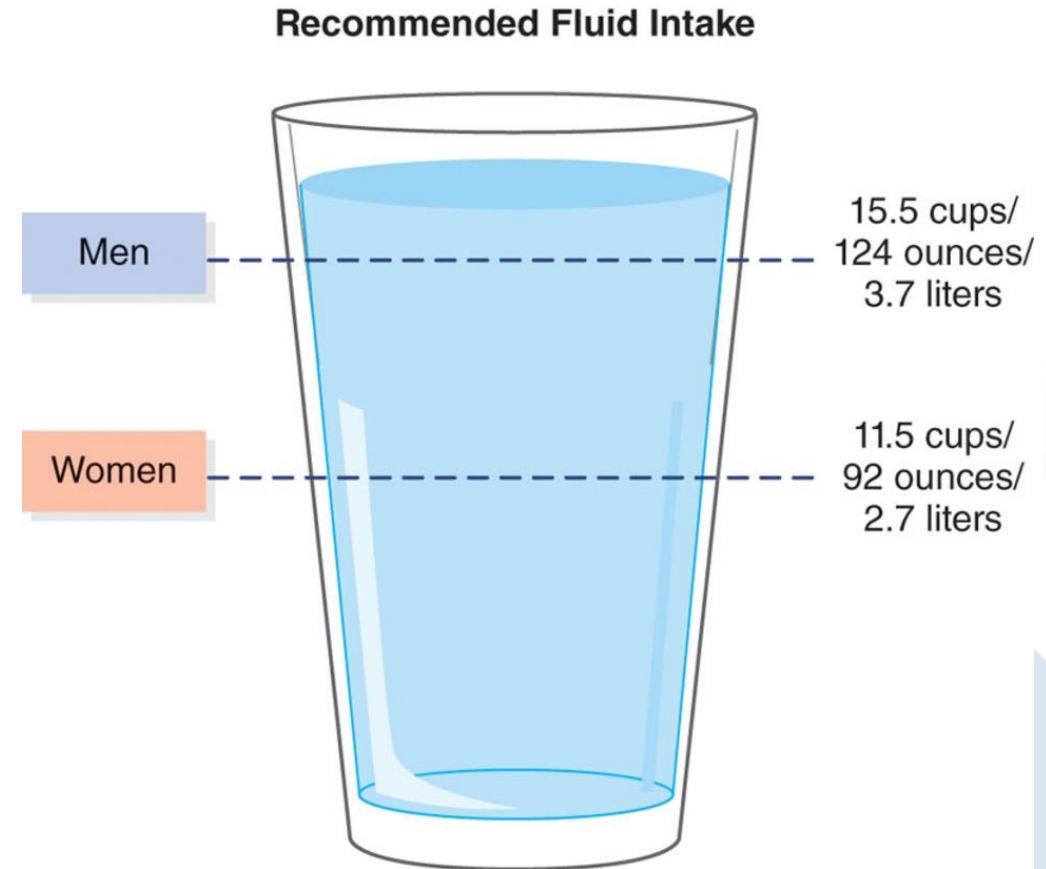


- Function
- Structure
- Dietary fats
- Fats – 9 calories
 - 20 – 35% total calories



• Importance of Hydration

- Regulation of body temperature
- Transport and distribution of water-soluble nutrients
- Maintenance of blood volume
- Lubrication of joints, membranes, and synovial tissue
- Shock absorption
- Removal of waste matter and toxins



- Health Supplements
 - A dietary supplement used to improve a component of well-being.
- Performance Supplements (Ergogenic Aids)
 - A dietary supplement that may enhance performance or body composition; may also be referred to as an ergogenic aid.



- Vitamins
 - Fat-soluble
 - Water-soluble
- Minerals
 - Macrominerals
 - Trace Minerals

