Anatomy & Physiology

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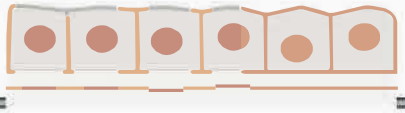
Epithelial Tissue

Simple Squamous

- One layer of large, flat cells
- Thin delicate layers for simple filtratrion, diffusion, with gas exchange osmosis
- Covered with closed body openings
- Located in alveoli and capillaries

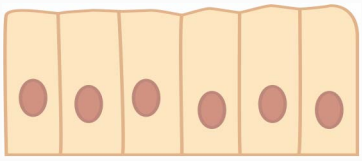
Simple Cuboidal

- One layer of cube-shaped cells
- Found in gland ducts and linings of cell



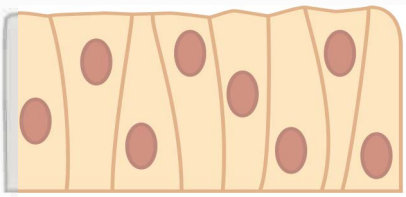
Simple Columnar

- One layer of cells that appear column-like
- Some secrete mucus cells
- Locations: GI tract lining, fallopian tubes, uterus, and bronchi in lungs
  - o Ciliated - shifts small substances over the cells/tissues
  - o Microvilli - provides larger surface area for secretion and absorption



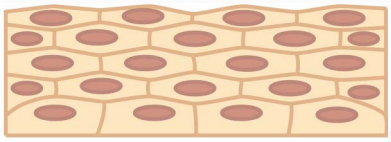
Pseudostratified Ciliated

- One ciliated layer of cells
- Nuclei appears at various levels
- Goblet cells secrete mucus
- Locations: Lines the upper respiratory tract, the prostate, vas deferens



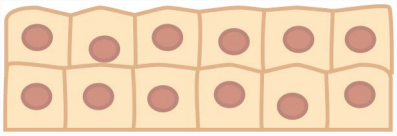
Stratified Squamous

- Keratinized
  - o Outermost layer is filled with keratin
- Locations: respiratory, digestive, skin, excretory, and reproductive systems
- Non-keratinized
  - o All living cells
- Locations: mouth, pharynx, esophagus, vagina, anus



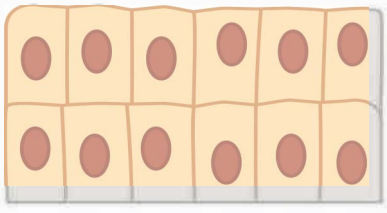
Stratified Cuboidal

- Many layers of cube-like cells on top
- Locations: sweat and salivary glands and ducts



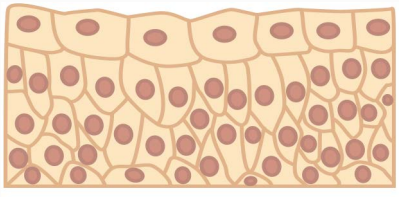
Stratified Columnar

- Several layers with column-like cells on top
- Ciliated Locations: larynx, conjunctiva of eye
- Non-ciliated Locations: sections of male urethra, epididymis, vas deferens



Transitional or Uroepithelium

- Stratified with round shape
- Found in the lower urinary tract, mucosal, lining of ureters, urinary bladder, urethra



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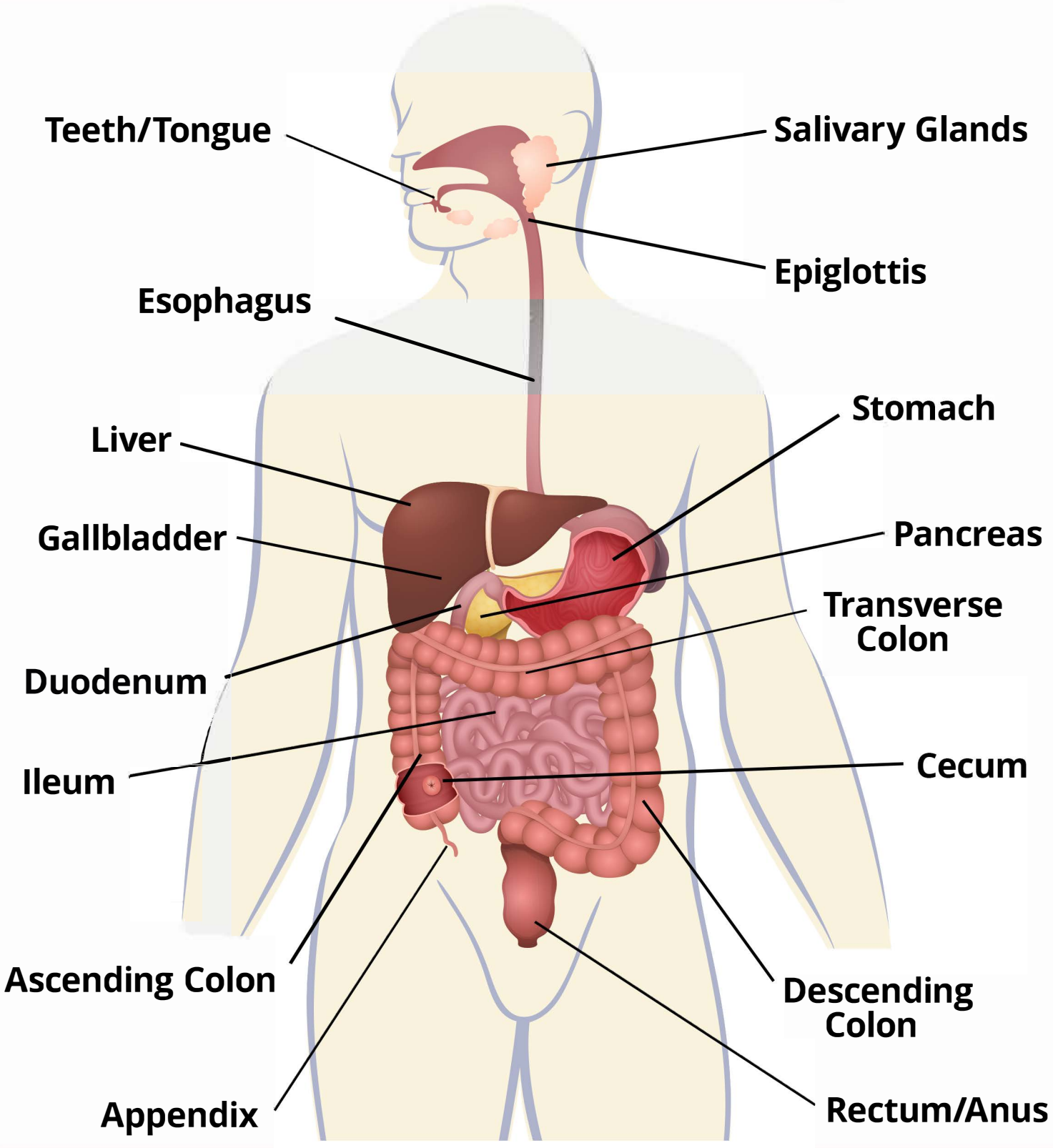
GI Track Anatomy



Digestive tract

Mouth - Esophagus - Stomach - Small Intestine - Large Intestine - Anus

Ancillary Organs: Salivary Glands, Gallbladder, Pancreas, Liver

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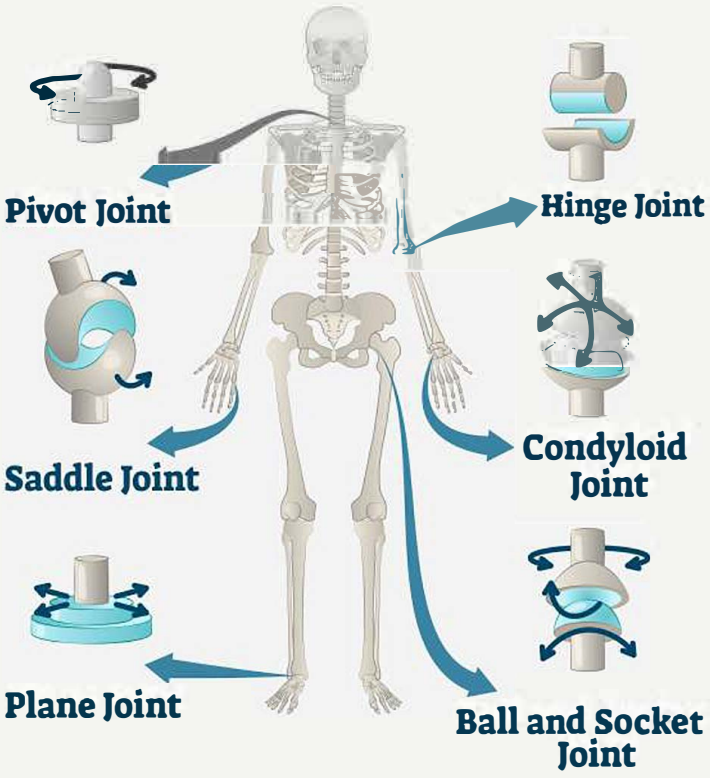
Joint Anatomy



Joint Types

Synarthroses
- Fixed, immovable
- Found in skull, sternum, pelvic bone

Amphiarthroses
- Some slight movement but limited
- Found in spinal intervertebral discs, hip pubic symphysis

Diarthroses
- Freely movable
- Packed with fluid between synovial joints
- Found in the limbs of the skeleton, shoulders, elbow, fingers, hips, knees

Joint Locations

Hinge
- Elbow, knee

Planar
- Wrist, foot (ankle)

Pivot
- The neck between vertebrae C1 and C2, wrist

Condyloid
- Wrist between radial and carpal bones

Diarthrosis Joints

Outer layer
- Contains fibrous membrane
- Fuses with periosteum of bone

Inner layer
- Holds synovial membrane
- No blood or lymph vessels
- Secretes synovial fluid for shock absorption and lubrication

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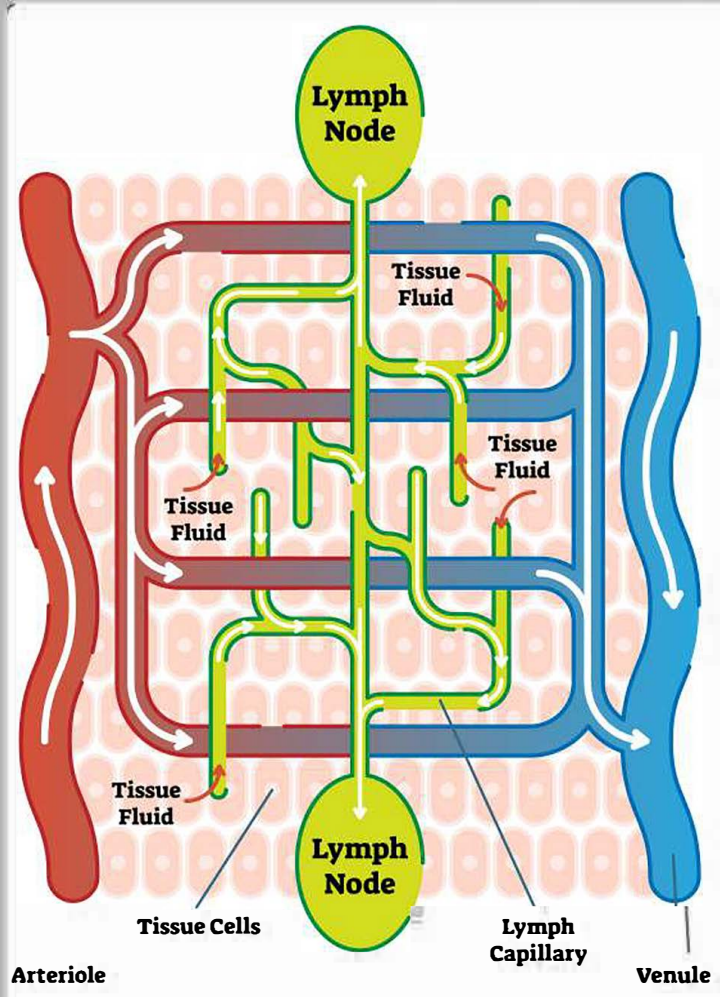
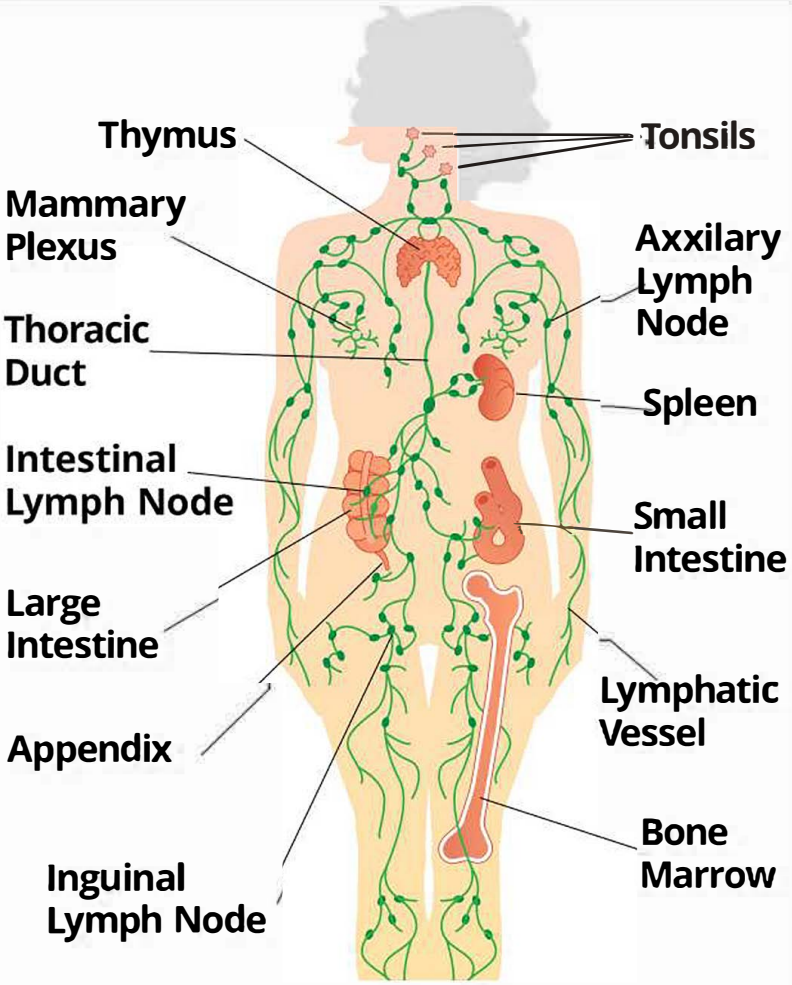
Lymph system anatomy





Lymph vessels

Organ	Function
Lymph-capillaries	• Responsible for regulation of fluid pressure, prevention of edema, and moves lymph through lymphatic vessels
Lymphatic collecting vessels	• Has valves that move fluid through the lymph system. • Collecting vessels to transport fluid to subclavian veins and back to the body's circulatory system
Lymphatic ducts	• Right lymphatic and thoracic ducts • Cisterna chyli receives lymph drainage from veins and divides into the right and left sides
Lymph Fluid	• Transports substances clear to white for the lymph system
Lymph Nodes	• Site for lymphocytes, B-cells, T-cells • A lymphatic system filter to kill pathogens that cause infection
Spleen	• Works to filter blood; storage for white blood cells and platelets • Produces cells for immunity • Removes and recycles older blood cells (red blood cells) • Fights particular bacterias to prevent illness
Thymus	• Site of maturing T-Cells help with immunity

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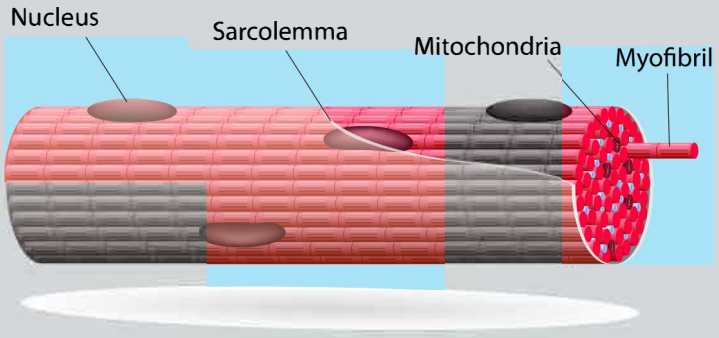
Muscle Anatomy

Muscle Anatomy

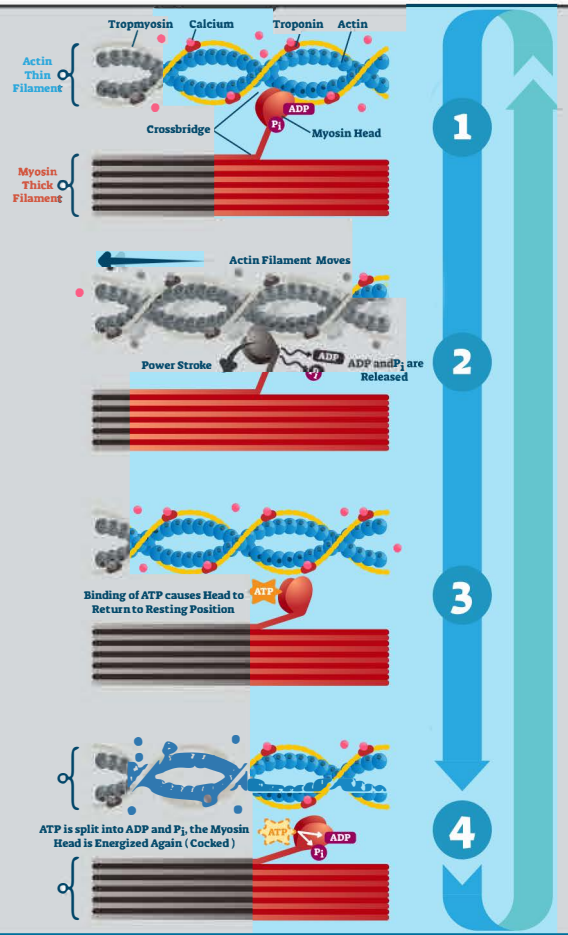
Transport System

- **Sarcoplasm** - muscle fiber cytoplasm
- **Sarcolemma** - functions as plasma\membrane
  - **T-System** (Transverse System) - penetrates into center of cardiac and skeletal muscle cells
  - **Sarcoplasmic reticulum**
    - Stores calcium ions
    - Transmits electrical impulses
    - During muscle contraction releases calcium
    - A system of tubules in muscle cells
    - Contains calcium pumps to use energy gained from adenosine triphosphate (ATP)
  - **Triad** - Found between A-I junction forming the excitation-contraction connection



Muscle Contraction

1. Action potential is sent to stimulate muscle
2. Release of calcium ions
3. Calcium connects with tropomyosin to reveal active actin sites
4. Myosin is activated and attached to center of actin (ATP is needed)
5. Breakdown of ATP
6. Contraction of muscle



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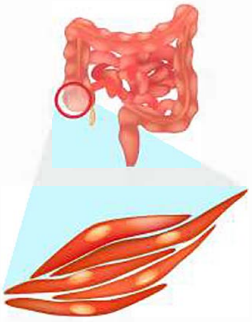
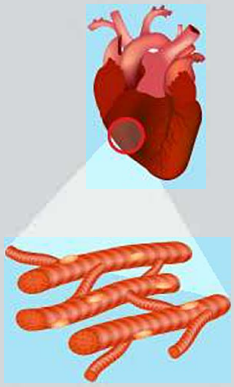
Muscle Anatomy

Muscle Types



Smooth

- Involuntary body movement
- Stimulated by Autonomic Nervous System
- Found in hollow organs such as stomach, intestines, bladder, blood vessels, uterus
- Propels fluids in peristalsis



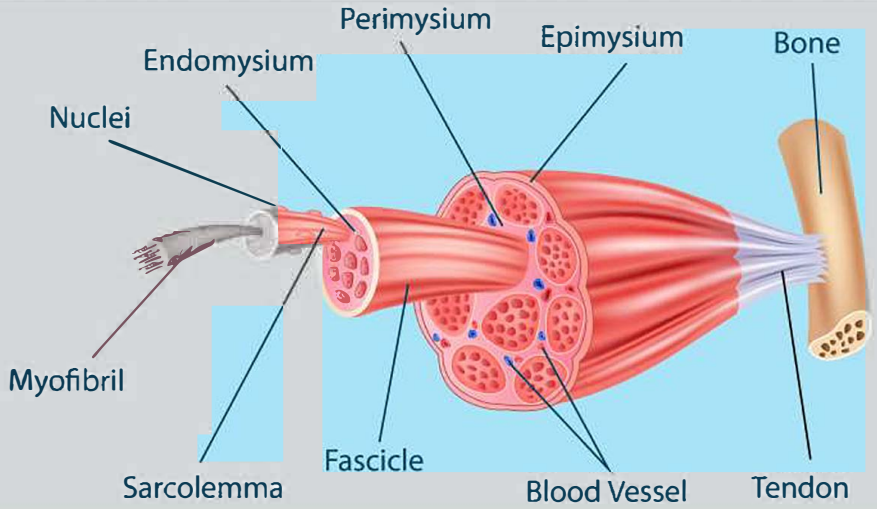
Cardiac

- Involuntary body movements
- Stimulated by Autonomic Nervous System
- Site within the heart
- Intrinsically controlled with branches and one nucleus

Skeletal

- Voluntary body movements
- Stimulated by Autonomic Nervous System
- Helps maintain posture, generate heat, controls inner movement, supports bones as well as joints

Muscle - Microanatomy



Arrangement

- Endomysium - covers exterior of muscle fibers
- Perimysium - covers exterior of fascicles (groups of muscle fibers)
- Epimysium - covers membrane above bundles of fascicles
  - Found between muscle
  - Combines with connective tissue made of tendons

Myofilament Arrangement

- Sarcomere - striated muscle fibers: contains myosin (thick) and actin (thin)
- I-Band - (short, thin band): contains actin filaments
- A-Band - consists of dark thick filaments (myosin)
- H-Zone - the A-Band center with thick filament
- Z-Disc - defines boundaries of sarcomere

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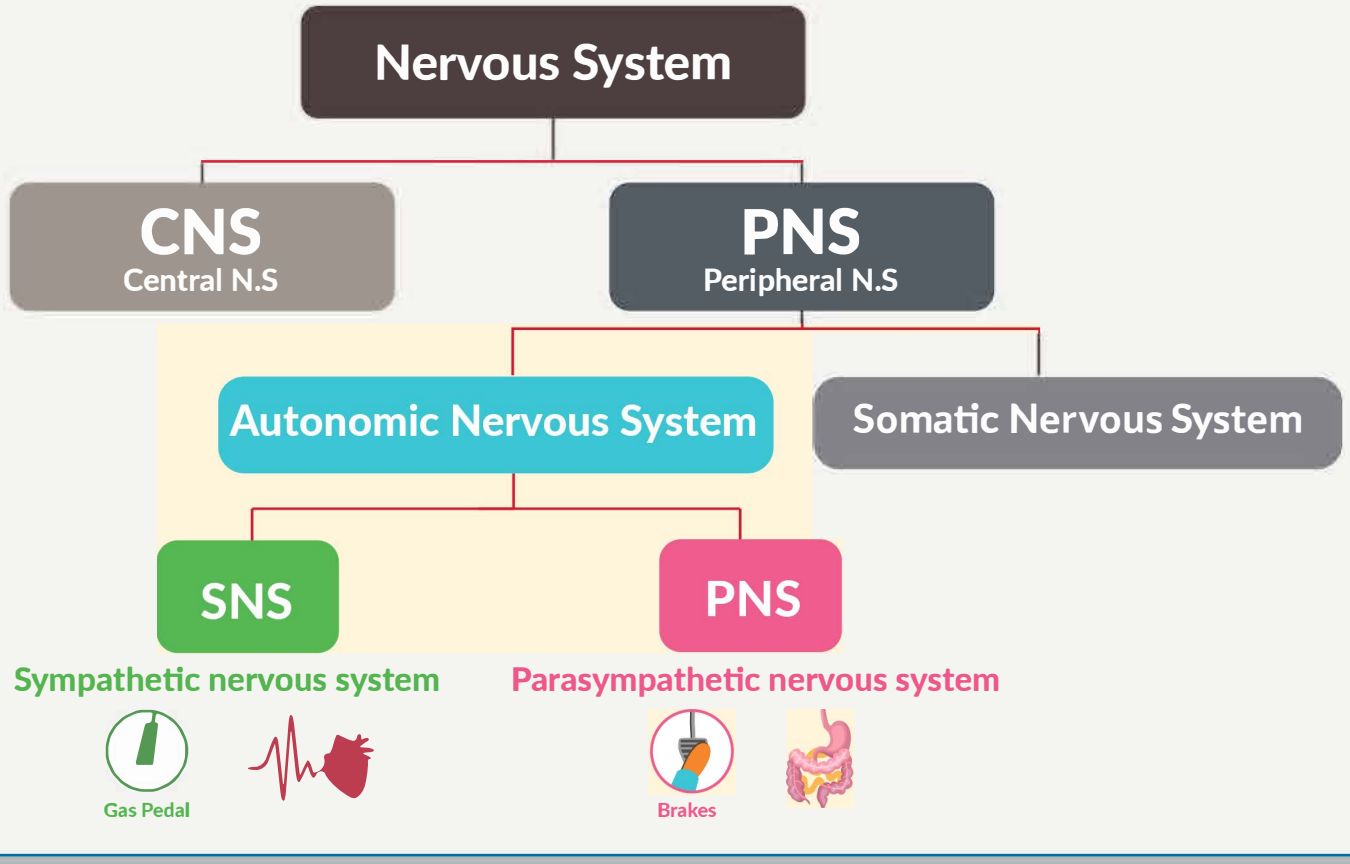
NERVOUS SYSTEM ANATOMY



Nervous System

Central Nervous System:
- Controls main functions of mind and body
- Contains the spinal cord and brain

Peripheral Nervous System:
- Contain nerves coming from the brain, spinal cord to all network body parts
- **Somatic Nervous System:** Contains sensory (afferent) and motor (efferent) nerves to perform reflex actions
- **Autonomic Nervous system:** Part of Peripheral Nervous System that controls involuntary physical actions

Sympathetic Nervous System: Fight or Flight response

Memory Tricks

S - Stress nervous system (SNS kicks in during times of stress)
S - Speeds UP the Vital signs (HIGH heart rate & blood pressure) in order to fight or flight in survival mode!
Controls Catecholamines made in the adrenals (Epinephrine & Norepi)
These help to constrict the blood vessels to speed up the vitals

Parasympathetic Nervous system: Rest & Digest

Memory Tricks

P - Puts the Brakes on the Vitals (Low heart rate & blood pressure)
P - Poop nervous system (PNS is used for times of rest & digesting food)
*Controls **cholinergic** effects, making more secretions in the body*
Think cccholinergics give more secccretions

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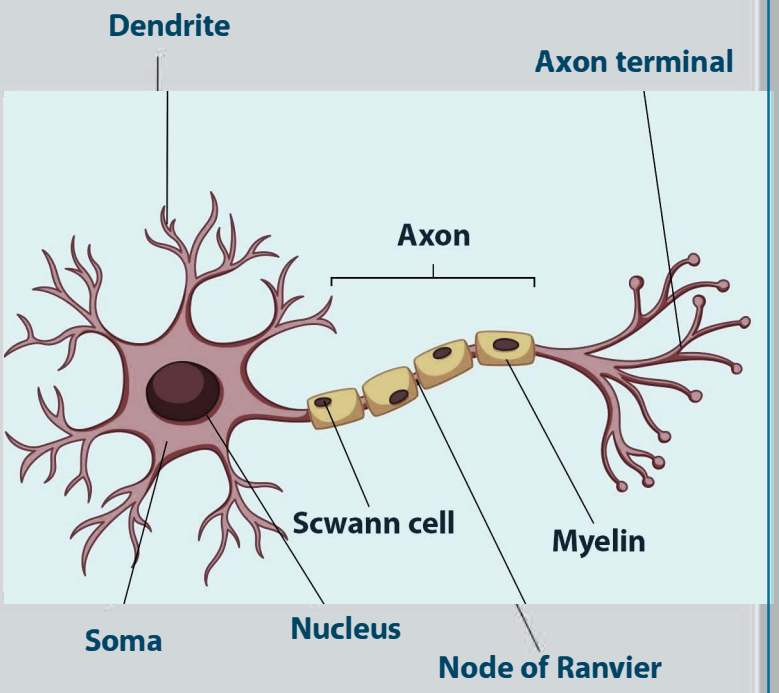
NERVOUS SYSTEM ANATOMY

Neuron Anatomy

Neuron

- **Dendrite**
  - Receives communication from other neurons
  - Sends communication to cell body(axons)
- **Cell body**
  - Site of nucleus
  - All cell functions are controlled here
- **Axon**
  - Long nerve fiber that ends at the axon terminal
- **Axon terminal**
  - End of nerve axon
  - Transmits signal to receiving axon via neurotransmitter
- **Glial Cell**
  - Capable of dividing
  - Sustains homeostasis
  - Creates myelin
  - Provides neuron support and protection



Glial Cells

Oligodendrocyte

- The main function is to produce myelin axons in the CNS

Microgliocytes

- Major player cells of CNS immune response
- Kills bacteria

Astrocytes

- Neurons metabolic and physical support
- Stores and releases nutrition source when help is needed (hypoglycemia)

Ependymal cells

- Produces and regulates cerebrospinal fluid (CSF)

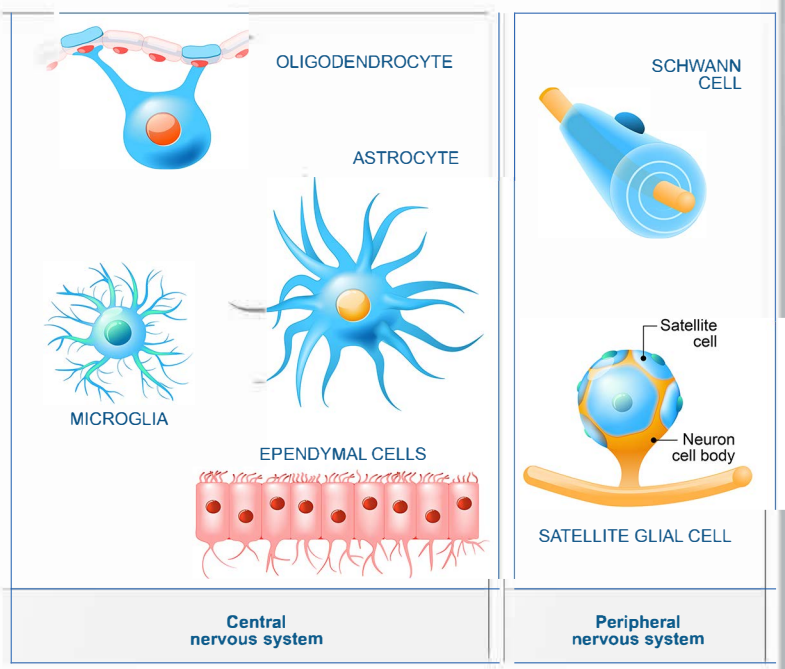
Satellite Cells

- Acts to protect and cushion cells
- Supplies nutrients to neurons nearby and contain structural function

Schwann Cells

- Required to insulate (myelin)
- Supplies nutrition to PNS neurons

Types of Neuroglia



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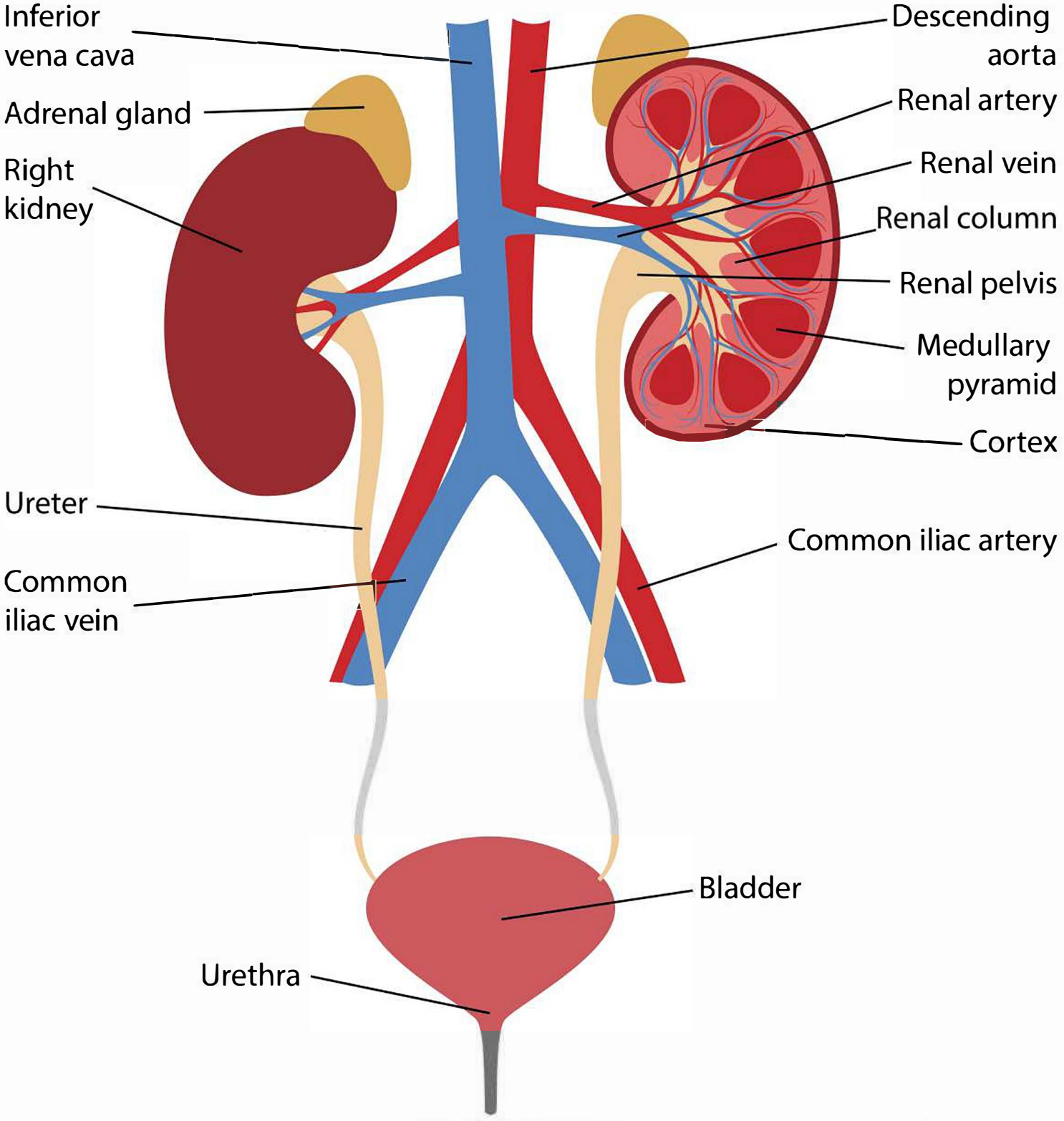
URINARY SYSTEM ANATOMY



Urinary Tract

Kidneys - Ureters - Bladder - Urethra

Functions:

- Removes waste from body
- Regulates blood volume and blood pressure
- Controls balance of blood pH

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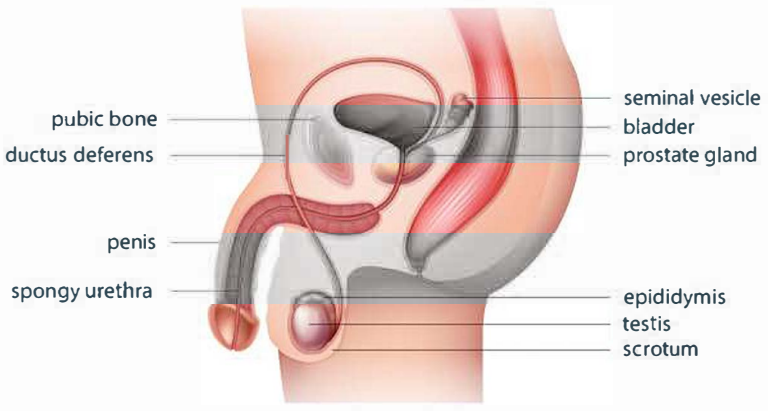
REPRODUCTIVE ANATOMY

Male Reproductive Anatomy

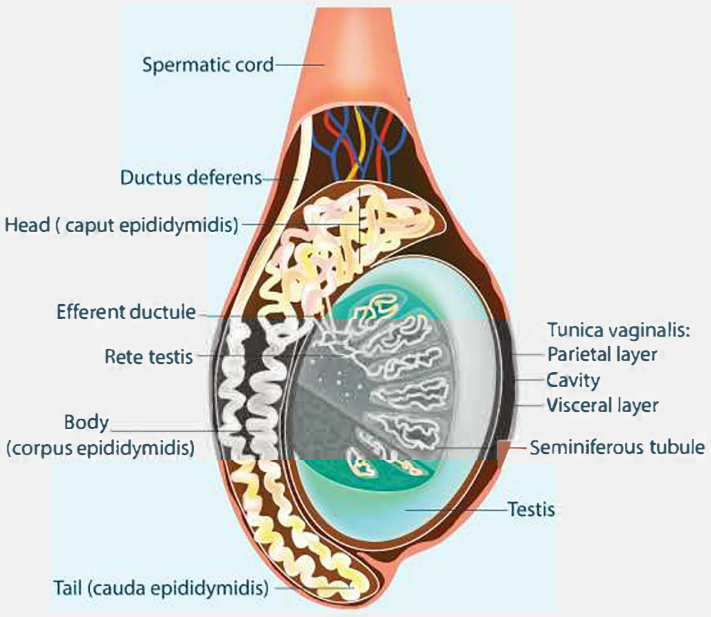
Organ	Function
Testes	• Generates sperm for transport • Produces the hormone testosterone
Scrotum	• Protects testes and controls temperature
Spermatic Ducts	• Carries sperm from testes to outside of urethra • Matures sperm cells
Seminal Vesicles	• Secretes yellow thick fluid that stores and creates the majority(70%) of semen
Prostate Gland	• Produces and secretes the milky substance to create about 30% of semen
Cowper's Glands	• Produces the creamy fluid that lubricates during sexual arousal • Provides sexual function
Penis	• Provides route for urination • Deposits yellow-white thick semen into vagina

Male Reproductive System

Male Reproductive Anatomy



Testes



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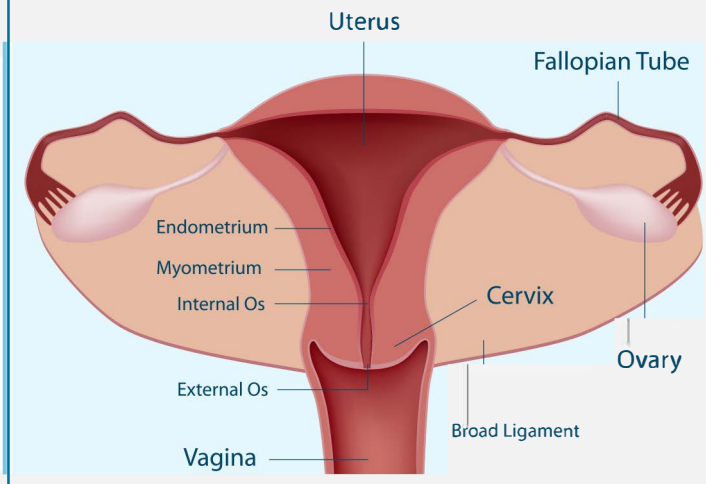
REPRODUCTIVE ANATOMY

Female Reproductive Anatomy

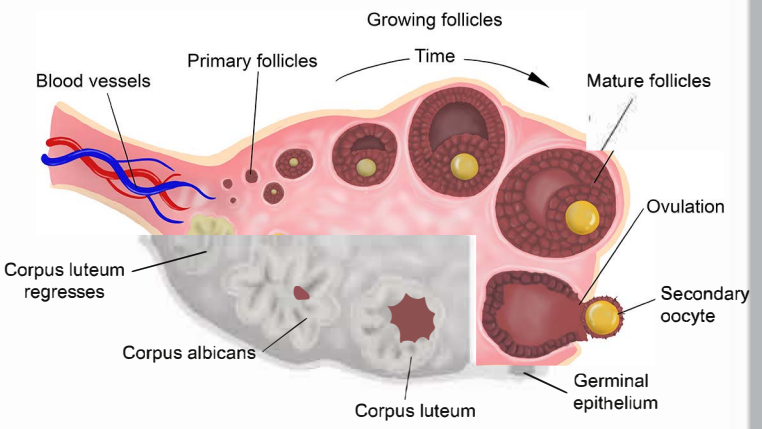
Organ	Function
Ovaries	• Produces mature eggs for fertilization • Delivers progesterone and estrogen to establish and maintain pregnancy
Fallopian Tubes	• Transports the egg from ovary to uterus
Uterus	• Houses fetus during gestation to delivery • Provides nutrition for fetus • During contractions, expels fetus during delivery
Vagina	• Pathway for blood & tissue of uterus to outside body during monthly menstrual cycle • Pathway for childbirth, sexual intercourse
Vulva	• External female genitalia containing erectile tissue (clitorus) • Bartholin's Glands - secrete mucus to lubricate vaginal canal • Skene's Glands - produce watery lubricant involved with sexual stimulation

Female Reproductive System

Female Reproductive Anatomy



Ovary Anatomy



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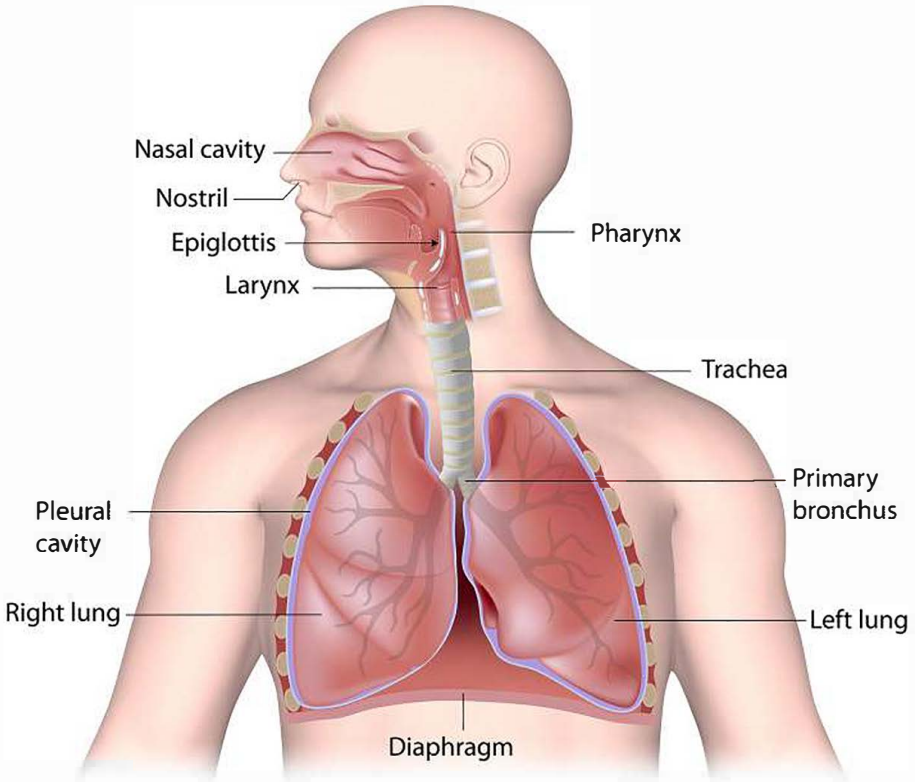
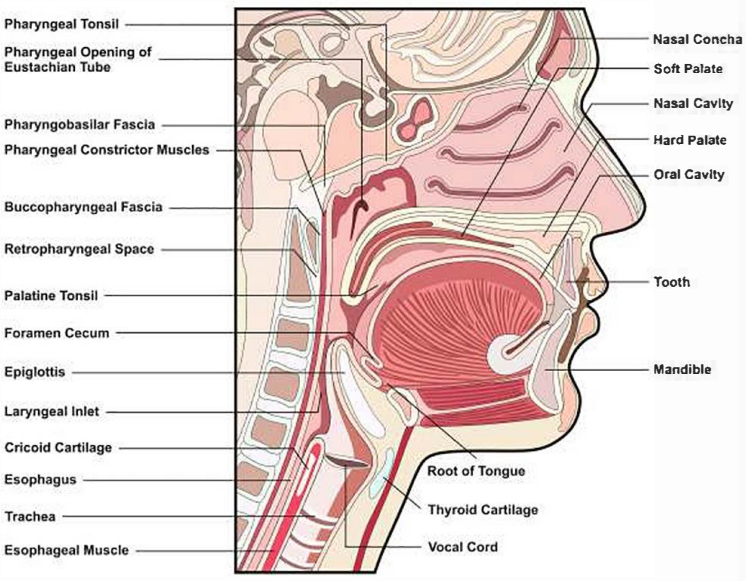
RESPIRATORY TRACT ANATOMY

Respiratory Tract

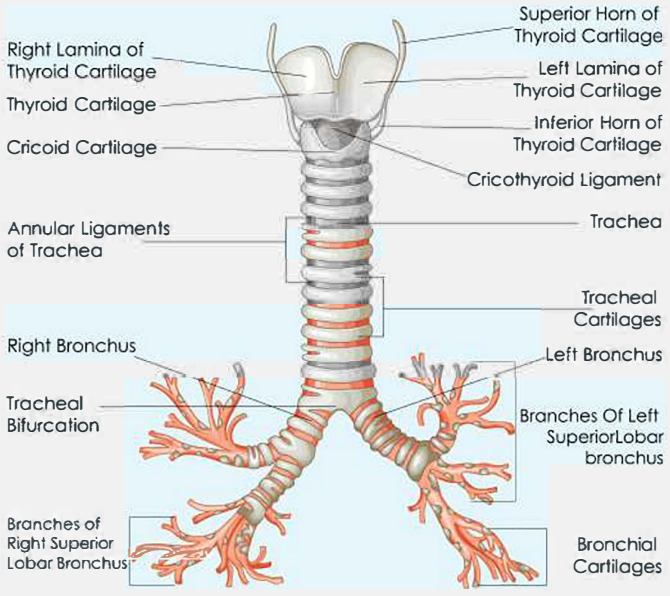


Upper Respiratory Tract



- Provides passage for breathing air in and out of lungs
- Filters air through nasal hair to trap pathogens and foreign intruders
- Involved in speaking, coughing, and swallowing

Lower Respiratory Tract



- Trachea cartilage are C-shaped rings with scattered plates in bronchi
- Separated into primary, secondary, as well as tertiary bronchi
- Then branch off into bronchioles before moving to capillaries and alveoli

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SKELETAL ANATOMY

Bone Classifications

Long

- Collarbone, limbs, arms, legs, hands, feet, fingers, toes

Short

- Located in wrists & ankles

Flat

- Skull bones
  - Sphenoid ethmoid
  - Frontal, parietal, temporal, & occipital
- Scapula
- Sternum
- Ribs

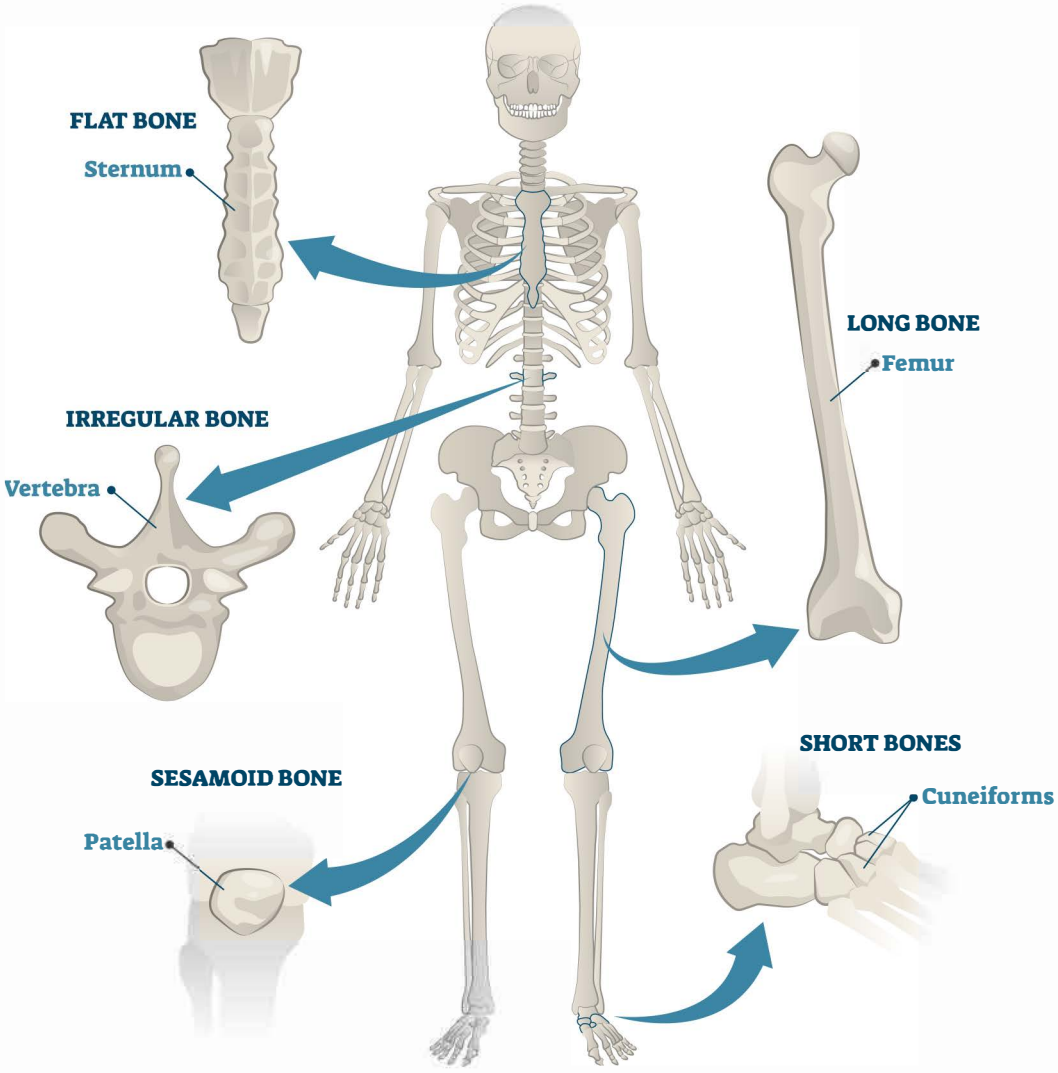
Irregular

- Spine
- Skull bones
  - Zygomatic, sphenoid, ethmoid, maxilla, palatine, nasal hyoid, mandible, & Temporal
- Vertebrae
- Pelvic bone
- Sacrum & coccyx

Sesamoid

- Embedded by tendons
  - Patella or kneecap

Types of Bones



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SKELETAL ANATOMY

Long Bone Anatomy

Diaphysis

- Shaft and center part of long bone
- Contains fat tissue and bone marrow
- Made of compact bones

Metaphysis

- Grows and hardens near epiphysis & diaphysis
- Supports load to surface of joint that places weight on diaphysis
- Holds growth plate that develops during childhood

Epiphysis

- Spongy end of long bone
- Covered by articular cartilage
- Forms joints through attachment to other bones

Periosteum

- Covers outer surface of bone
- Made of fibrous tissue
- Site of tendon & ligament connection to bone

Cross Section of Bone

Medullary cavity

- Innermost hollow cavity
- Stores bone marrow, both red and yellow

Trabecular bone

- Porous spongy bone
- Formed near edge of hard long bones (femur)

Compact bone

- Forms outer layer of most bones
- Produces hard shell for bones

Compact Bone Anatomy

Osteons

- Consist of mineral matrix and cylindrical structures that contain osteocytes
- Main structure of compact bone
- Contain the Haversian canal with surrounding lamellae

Haversian Canals

- Tunnel cavities containing capillaries & nerves
- Run longitudinally through bone

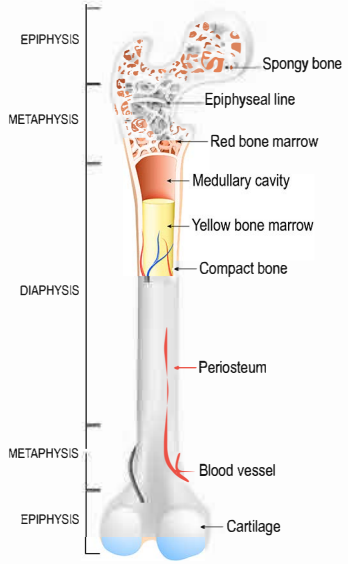
Volkmann's Canals

- Found inside osteons
- Provide nourishment & energy to osteons
- Interconnect Haversian canals to each other
- Transfer blood vessels away from periosteum to bone

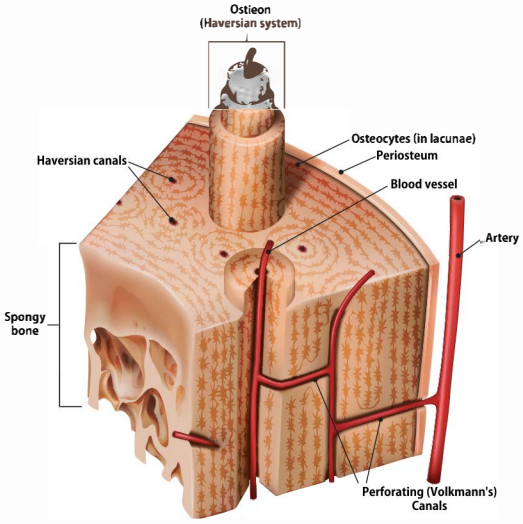
Lamellae

- Concentric layers to make osteons
- Inner & outer layer of compact bone
- Compact matrix surrounding Haversian canal

Bone Anatomy



Bone Structure



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SKIN ANATOMY

Layers

Epidermis

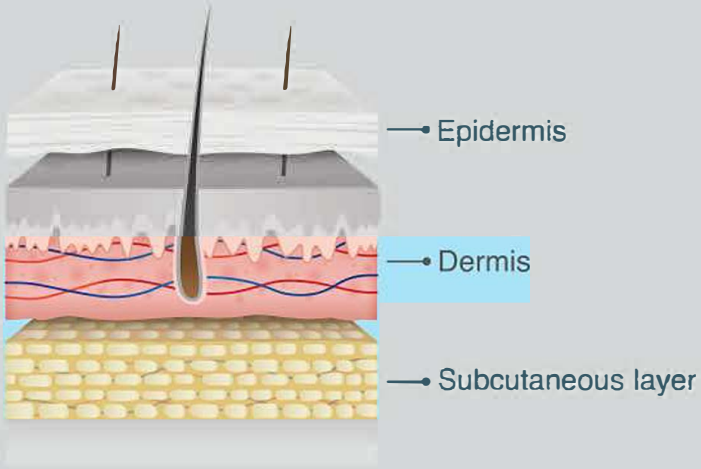
- Outermost layer composed of epithelial tissue
- Regulates water emitted from body
- Provides barrier against infection

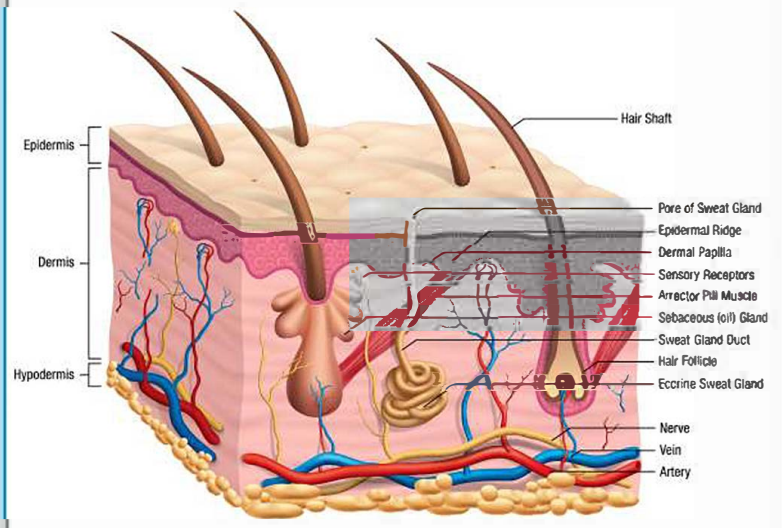
Dermis

- Sweat glands
- Protects from stress
- Contains hair follicles
- Provides skin with elasticity
- Nerve endings for heat & touch

Subcutaneous

- Connective and adipose tissue
- Regulates body temperature & insulates
- Passage for blood vessels & nerves
- Joins skin with muscle tissue & bone





Functions

Protection

- Maintains body temperature & fluid balance
- Against infection & harm
- Against outside environment (heat - UV rays & cold)

Sensory Detection

- Senses light touch & sustained pressure by Merkel's disks
- Detects deep tissue by bulbous corpuscles
- Senses environmental changes (temperature)
- Senses pain by nociceptors

Other Functions

- Absorbs sunlight to produce Vitamin D
- Responsible for waste excretion
- Forms unique marks like birthmarks & fingerprints

Thermoregulation

- Helps to maintain core body temperature
- Limits sweat evaporation, thus loss of heat
- Regulates heat loss through vasodilation while retaining heat by vasoconstriction

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Epithelial cells

Simple Squamous

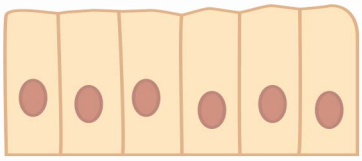
- One layer of large, flat cells
- Thin delicate layers for simple filtratrion, diffusion, with gas exchange osmosis
- Covered with closed body openings
- Located in alveoli and capillaries

Simple Cuboidal

- One layer of cube-shaped cells
- Found in gland ducts and linings of cell

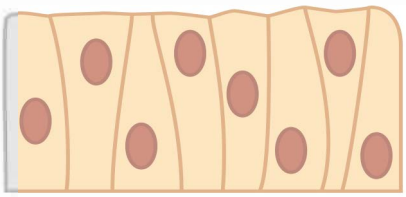
Simple Columnar

- One layer of cells that appear column-like
- Some secrete mucus cells
- Locations: GI tract lining, fallopian tubes, uterus, and bronchi in lungs
  - o Ciliated - shifts small substances over the cells/tissues
  - o Microvilli - provides larger surface area for secretion and absorption



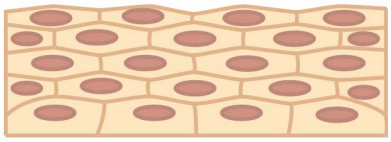
Pseudostratified Ciliated

- One ciliated layer of cells
- Nuclei appears at various levels
- Goblet cells secrete mucus
- Locations: Lines the upper respiratory tract, the prostate, vas deferens



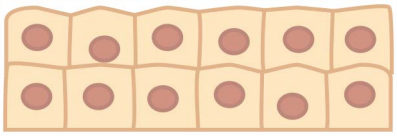
Stratified Squamous

- Keratinized
  - o Outermost layer is filled with keratin
- Locations: respiratory, digestive, skin, excretory, and reproductive systems
- Non-keratinized
  - o All living cells
- Locations: mouth, pharynx, esophagus, vagina, anus



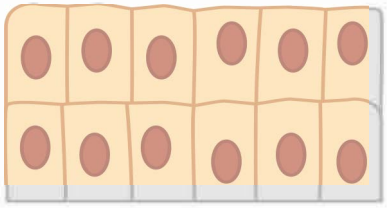
Stratified Cuboidal

- Many layers of cube-like cells on top
- Locations: sweat and salivary glands and ducts



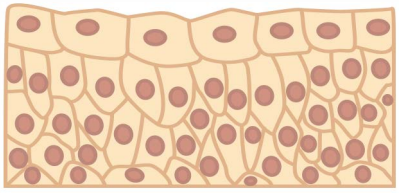
Stratified Columnar

- Several layers with column-like cells on top
- Ciliated Locations: larynx, conjunctiva of eye
- Non-ciliated Locations: sections of male urethra, epididymis, vas deferens



Transitional or Uroepithelium

- Stratified with round shape
- Found in the lower urinary tract, mucosal, lining of ureters, urinary bladder, urethra



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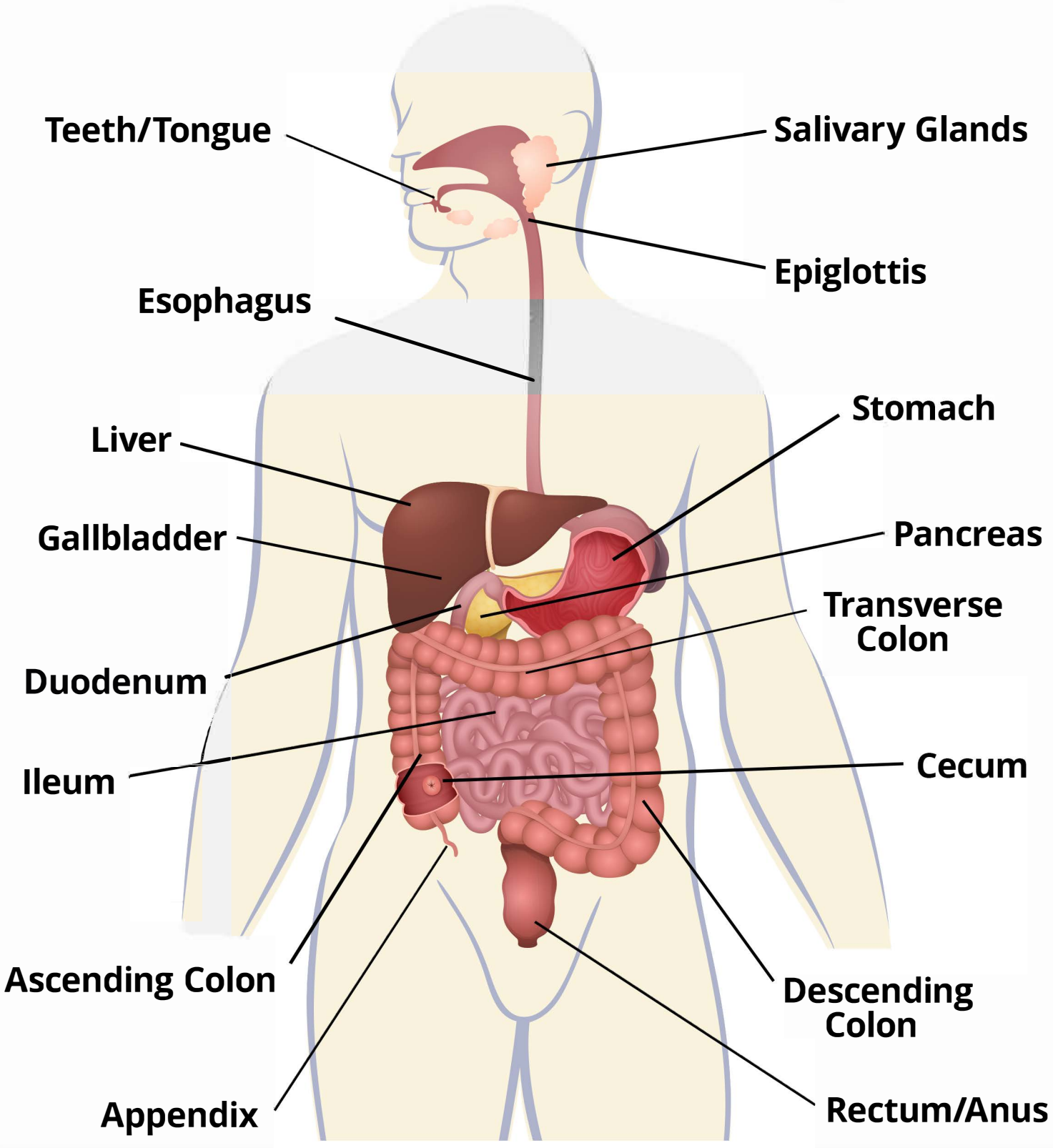
GI Trad Anatomy



Digestive tract

Mouth - Esophagus - Stomach - Small Intestine - Large Intestine - Anus

Ancillary Organs: Salivary Glands, Gallbladder, Pancreas, Liver

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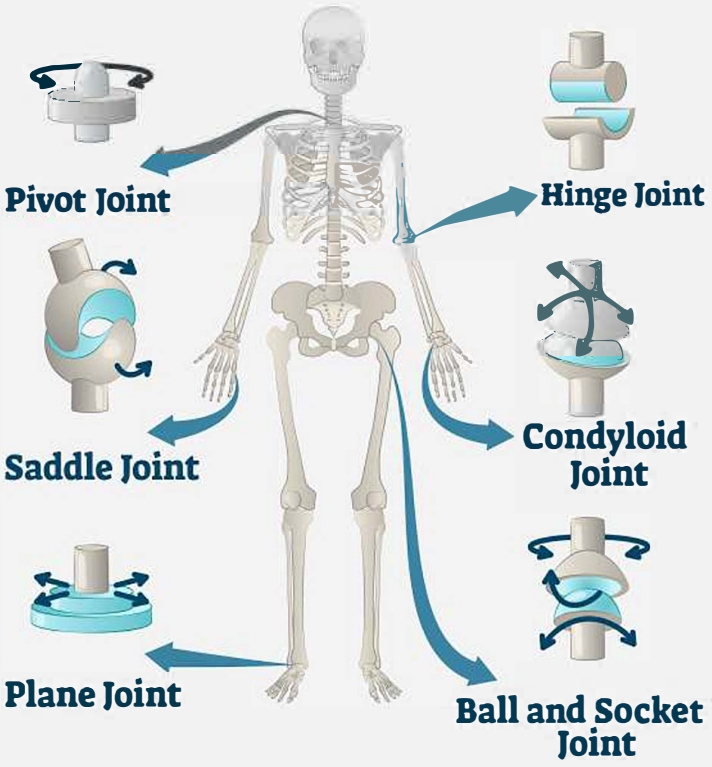
Joint Anatomy



Joint Types

Synarthroses
- Fixed, immovable
- Found in skull, sternum, pelvic bone

Amphiarthroses
- Some slight movement but limited
- Found in spinal intervertebral discs, hip pubic symphysis

Diarthroses
- Freely movable
- Packed with fluid between synovial joints
- Found in the limbs of the skeleton, shoulders, elbow, fingers, hips, knees

Joint Locations

Hinge
- Elbow, knee

Planar
- Wrist, foot (ankle)

Pivot
- The neck between vertebrae C1 and C2, wrist

Condyloid
- Wrist between radial and carpal bones

Diarthrosis Joints

Outer layer
- Contains fibrous membrane
- Fuses with periosteum of bone

Inner layer
- Holds synovial membrane
- No blood or lymph vessels
- Secretes synovial fluid for shock absorption and lubrication

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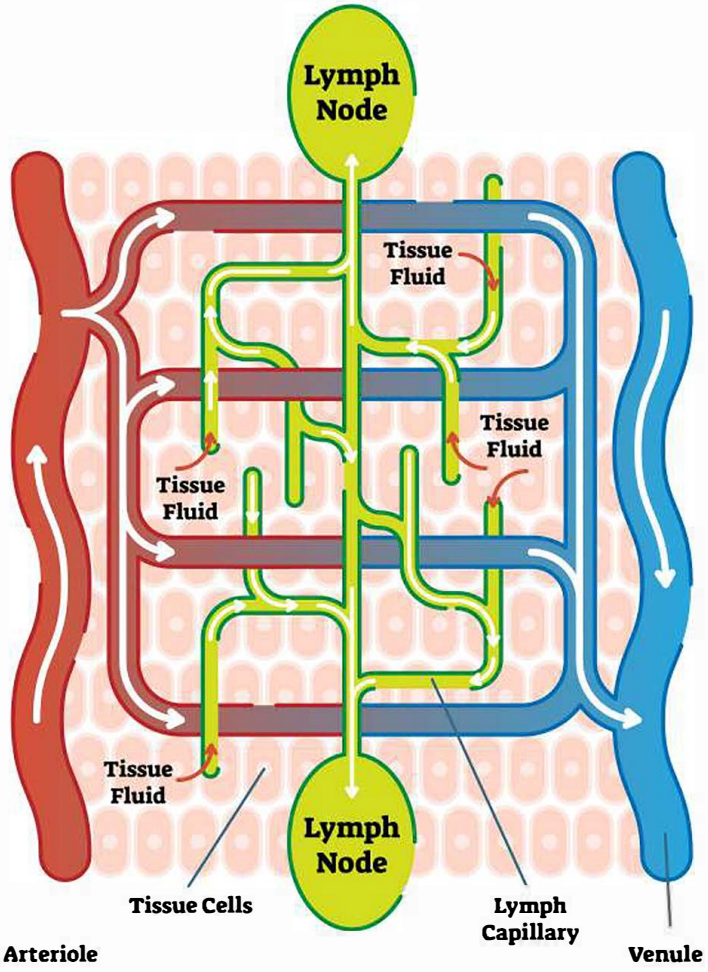
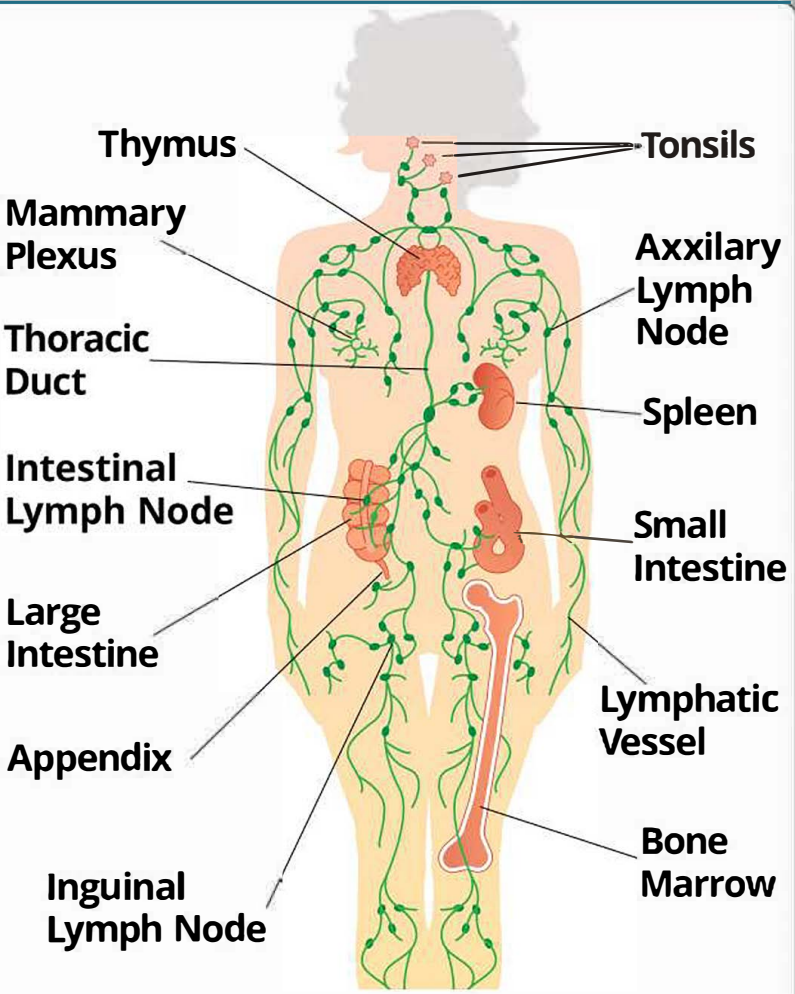
Lymph system anatomy





Lymph vessels

Organ	Function
Lymph-capillaries	• Responsible for regulation of fluid pressure, prevention of edema, and moves lymph through lymphatic vessels
Lymphatic collecting vessels	• Has valves that move fluid through the lymph system. • Collecting vessels to transport fluid to subclavian veins and back to the body's circulatory system
Lymphatic ducts	• Right lymphatic and thoracic ducts • Cisterna chyli receives lymph drainage from veins and divides into the right and left sides
Lymph Fluid	• Transports substances clear to white for the lymph system
Lymph Nodes	• Site for lymphocytes, B-cells, T-cells • A lymphatic system filter to kill pathogens that cause infection
Spleen	• Works to filter blood; storage for white blood cells and platelets • Produces cells for immunity • Removes and recycles older blood cells (red blood cells) • Fights particular bacterias to prevent illness
Thymus	• Site of maturing T-Cells help with immunity

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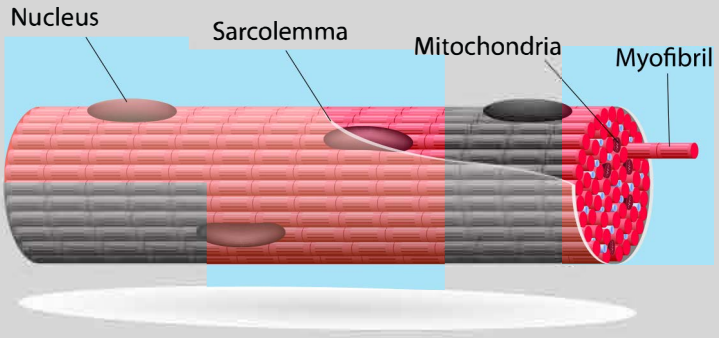
Muscle Anatomy

Muscle Anatomy

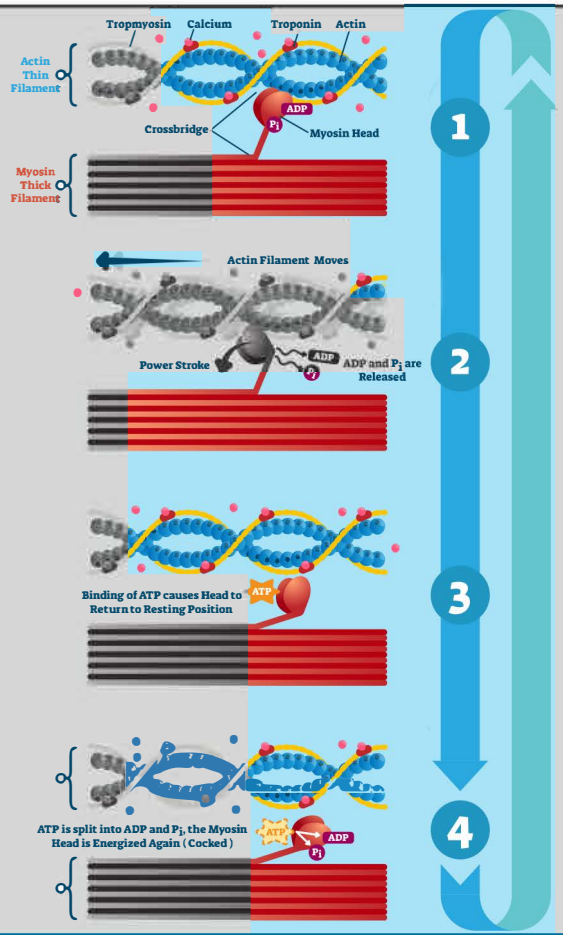
Transport System

- **Sarcoplasm** - muscle fiber cytoplasm
- **Sarcolemma** - functions as plasma\membrane
  - **T-System** (Transverse System) - penetrates into center of cardiac and skeletal muscle cells
  - **Sarcoplasmic reticulum**
    - Stores calcium ions
    - Transmits electrical impulses
    - During muscle contraction releases calcium
    - A system of tubules in muscle cells
    - Contains calcium pumps to use energy gained from adenosine triphosphate (ATP)
  - **Triad** - Found between A-I junction forming the excitation-contraction connection



Muscle Contraction

1. Action potential is sent to stimulate muscle
2. Release of calcium ions
3. Calcium connects with tropomyosin to reveal active actin sites
4. Myosin is activated and attached to center of actin (ATP is needed)
5. Breakdown of ATP
6. Contraction of muscle



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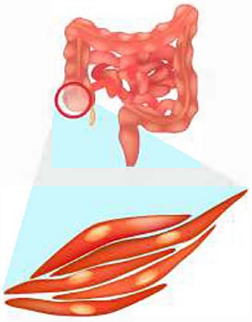
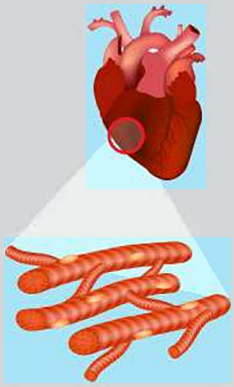
Muscle Anatomy

Muscle Types



Smooth

- Involuntary body movement
- Stimulated by Autonomic Nervous System
- Found in hollow organs such as stomach, intestines, bladder, blood vessels, uterus
- Propels fluids in peristalsis



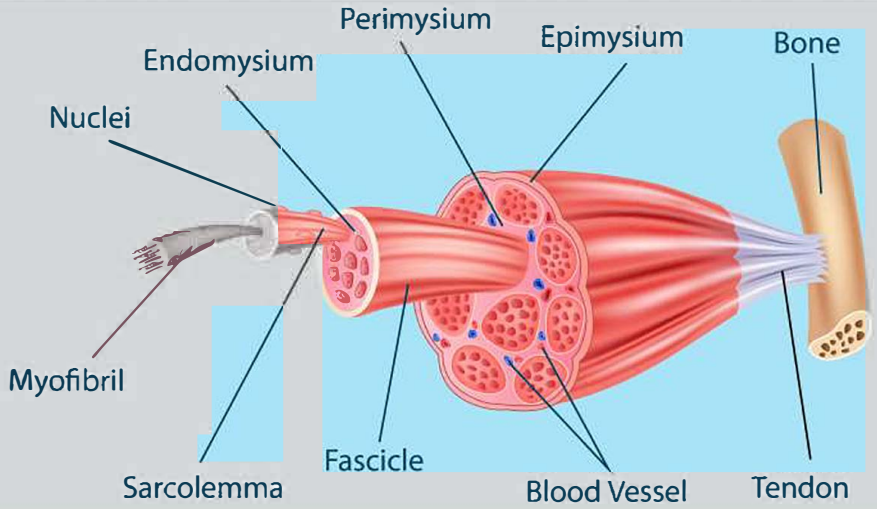
Cardiac

- Involuntary body movements
- Stimulated by Autonomic Nervous System
- Site within the heart
- Intrinsically controlled with branches and one nucleus

Skeletal

- Voluntary body movements
- Stimulated by Autonomic Nervous System
- Helps maintain posture, generate heat, controls inner movement, supports bones as well as joints

Muscle - Microanatomy



Arrangement

- Endomysium - covers exterior of muscle fibers
- Perimysium - covers exterior of fascicles (groups of muscle fibers)
- Epimysium - covers membrane above bundles of fascicles
  - Found between muscle
  - Combines with connective tissue made of tendons

Myofilament Arrangement

- Sarcomere - striated muscle fibers: contains myosin (thick) and actin (thin)
- I-Band - (short, thin band): contains actin filaments
- A-Band - consists of dark thick filaments (myosin)
- H-Zone - the A-Band center with thick filament
- Z-Disc - defines boundaries of sarcomere

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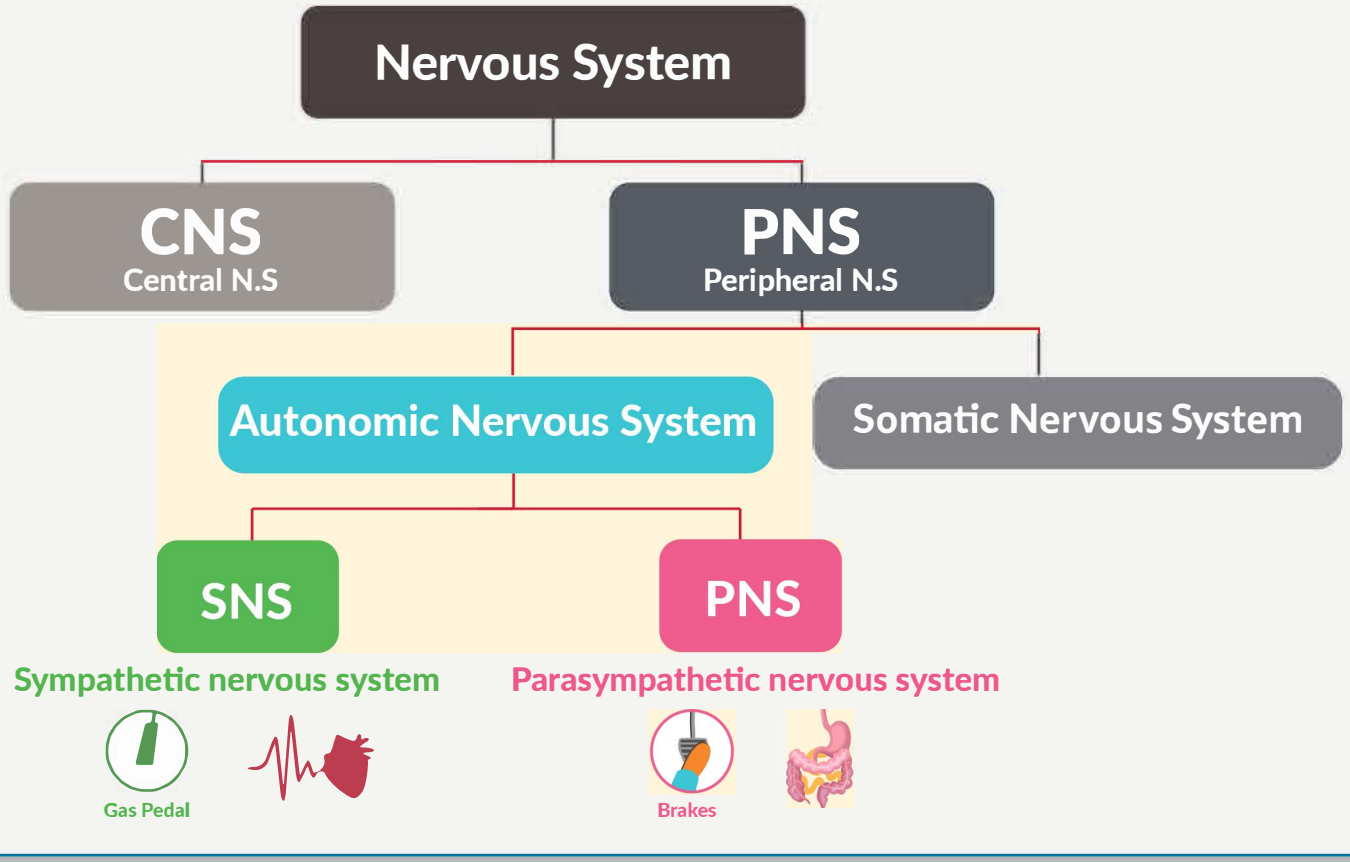
NERVOUS SYSTEM ANATOMY



Nervous System

Central Nervous System:
- Controls main functions of mind and body
- Contains the spinal cord and brain

Peripheral Nervous System:
- Contain nerves coming from the brain, spinal cord to all network body parts
- **Somatic Nervous System:** Contains sensory (afferent) and motor (efferent) nerves to perform reflex actions
- **Autonomic Nervous system:** Part of Peripheral Nervous System that controls involuntary physical actions

Sympathetic Nervous System: Fight or Flight response

Memory Tricks

S - Stress nervous system (SNS kicks in during times of stress)
S - Speeds UP the Vital signs (HIGH heart rate & blood pressure) in order to fight or flight in survival mode!
Controls Catecholamines made in the adrenals (Epinephrine & Norepi)
These help to constrict the blood vessels to speed up the vitals

Parasympathetic Nervous system: Rest & Digest

Memory Tricks

P - Puts the Brakes on the Vitals (Low heart rate & blood pressure)
P - Poop nervous system (PNS is used for times of rest & digesting food)
*Controls **cholinergic** effects, making more secretions in the body*
Think cccholinergics give more secccretions

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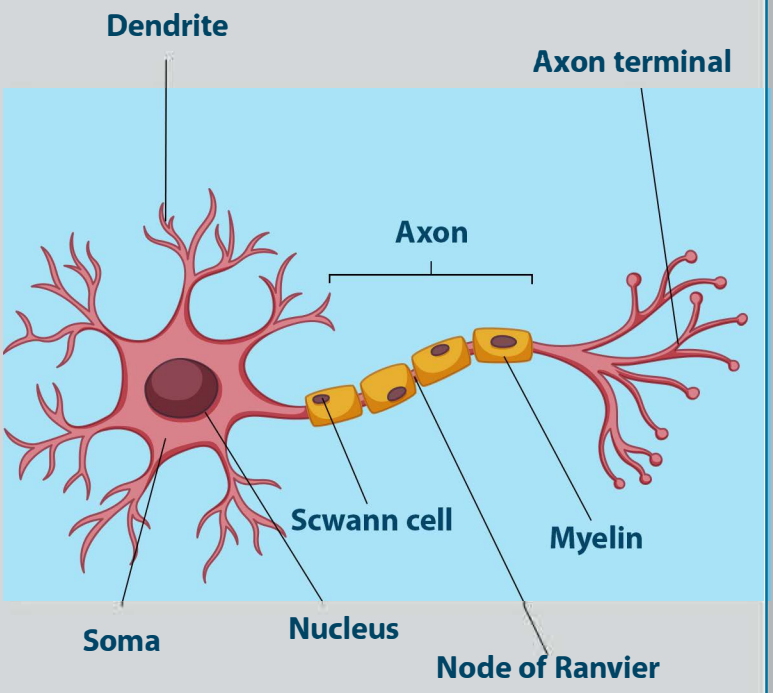
NERVOUS SYSTEM ANATOMY

Neuron Anatomy

Neuron

- **Dendrite**
  - Receives communication from other neurons
  - Sends communication to cell body(axons)
- **Cell body**
  - Site of nucleus
  - All cell functions are controlled here
- **Axon**
  - Long nerve fiber that ends at the axon terminal
- **Axon terminal**
  - End of nerve axon
  - Transmits signal to receiving axon via neurotransmitter
- **Glial Cell**
  - Capable of dividing
  - Sustains homeostasis
  - Creates myelin
  - Provides neuron support and protection



Glial Cells

Oligodendrocyte

- The main function is to produce myelin axons in the CNS

Microgliocytes

- Major player cells of CNS immune response
- Kills bacteria

Astrocytes

- Neurons metabolic and physical support
- Stores and releases nutrition source when help is needed (hypoglycemia)

Ependymal cells

- Produces and regulates cerebrospinal fluid (CSF)

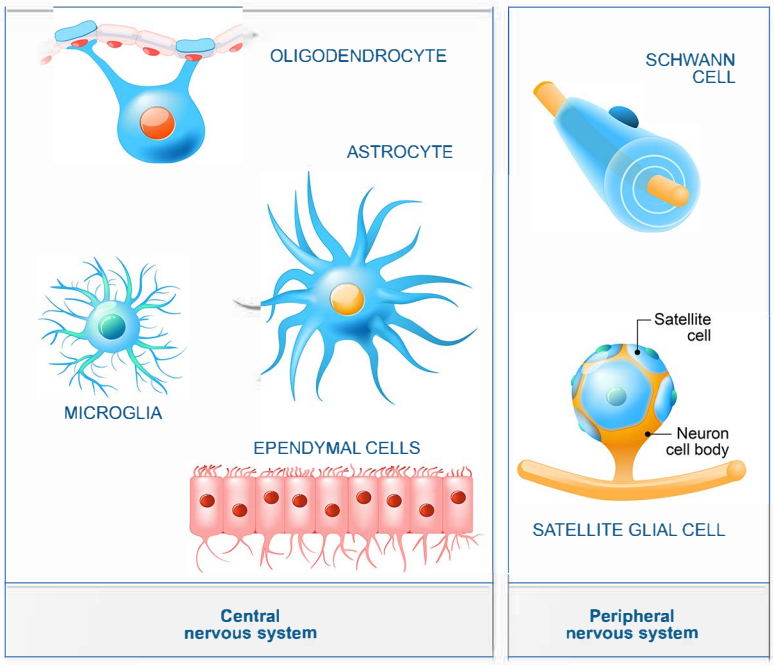
Satellite Cells

- Acts to protect and cushion cells
- Supplies nutrients to neurons nearby and contain structural function

Schwann Cells

- Required to insulate (myelin)
- Supplies nutrition to PNS neurons

Types of Neuroglia



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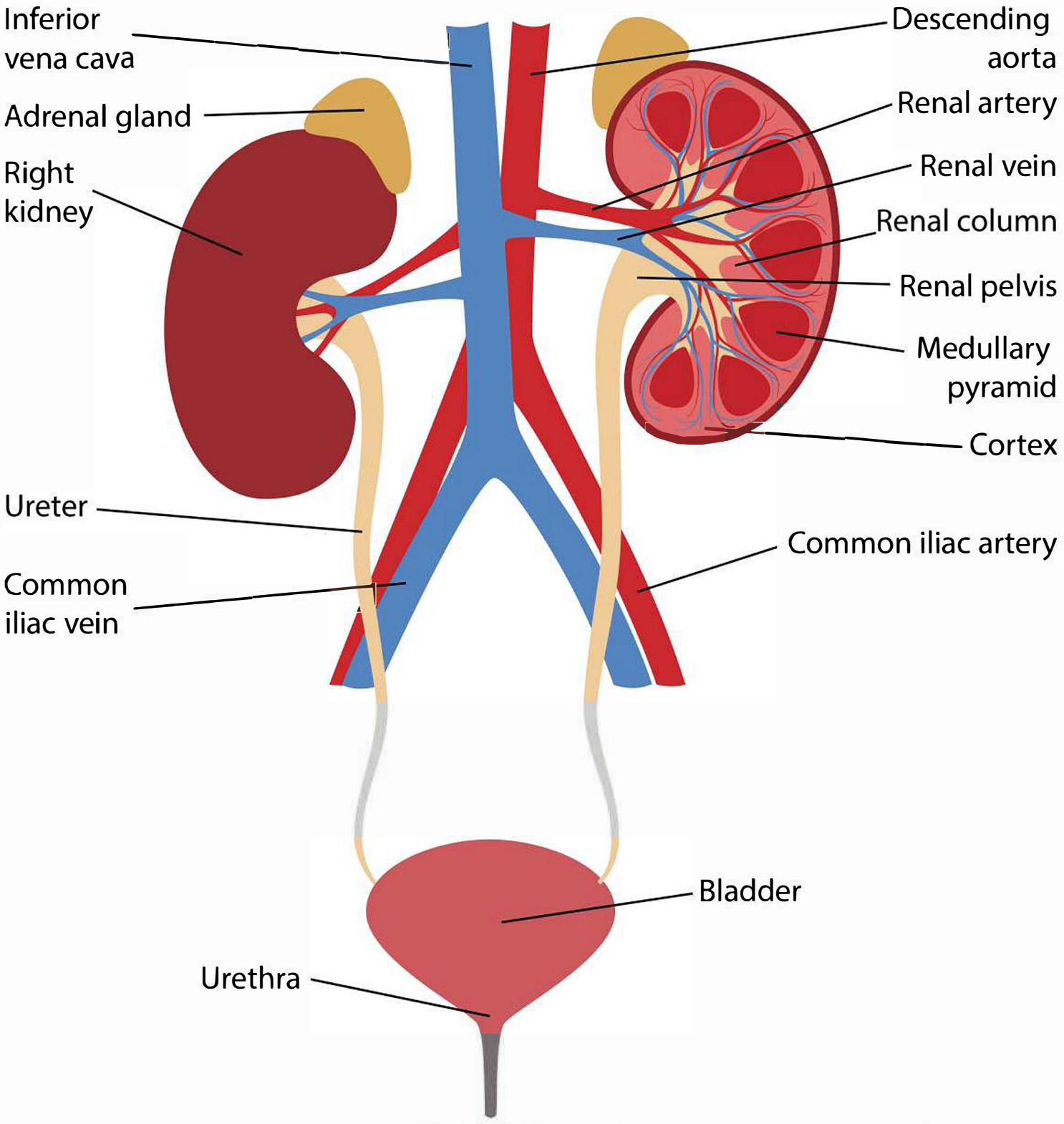
URINARY SYSTEM ANATOMY



Urinary Tract

Kidneys - Ureters - Bladder - Urethra

Functions:

- Removes waste from body
- Regulates blood volume and blood pressure
- Controls balance of blood pH

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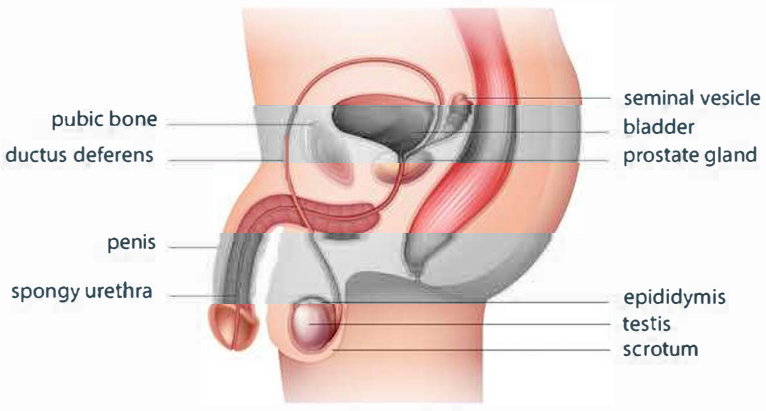
REPRODUCTIVE ANATOMY

Male Reproductive Anatomy

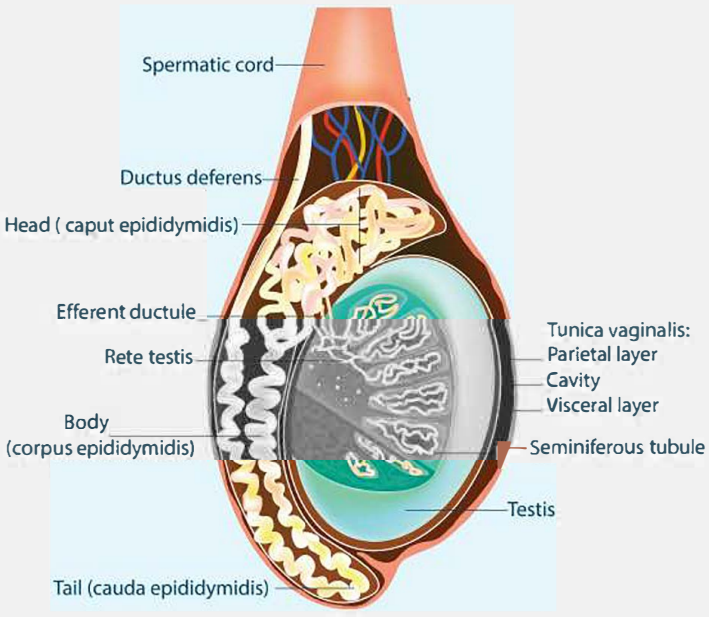
Organ	Function
Testes	• Generates sperm for transport • Produces the hormone testosterone
Scrotum	• Protects testes and controls temperature
Spermatic Ducts	• Carries sperm from testes to outside of urethra • Matures sperm cells
Seminal Vesicles	• Secretes yellow thick fluid that stores and creates the majority(70%) of semen
Prostate Gland	• Produces and secretes the milky substance to create about 30% of semen
Cowper's Glands	• Produces the creamy fluid that lubricates during sexual arousal • Provides sexual function
Penis	• Provides route for urination • Deposits yellow-white thick semen into vagina

Male Reproductive System

Male Reproductive Anatomy



Testes



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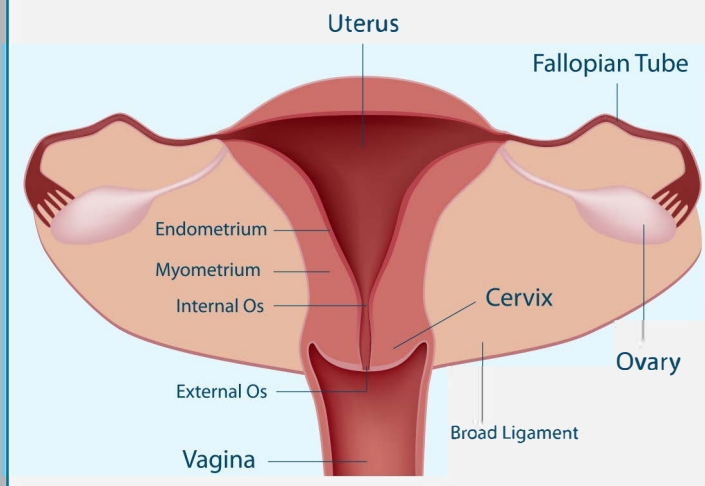
Reproductive Anatomy

Female Reproductive Anatomy

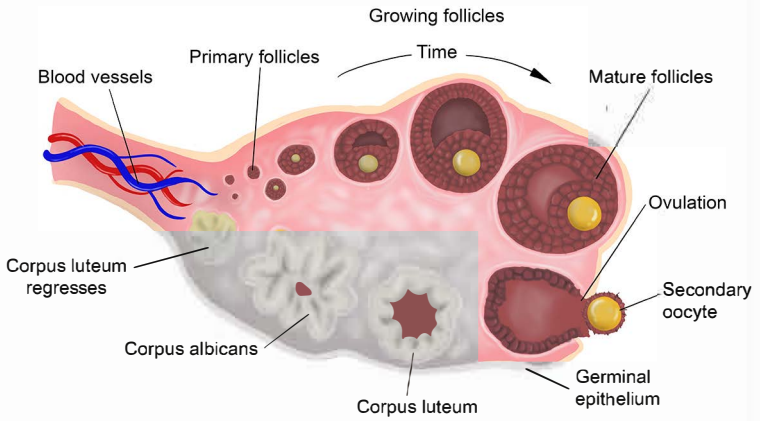
Organ	Function
Ovaries	• Produces mature eggs for fertilization • Delivers progesterone and estrogen to establish and maintain pregnancy
Fallopian Tubes	• Transports the egg from ovary to uterus
Uterus	• Houses fetus during gestation to delivery • Provides nutrition for fetus • During contractions, expels fetus during delivery
Vagina	• Pathway for blood & tissue of uterus to outside body during monthly menstrual cycle • Pathway for childbirth, sexual intercourse
Vulva	• External female genitalia containing erectile tissue (clitorus) • Bartholin's Glands - secrete mucus to lubricate vaginal canal • Skene's Glands - produce watery lubricant involved with sexual stimulation

Female Reproductive System

Female Reproductive Anatomy



Ovary Anatomy



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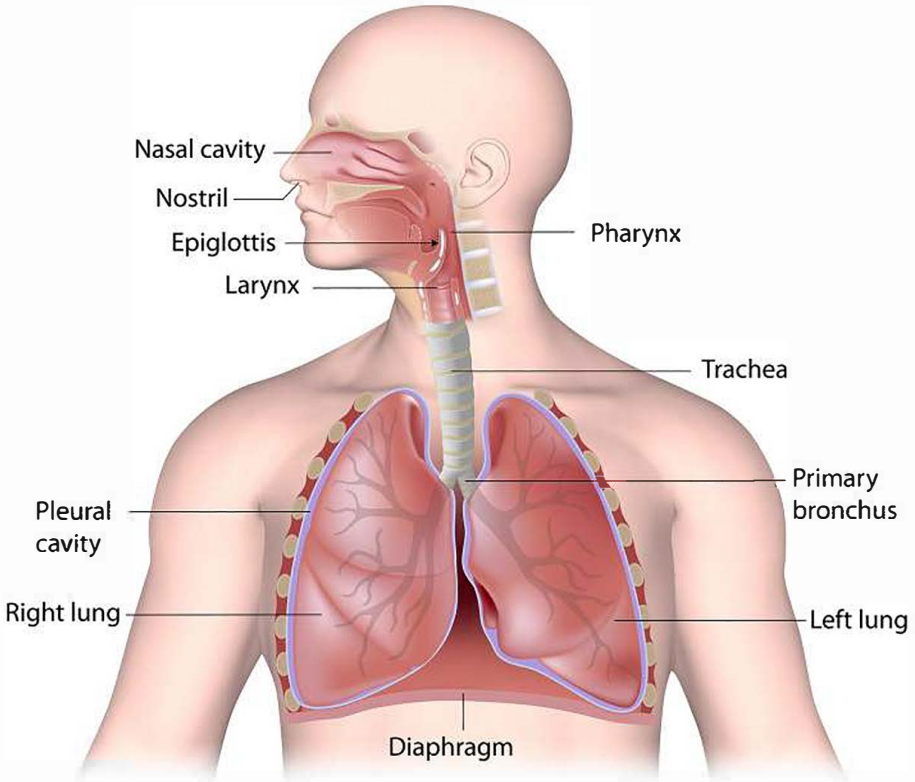
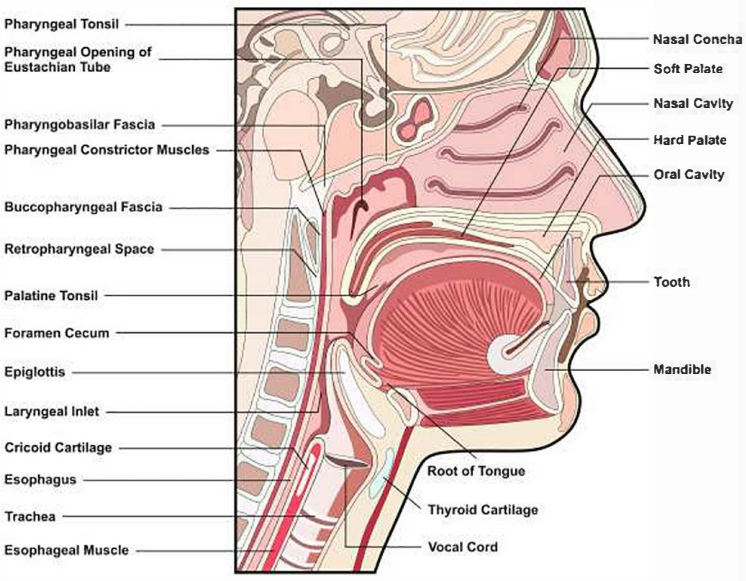
RESPIRATORY TRACT ANATOMY

Respiratory Tract

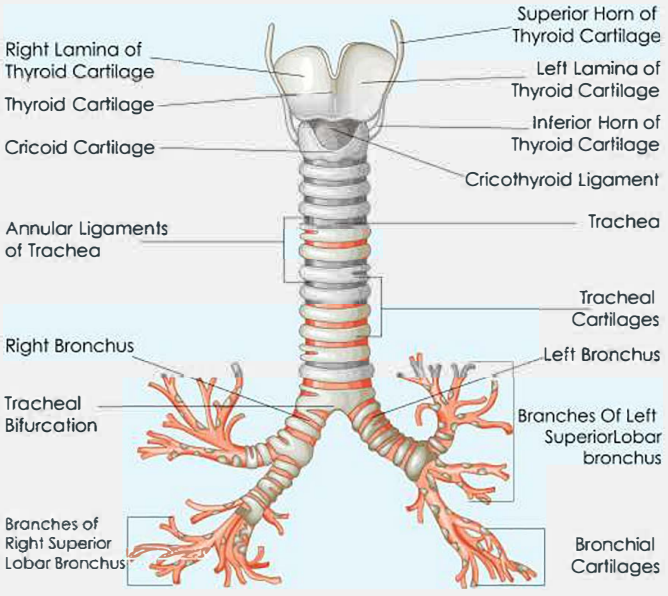


Upper Respiratory Tract



- Provides passage for breathing air in and out of lungs
- Filters air through nasal hair to trap pathogens and foreign intruders
- Involved in speaking, coughing, and swallowing

Lower Respiratory Tract



- Trachea cartilage are C-shaped rings with scattered plates in bronchi
- Separated into primary, secondary, as well as tertiary bronchi
- Then branch off into bronchioles before moving to capillaries and alveoli

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SKELETAL ANATOMY

Bone Classifications

Long

- Collarbone, limbs, arms, legs, hands, feet, fingers, toes

Short

- Located in wrists & ankles

Flat

- Skull bones
  - Sphenoid ethmoid
  - Frontal, parietal, temporal, & occipital
- Scapula
- Sternum
- Ribs

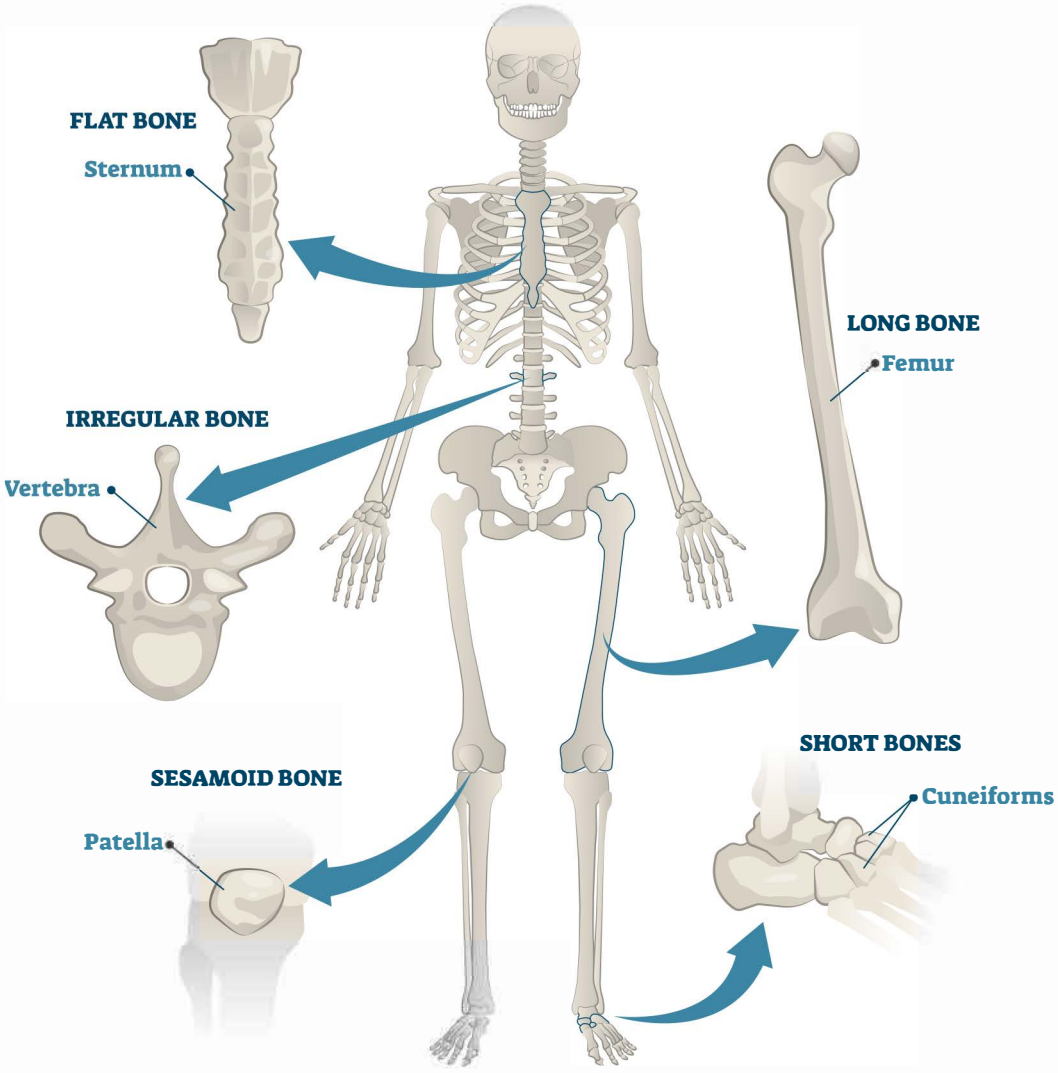
Irregular

- Spine
- Skull bones
  - Zygomatic, sphenoid, ethmoid, maxilla, palatine, nasal hyoid, mandible, & Temporal
- Vertebrae
- Pelvic bone
- Sacrum & coccyx

Sesamoid

- Embedded by tendons
  - Patella or kneecap

Types of Bones



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SKELETAL ANATOMY

Long Bone Anatomy

Diaphysis

- Shaft and center part of long bone
- Contains fat tissue and bone marrow
- Made of compact bones

Metaphysis

- Grows and hardens near epiphysis & diaphysis
- Supports load to surface of joint that places weight on diaphysis
- Holds growth plate that develops during childhood

Epiphysis

- Spongy end of long bone
- Covered by articular cartilage
- Forms joints through attachment to other bones

Periosteum

- Covers outer surface of bone
- Made of fibrous tissue
- Site of tendon & ligament connection to bone

Cross Section of Bone

Medullary cavity

- Innermost hollow cavity
- Stores bone marrow, both red and yellow

Trabecular bone

- Porous spongy bone
- Formed near edge of hard long bones (femur)

Compact bone

- Forms outer layer of most bones
- Produces hard shell for bones

Compact Bone Anatomy

Osteons

- Consist of mineral matrix and cylindrical structures that contain osteocytes
- Main structure of compact bone
- Contain the Haversian canal with surrounding lamellae

Haversian Canals

- Tunnel cavities containing capillaries & nerves
- Run longitudinally through bone

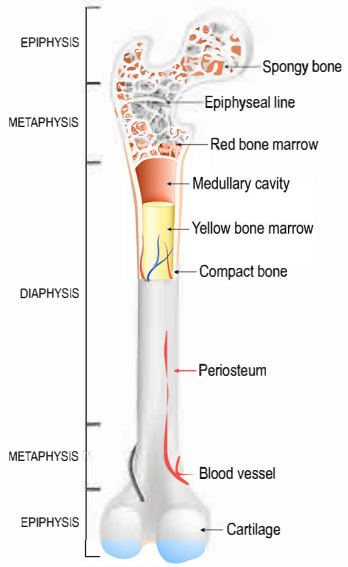
Volkmann's Canals

- Found inside osteons
- Provide nourishment & energy to osteons
- Interconnect Haversian canals to each other
- Transfer blood vessels away from periosteum to bone

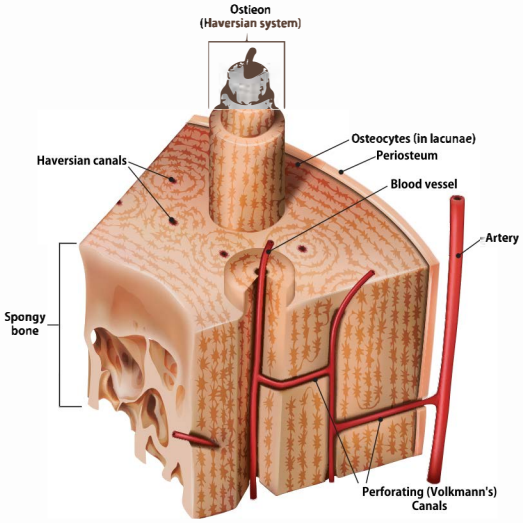
Lamellae

- Concentric layers to make osteons
- Inner & outer layer of compact bone
- Compact matrix surrounding Haversian canal

Bone Anatomy



Bone Structure



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SKIN ANATOMY

Layers

Epidermis

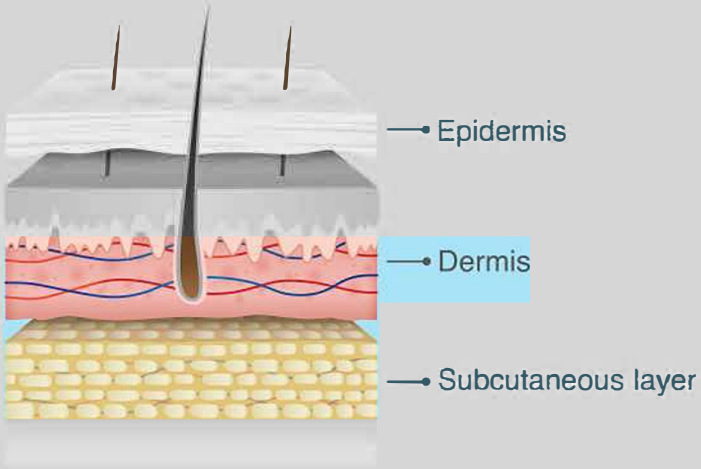
- Outermost layer composed of epithelial tissue
- Regulates water emitted from body
- Provides barrier against infection

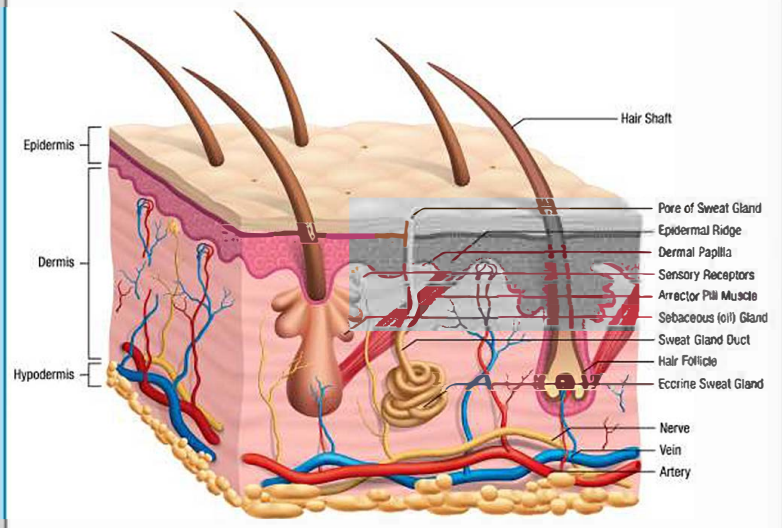
Dermis

- Sweat glands
- Protects from stress
- Contains hair follicles
- Provides skin with elasticity
- Nerve endings for heat & touch

Subcutaneous

- Connective and adipose tissue
- Regulates body temperature & insulates
- Passage for blood vessels & nerves
- Joins skin with muscle tissue & bone





Functions

Protection

- Maintains body temperature & fluid balance
- Against infection & harm
- Against outside environment (heat - UV rays & cold)

Sensory Detection

- Senses light touch & sustained pressure by Merkel's disks
- Detects deep tissue by bulbous corpuscles
- Senses environmental changes (temperature)
- Senses pain by nociceptors

Other Functions

- Absorbs sunlight to produce Vitamin D
- Responsible for waste excretion
- Forms unique marks like birthmarks & fingerprints

Thermoregulation

- Helps to maintain core body temperature
- Limits sweat evaporation, thus loss of heat
- Regulates heat loss through vasodilation while retaining heat by vasoconstriction

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