
بسم الله الرحمن الرحيم
السلام عليكم ورحمة الله وبركاته

بسم الله الرحمن الرحيم

DR. NAMMER
PhD ANATOMY, HISTOLOGY AND EMBRYOLOGY

Introduction to human anatomy

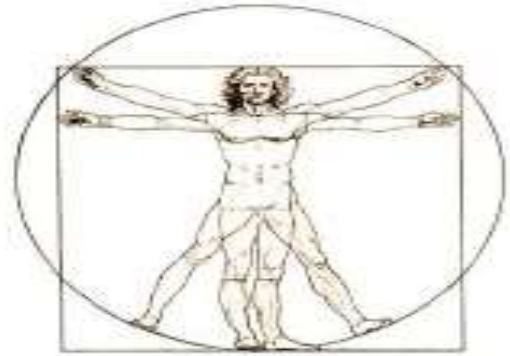
Anatomy

- Definition - anatome = up (ana) + cutting (tome)
- Disciplines of anatomy
  - Macroscopic
  - Microscopic
  - Developmental
  - Neuroanatomy
- Approach to study of gross anatomy
  - Upper extremity
  - Head and neck
  - Abdomen
  - Lower extremity
  - Back
  - Thorax
  - Pelvis and perineum

INTRODUCTION

Anatomy

- Studies of the **body parts and their relationships.**



Macroscopic (Gross) Anatomy

- Study of **large body structure.**
  (e.g: **heart, lungs, kidneys**... etc.)

- **can be further divided into:**

  1. Regional Anatomy
  - all structures in **one particular region.**

Cont..

2. Systemic Anatomy

- system by system



3. Surface Anatomy

- study of internal body structures

Microscopic Anatomy

- Very small structures that cannot be seen with naked eyes.

1. Cytology

- Study of body cells

2. Histology

- Study of body tissues

Cont..

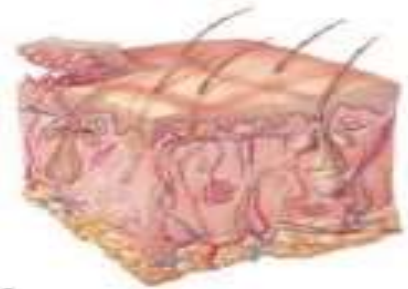
Developmental Anatomy

- Structural changes to the body throughout lifespan.

1. Embryology

- Development which occur before birth

SYSTEM OF THE BODY



- **Integumentary System**
  - External cover of the body (skin)
  - Protects deeper tissues from injury
  - Site of cutaneous, receptors, sweat and oil glands.

- **Skeletal System**
  - Bones
  - Protects and supports body organs

Cont..

SYSTEM OF THE BODY

- **Muscular System**
  - muscles
  - produce body movement

- **Nervous System**
  - consist of brain, sensory receptor, nerves, spinal cord
  - control homeostasis by stimulating particular muscles contraction and glands secretion

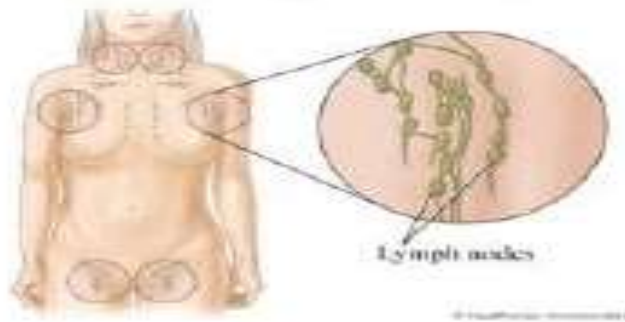
Cont..

SYSTEM OF THE BODY

- **Endocrine System**
  - Hormones secretion to regulate body processes.

- **Cardiovascular System**
  - Transport blood to the body

- **Lymphatic/Immune System**
  - Protect the body by attacking foreign substances entering body system

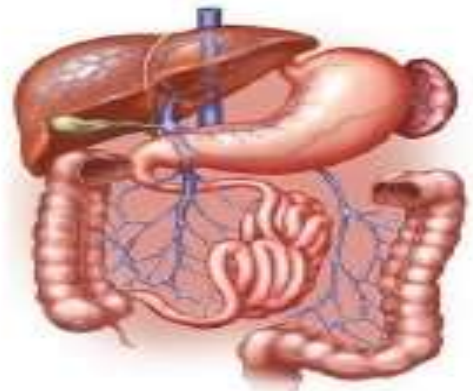


Cont..

SYSTEM OF THE BODY

- **Respiratory System**
  - supply blood with oxygen and removing carbon dioxide.

- **Digestive System**
  - break down the food for absorption
  - indigestible food will be removed as feces

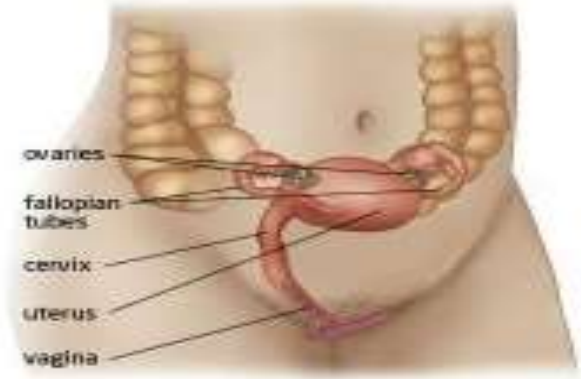


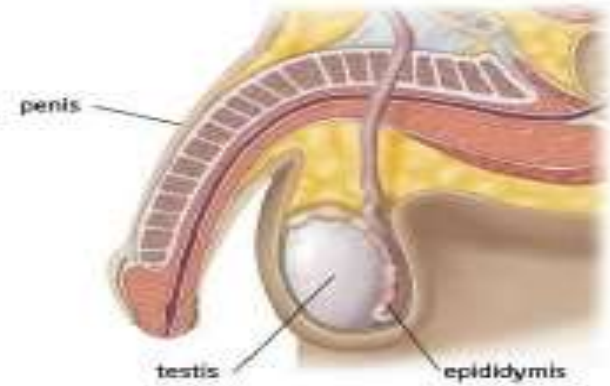
Cont..

SYSTEM OF THE BODY

- **Urinary System**
  - regulation of water, electrolytes and acid-base balance in the body.

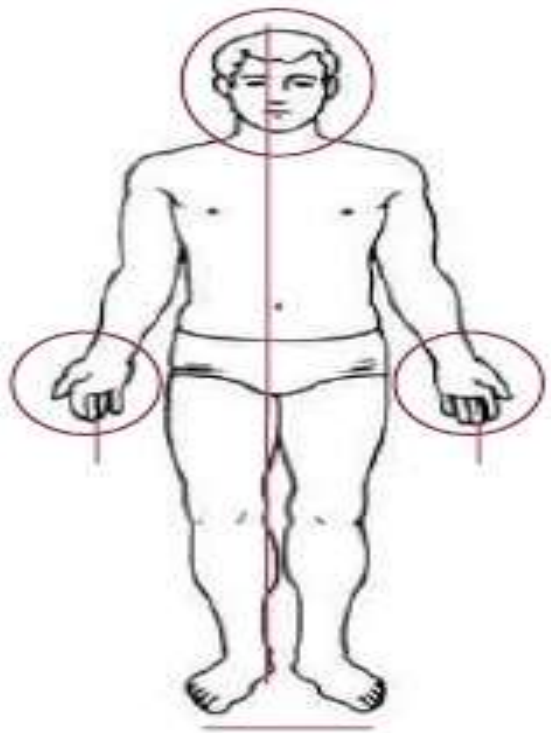
- **Reproductive System**
  - production of babies

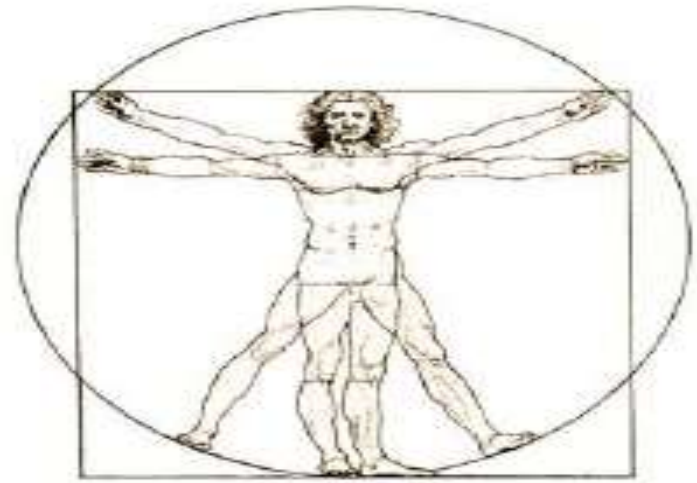




ANATOMICAL POSITION

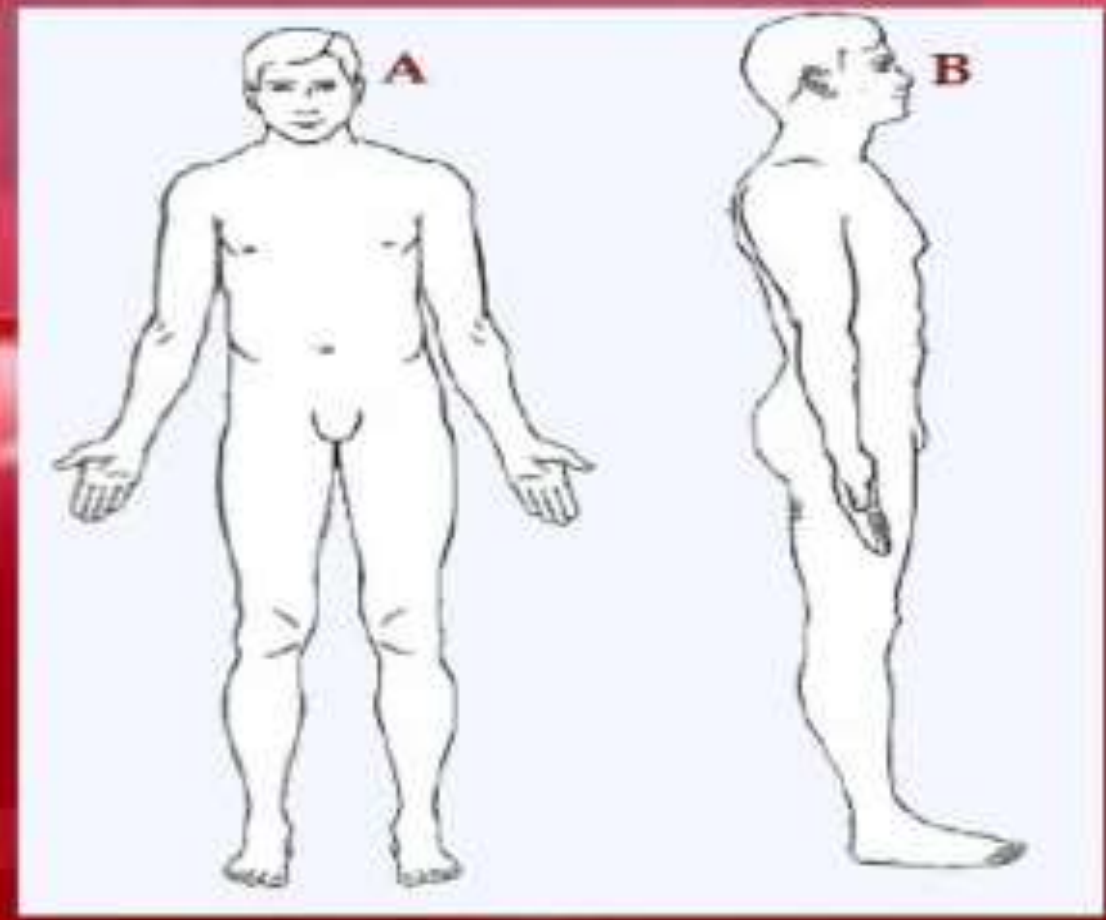
- Standing position with the body erect facing forward, feet slightly apart, arms hanging and palms also facing forward.





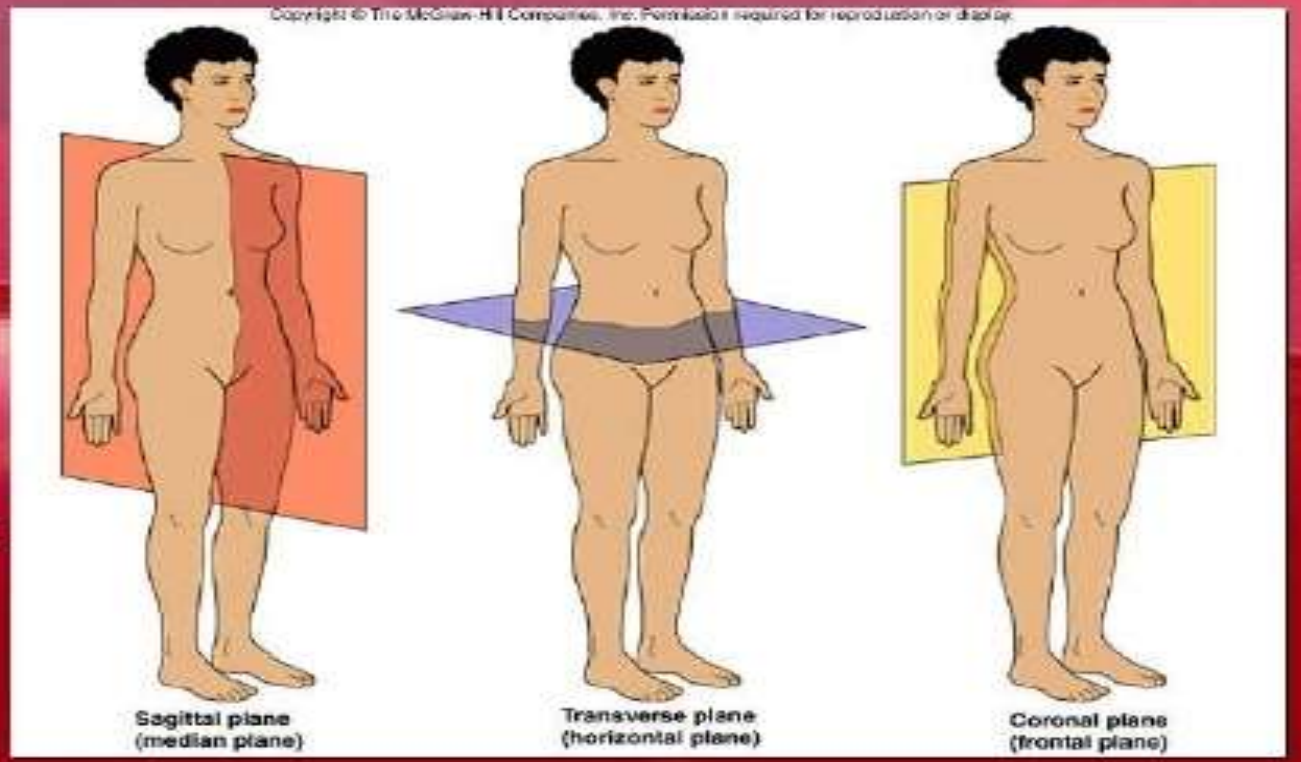
Anatomical Position

- Body erect
- Head, eyes, toes directed forward
- Limbs at sides of body
- Palms directed forward



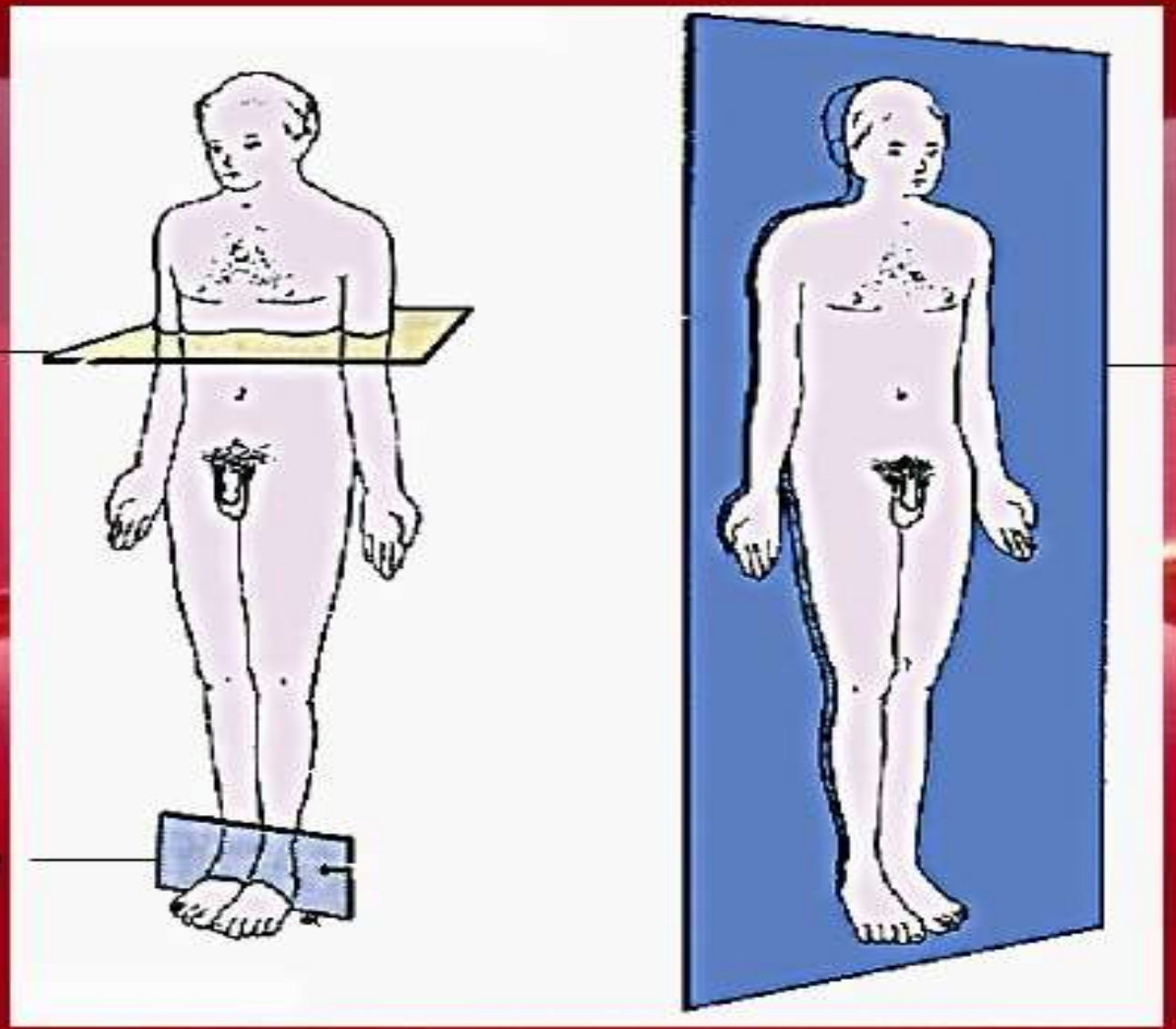
Planes and Sections

- A plane is an imaginary flat surface that passes through the body.
- A section is one of the 2 surfaces (pieces) that results when the body is cut by a plane passing through it.

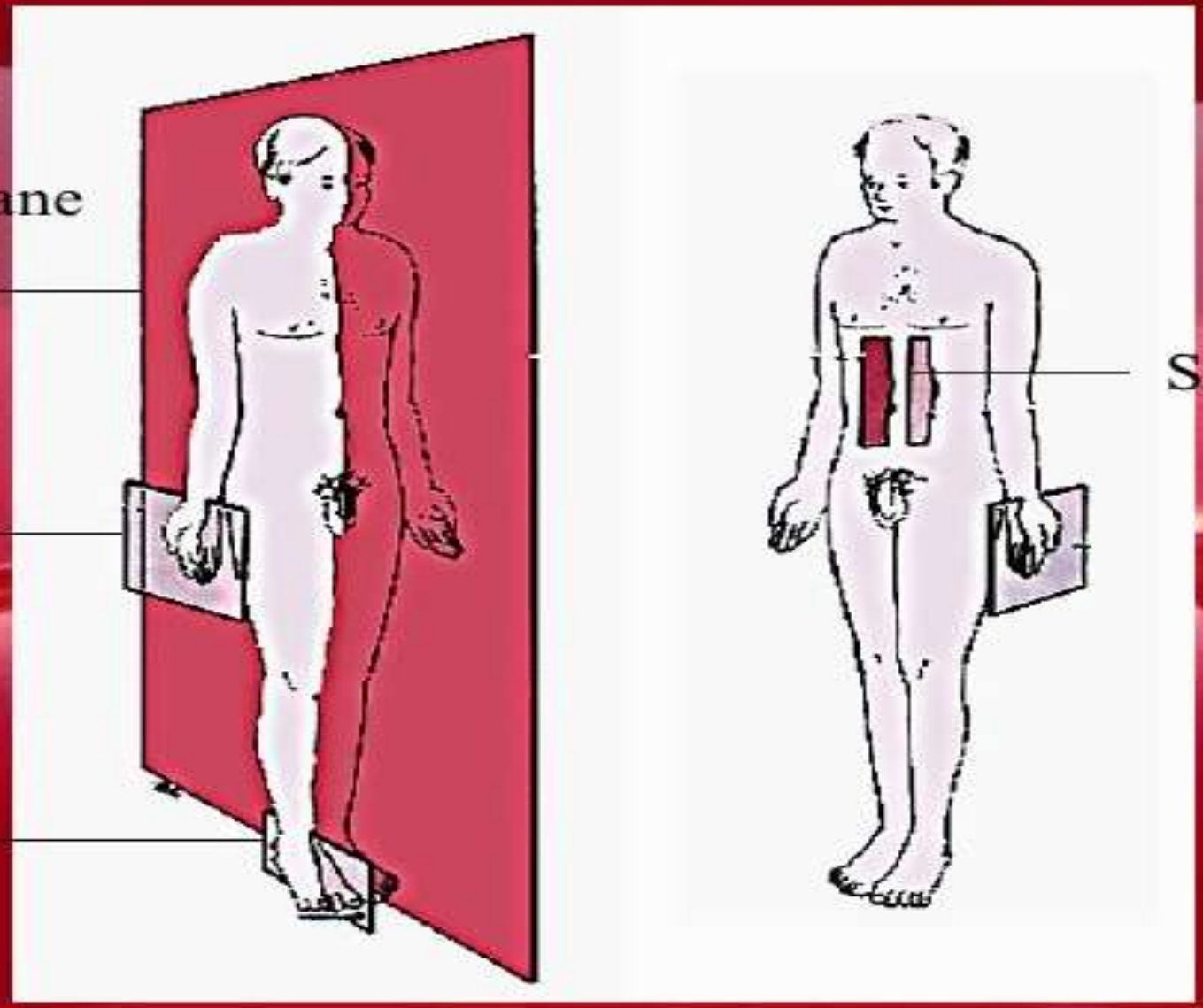


Transverse plane

Coronal plane



Coronal plane

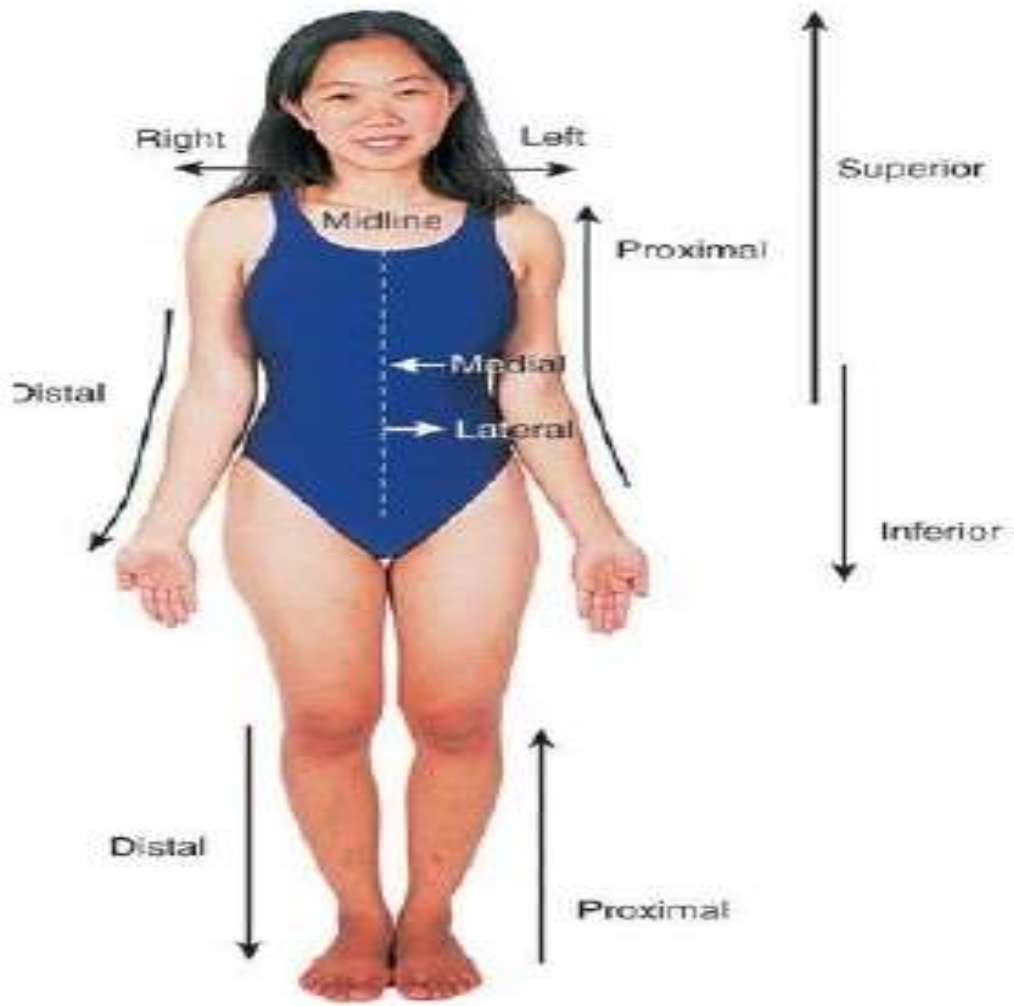

Median plane
Of body
Of hand
Of foot
Sagittal plane

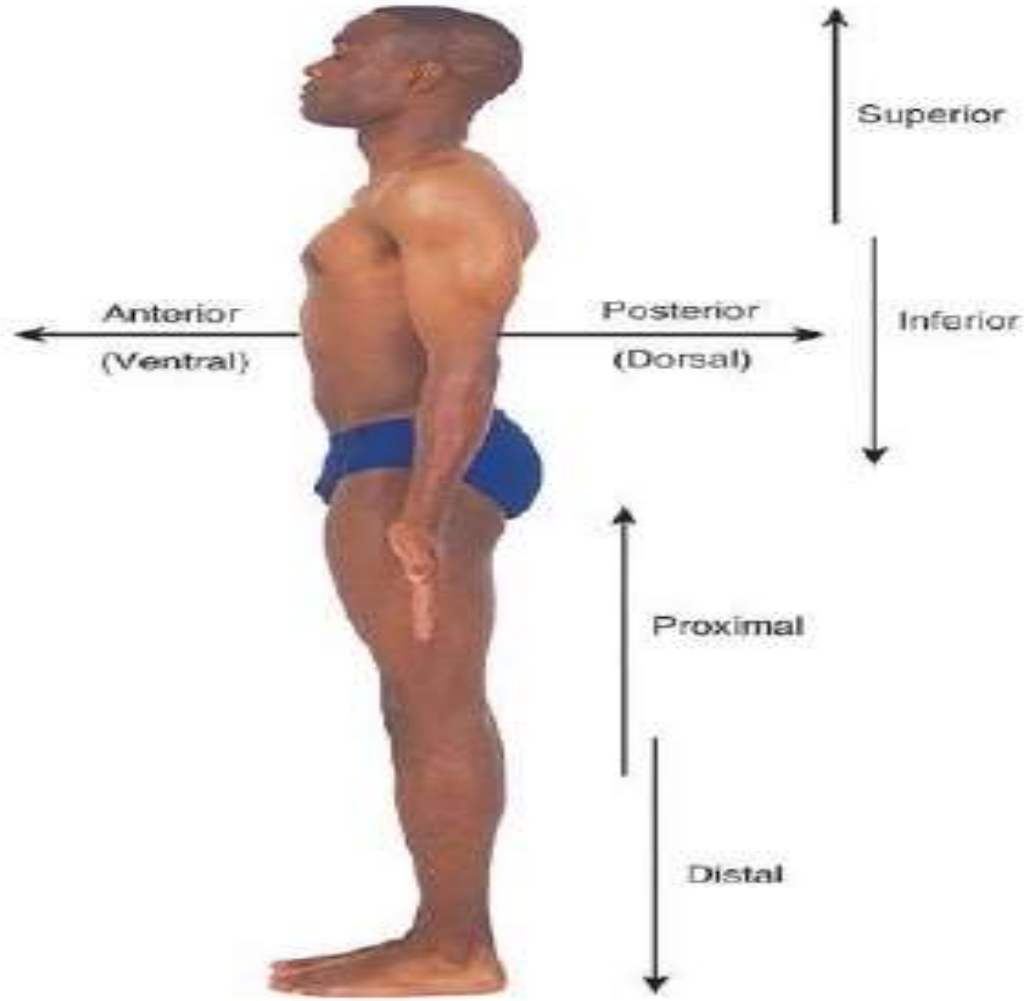
DIRECTIONAL TERMS

- Explain and locate precisely where the body structure and it's relation to another.

TERM	DEFINITION
Superior (cranial)	Toward head end, above
Inferior (caudal)	Away head end, below
Anterior (ventral)	Front of the body
Posterior (dorsal)	Behind the body
Medial	Midline of the body, inner
Lateral	Away from midline, outer
Intermediate	Between medial and lateral
Proximal	Close to body origin
Distal	Away from body origin
Superficial (external)	Toward body surface
Deep (internal)	Away body surface

DIRECTIONAL TERMS



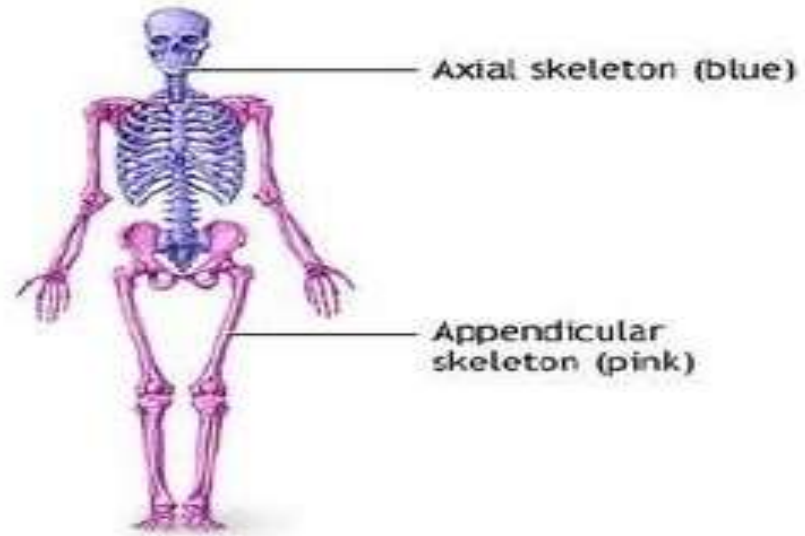


Anatomical Planes

- Median = vertical, front to back in midline
- Frontal (coronal) = vertical, perpendicular to median
- Horizontal (transverse) = parallel to floor, perpendicular to median, coronal
- Sagittal = vertical, parallel to median
- Midsagittal (R-L)
- Parasagittal (unequal R-L)

REGIONAL TERMS

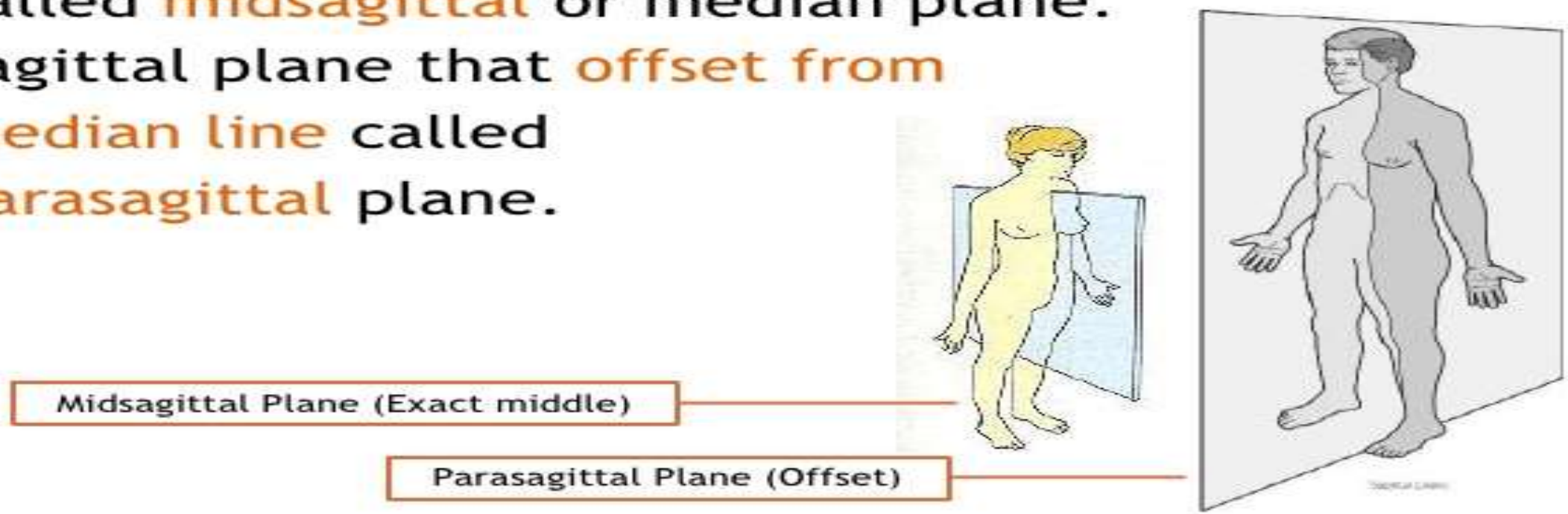
- **Axial Region**
  - axis of our body
  - comprise of three parts: head, neck and trunk



- **Perpendicular Region**
  - limbs, or appendages
  - body parts that attached to the axis.

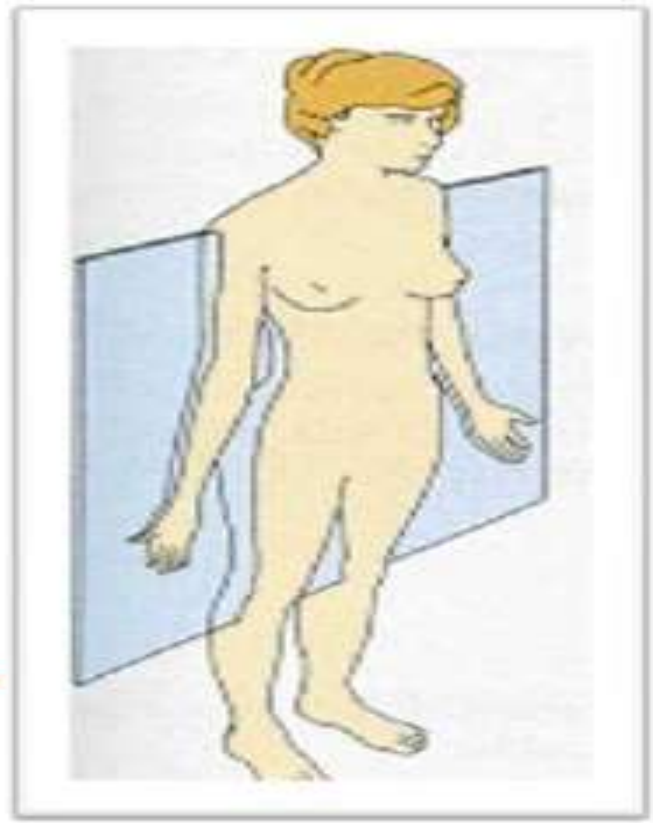
BODY PLANES AND SECTIONS

- **Sagittal plane**
  - Vertical plane divide body into right and left
  - Sagittal plane that exactly cut in the middle called midsagittal or median plane.
  - Sagittal plane that offset from median line called parasagittal plane.



BODY PLANES AND SECTIONS

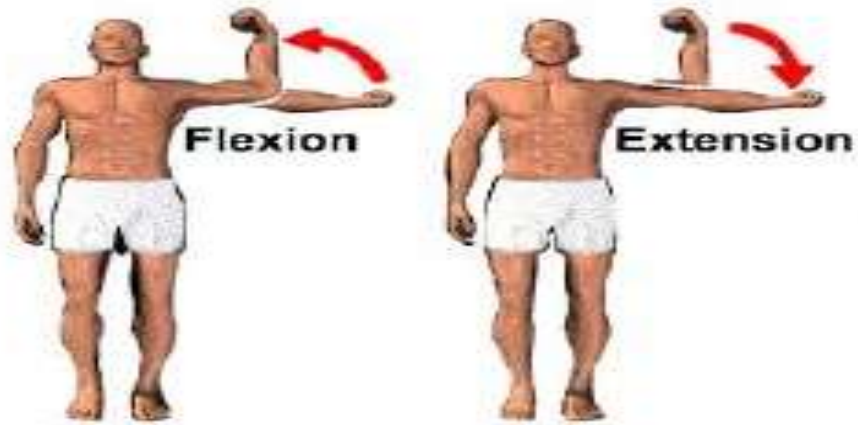
- **Frontal Plane**
  - vertical line that divide the body to anterior and posterior parts.

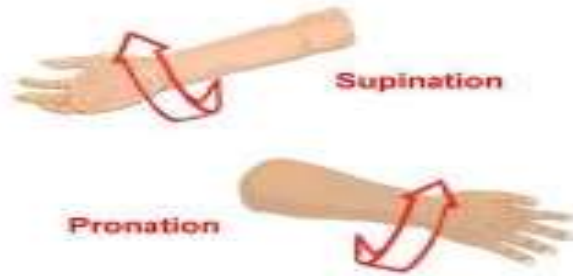


BODY PLANES AND SECTIONS

- **Transverse Plane**
  - horizontal plane which divide body into superior and inferior.

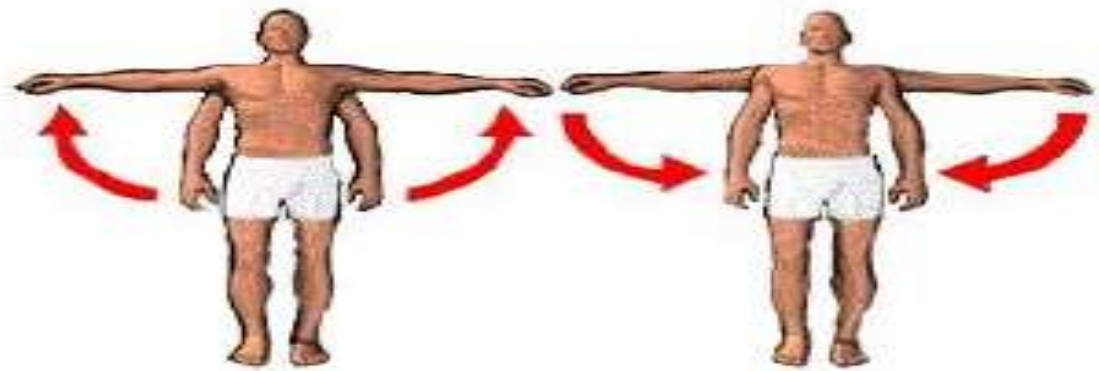
TERMS OF MOTION





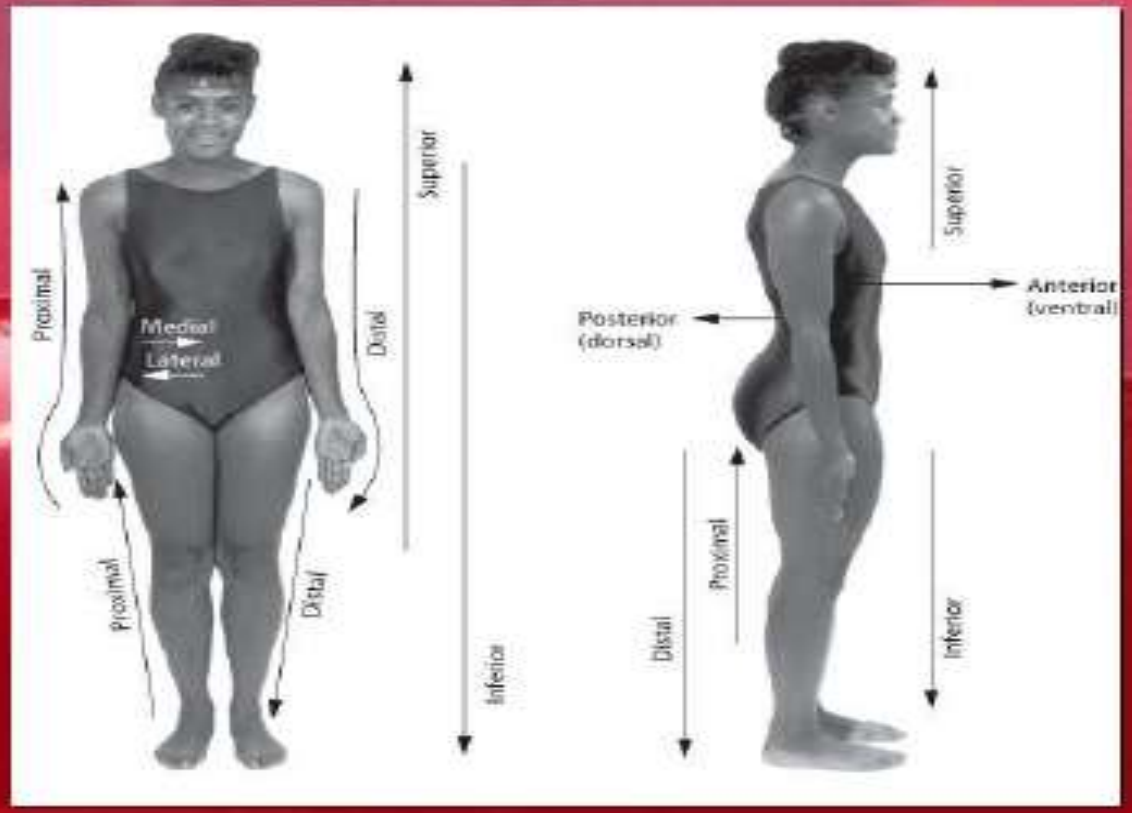

Supine


Prone



Anatomical directional terminology

- Anterior
  - in front or in the front part
- Anteroinferior
  - in front & below
- Anterosuperior
  - in front & above
- Posterior
  - behind, in back, or in the rear
- Posteroinferior
  - behind & below; in back & below
- Posterolateral
  - behind & to one side, specifically to the outside

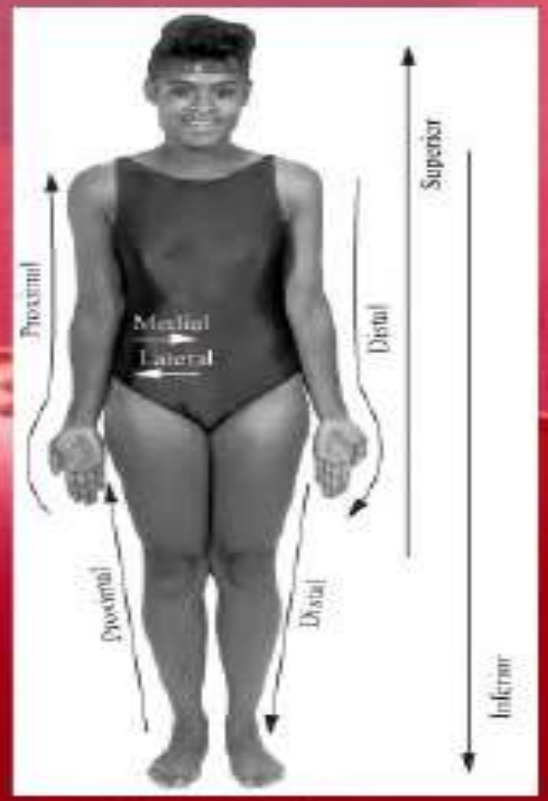


Anatomical directional terminology

- Contralateral
  - pertaining or relating to the opposite side
- Ipsilateral
  - on the same side
- Bilateral
  - relating to the right and left sides of the body or of a body structure such as the right & left extremities

Anatomical directional terminology

- Inferior (infra)
  - below in relation to another structure; caudal
- Superior (supra)
  - above in relation to another structure; higher, cephalic
- Distal
  - situated away from the center or midline of the body, or away from the point of origin
- Proximal
  - nearest the trunk or the point of origin
- Lateral
  - on or to the side; outside, farther from the median or midsagittal plane
- Medial
  - relating to the middle or center; nearer to the medial or midsagittal plane
- Median
  - Relating to the middle or center; nearer to the median or midsagittal plane



From Van De Graaff KM: *Human anatomy*, 6e, New York, 2002, McGraw-Hill

Anatomical directional terminology

- Caudal
  - below in relation to another structure; inferior
- Cephalic
  - above in relation to another structure; higher; superior
- Deep
  - beneath or below the surface; used to describe relative depth or location of muscles or tissue
- Superficial
  - near the surface; used to describe relative depth or location of muscles or tissue

Anatomical directional terminology

- Prone
  - the body lying face downward; stomach lying
- Supine
  - lying on the back; face upward position of the body
- Dorsal
  - relating to the back; being or located near, on or toward the back, posterior part, or upper surface of
- Ventral
  - relating to the belly or abdomen, on or toward the front, anterior part of
- Volar
  - relating to palm of the hand or sole of the foot
- Plantar
  - relating to the sole or undersurface of the foot

Directional Terms

- *Toward the upper part*
  - *Superior Cephalic*
- *Toward the lower part*
  - *Inferior Caudal*
- *Front*
  - *Ventral Anterior*
- *Back*
  - *Dorsal Posterior*

Directional Terms

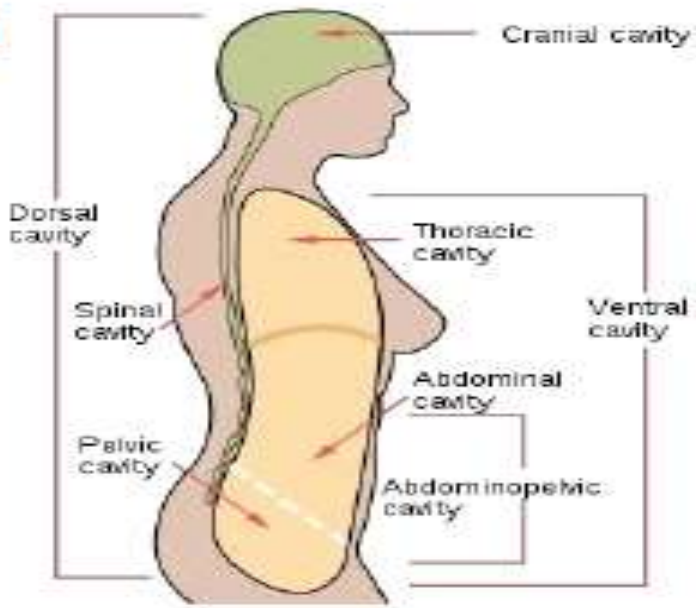
- *Front Down*
  - *Prone*
- *Toward Midline*
  - *Medial*
- *Away from Midline*
  - *Lateral*
    - *Same-Ipsilateral*
    - *Opposite-Contralateral*
- *Between*
  - *Intermediate*
- *Near*
  - *Proximal*

Directional Terms

- Far
  - Distal
- On the Surface
  - Superficial
- On the Inside
  - Deep
- On the Wall of the Body Cavity
  - Parietal
- On an Organ
  - Visceral

BODY CAVITY

- **Dorsal Cavity** – protects nervous system
  - two subdivisions:-
    1. Cranial Cavity – brain
    2. Spinal Cavity – spinal cord



- **Ventral Cavity** – houses visceral organs
  - two subdivisions:-
    1. Thoracic Cavity – pleural (lungs), mediastinum (heart, esophagus, trachea, etc…)
    2. Abdominopelvic cavity – abdominal (stomach, intestines, spleen, liver, etc…), pelvic (bladder, reproductive system, rectum)

Structures

Skin

- Epidermis
- Dermis
- Apocrine gland
- Subcutaneous tissue
- Arrector pili muscle
- Eccrine sweat gland
- Melanocytes
- Hair
- Nails

(Continued)

Functions

What are the major functions of the integumentary system?

- Protect
- Fluid balance
- Absorption
- Synthesis of Vitamin D
- Sensation/communication with external environment
- Thermoregulation
- Immunity
- Excretion

- ***Skin***
- ***Superficial fascia***
- ***Artery, Vein ,Nerve***
- ***Deep fascia***
- ***Muscles***
- ***Bones***
- ***joints***

Introduction to

- Skin.
- Fascia.
  - Superficial Fascia
  - Deep Fascia

Structure of the skin

Superficial epithelial layer
(epidermis)

Deep connective tissue layer
(dermis)

Deep to the dermis is the Hypodermis :subcutaneous tissue
(superficial fascia)

Structure of the skin

Epidermis

- Keratinized stratified squamous epithelium devoid of blood vessels

Dermis

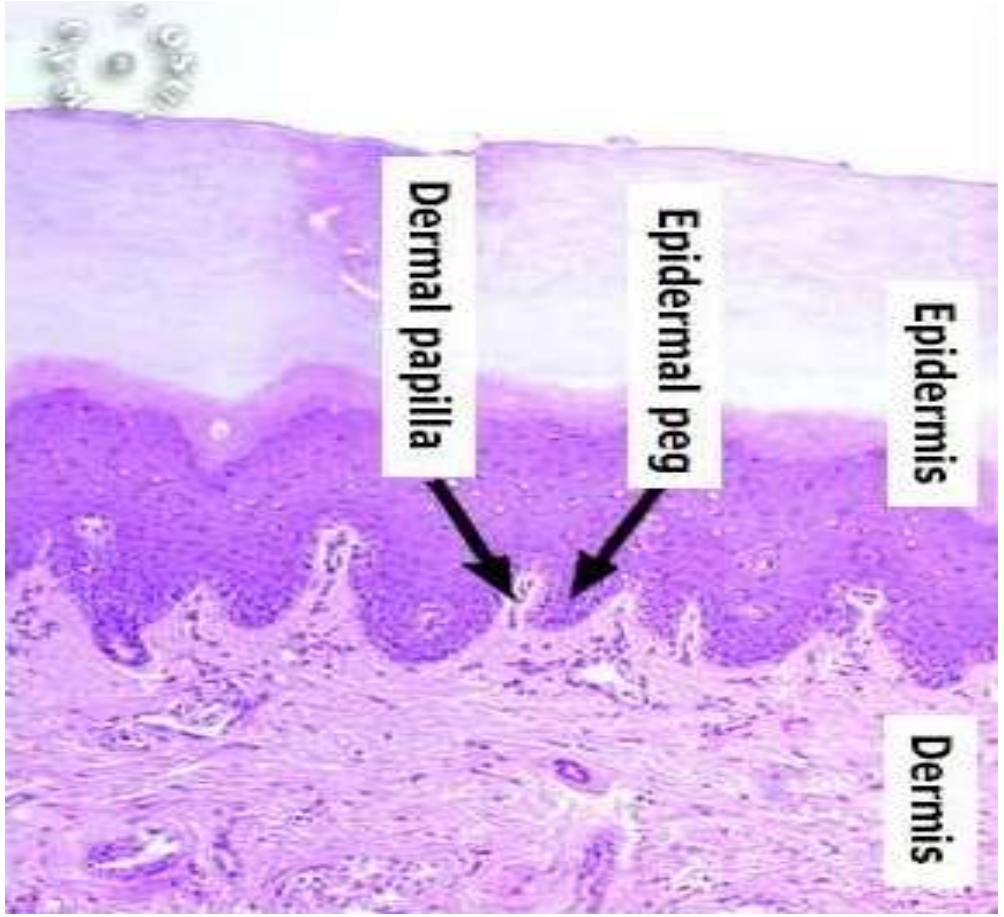
- Connective tissue containing (bl. v. lymph v., sensory nerve endings, smooth m, hair follicles, sweat and sebaceous glands)
- In its deep part the collagen bundles are arranged in parallel rows

Skin

- **Layers of skin**
- **Epidermis**
- ***Five type of layers***
- **Dermis**
- ***Two type of layers***

Junction

- **Dermal papilla**
- **Epidermal peg (*rete pegs*)**

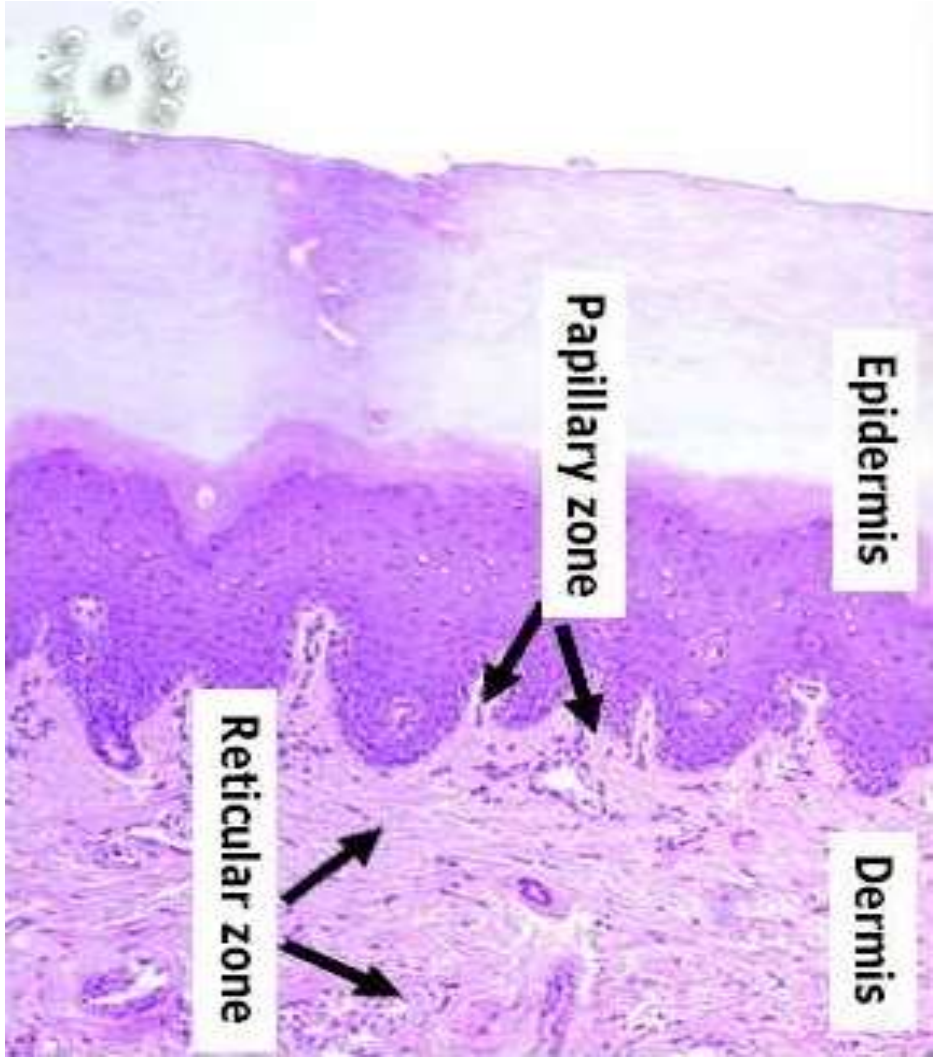


Skin…..

Dermis

- **Papillary layer**
- **Tactile papilla**
- **Vascular papilla**
- **Collagen fibre**
- **Reticular layer**

  Collagen fibre
- **Sweat glands**
- **Sebaceous glands**
- **Hairs**



Skin……

- **Thick skin**

  -No hairs

- **Thin skin**
- **Devoid of Stratum lucidum**

Fascia

Fascia

Collection of connective tissue

Superficial fascia

Superficial fascia:

- **Loose, mixture of adipose and loose areolar tissues.**
- **It unites the skin to the underlying structures.**
- **It is dense in some places as scalp, palm of hand and sole of foot and contains collagen bundles**
- **It is thin in the eyelids, auricle, scrotum, penis and clitoris (devoid of adipose tissue).**

Functions:

- **Facilitates movement of skin over underlying structures.**
- **Passage for cutaneous vessels, nerves…**

Protects the body against heat loss.

Superficial Fascia

- **Site with Very less fat**
  - ***-Eyelids***
  - ***-Pinna***
  - ***-Penis***
- **Site with more fat**
  - ***- Breast***
  - ***- Abdomen***
  - ***-Gluteal region***

Deep fascia

- It is more dense than superficial fascia
- Collagenous bundles are more compact and more regularly arranged
- It is usually present in the form of membranes

Examples of deep fascia

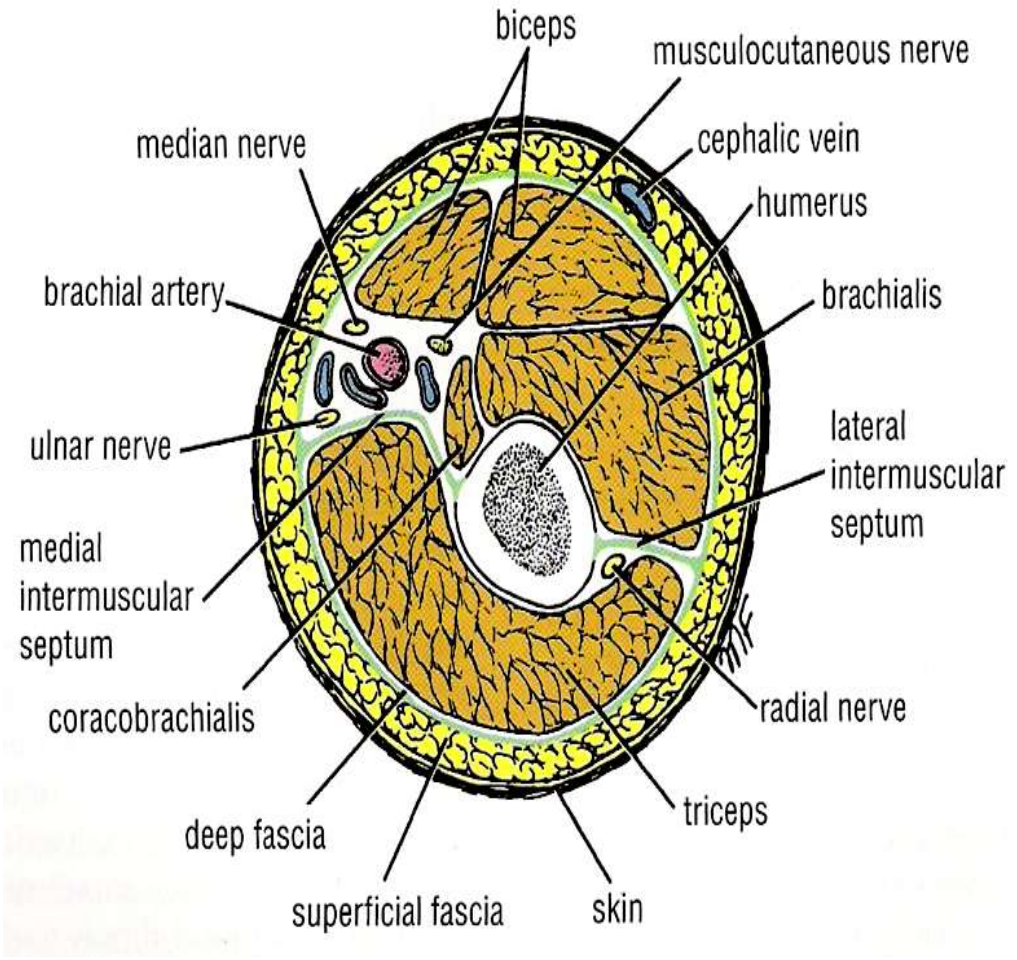
A. Investing fascia

- **Covers the surfaces of muscles**
- **In the neck: it forms well-defined layers, bounds fascial spaces so limits spread of infection or determine the path of infection**
- **In the abdomen: it is thin**
- **In the limbs: forms a definite sheath around the muscles**

Examples of deep fascia……..

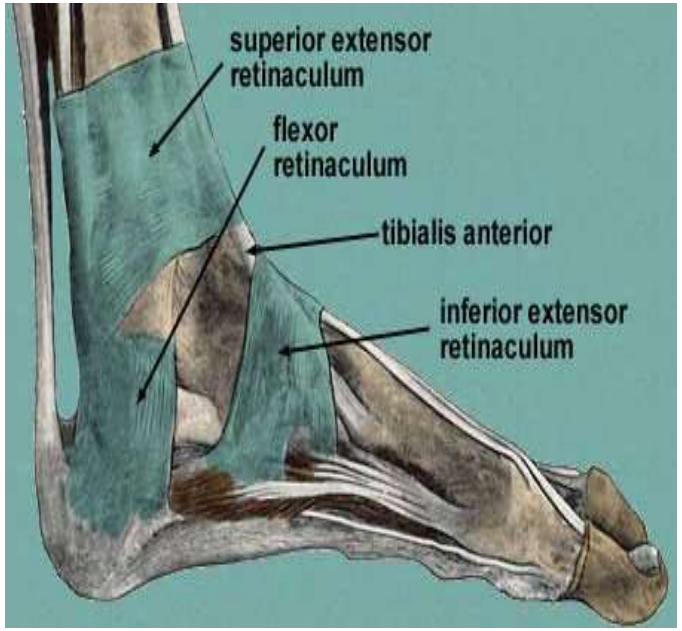
B. Inter muscular septa

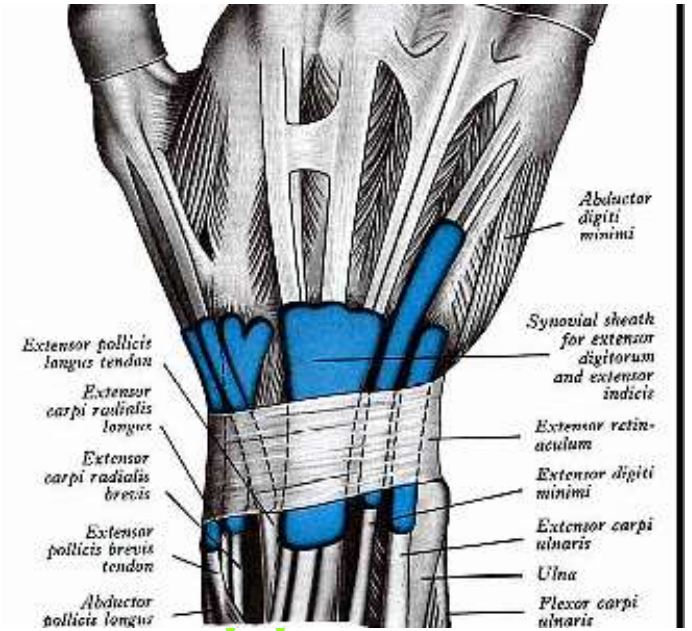
lie between muscles dividing the limb into compartments



Examples of deep fascia……..

C. Retinacula





joints

prevent bowstringing

Examples of deep fascia……..

- **Fibrous sheath**
  - ***eg. Carotid sheath Axillary sheath***
- **Fibrous capsule**
  - **eg Parotid capsule**
- **Ligaments**

Absence of deep fascia

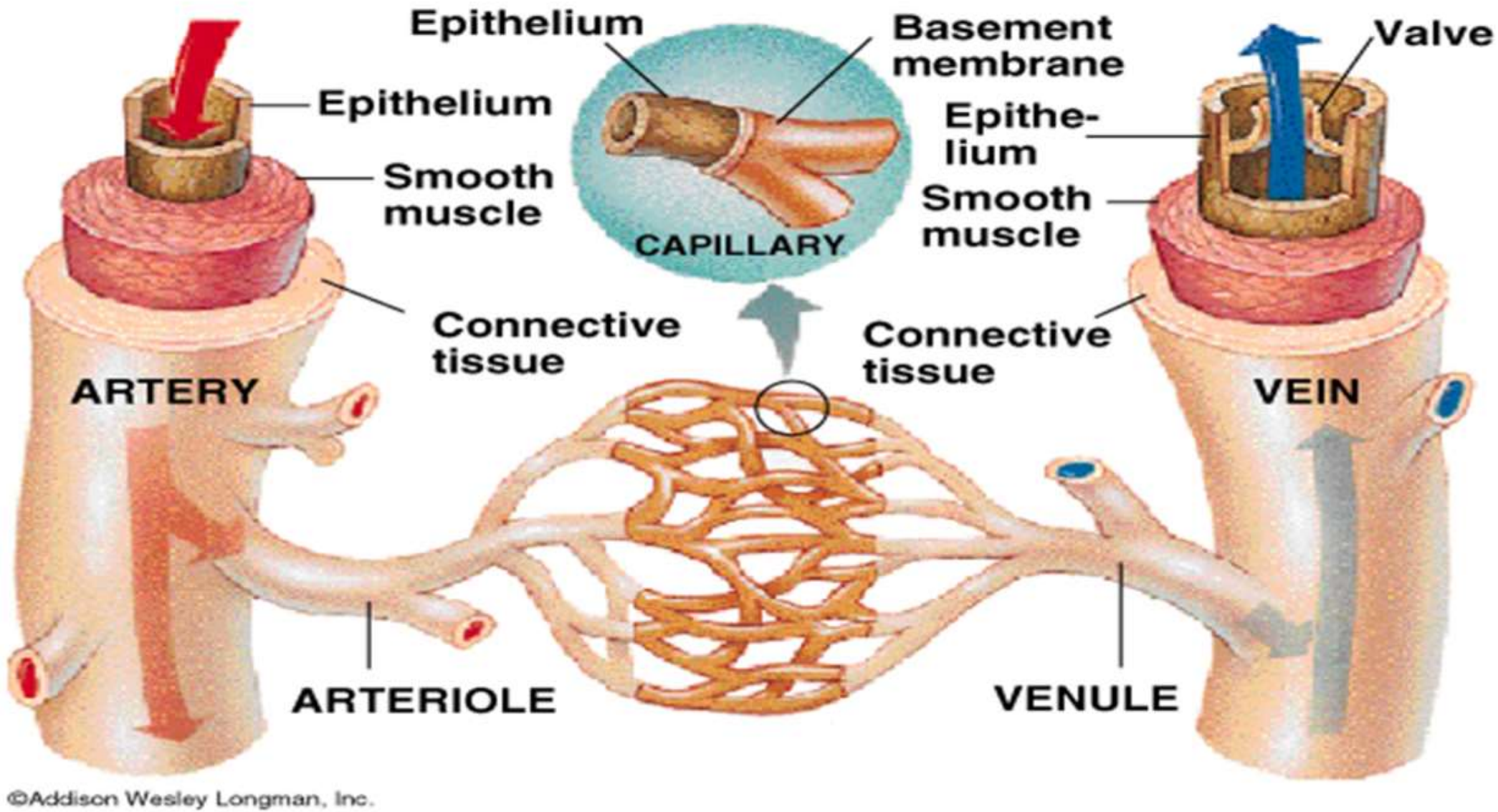
- Face
- Breast
- Penis
- Anterior abdominal wall

. Blood Vessels

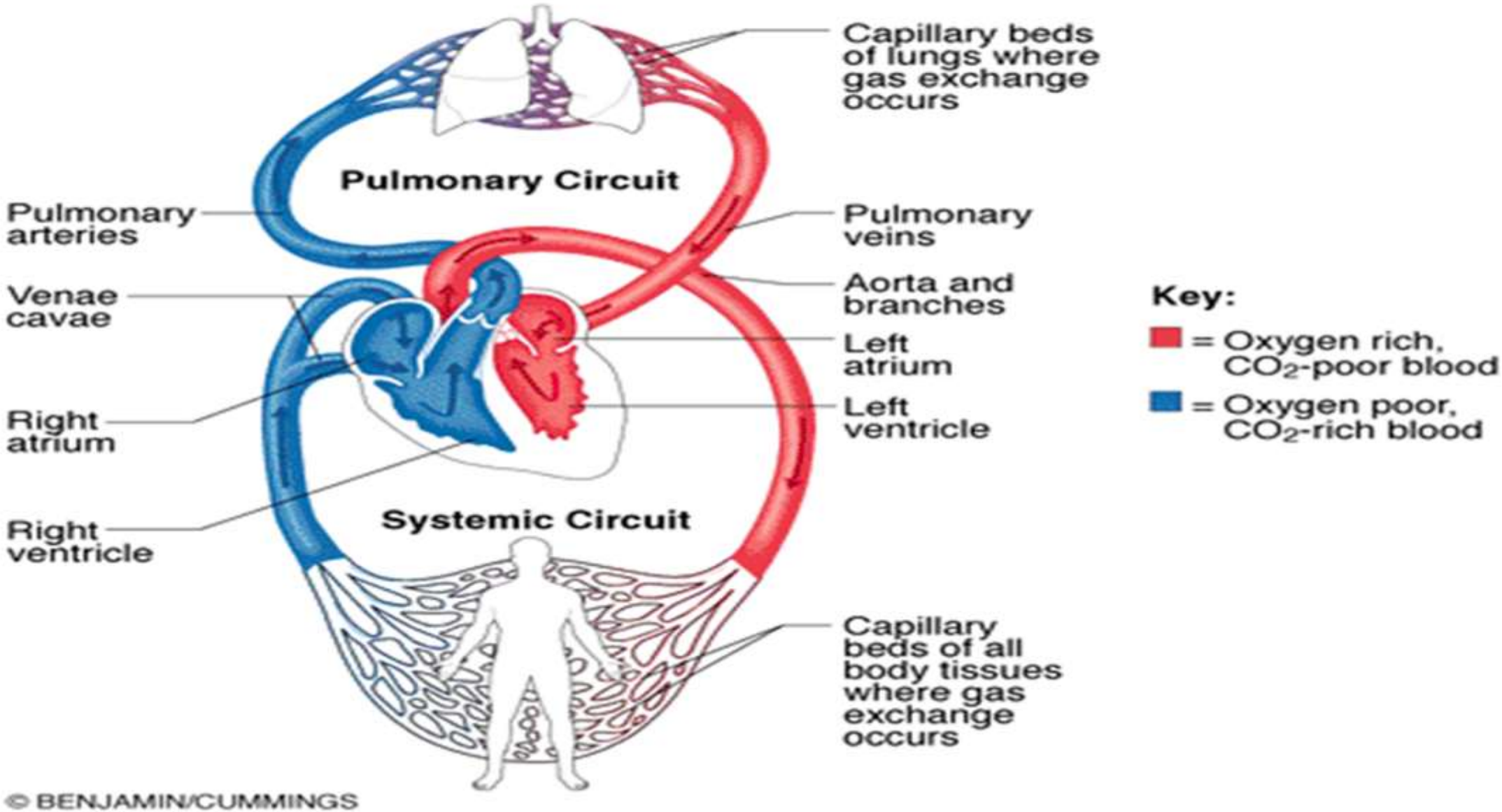
- Include arteries, arterioles, capillaries, venules, and veins.
- Double circuit, closed system:

1. Pulmonary circuit: Delivers blood to lungs. Oxygenation of blood.
2. Systemic circuit: Delivers oxygenated blood to tissues and organs of body (brain, liver, heart, kidneys, etc). Picks up carbon dioxide produced by tissues.

Structure of Different Blood Vessels



Pulmonary and Systemic Circuits



Types of Blood Vessels

A. Arteries and Arterioles:

Carry blood away from heart to body.

Have high pressure.

Have thick muscular walls, which make them elastic and contractile.

Vasoconstriction: Arteries contract:

Reducing flow of blood into capillaries.

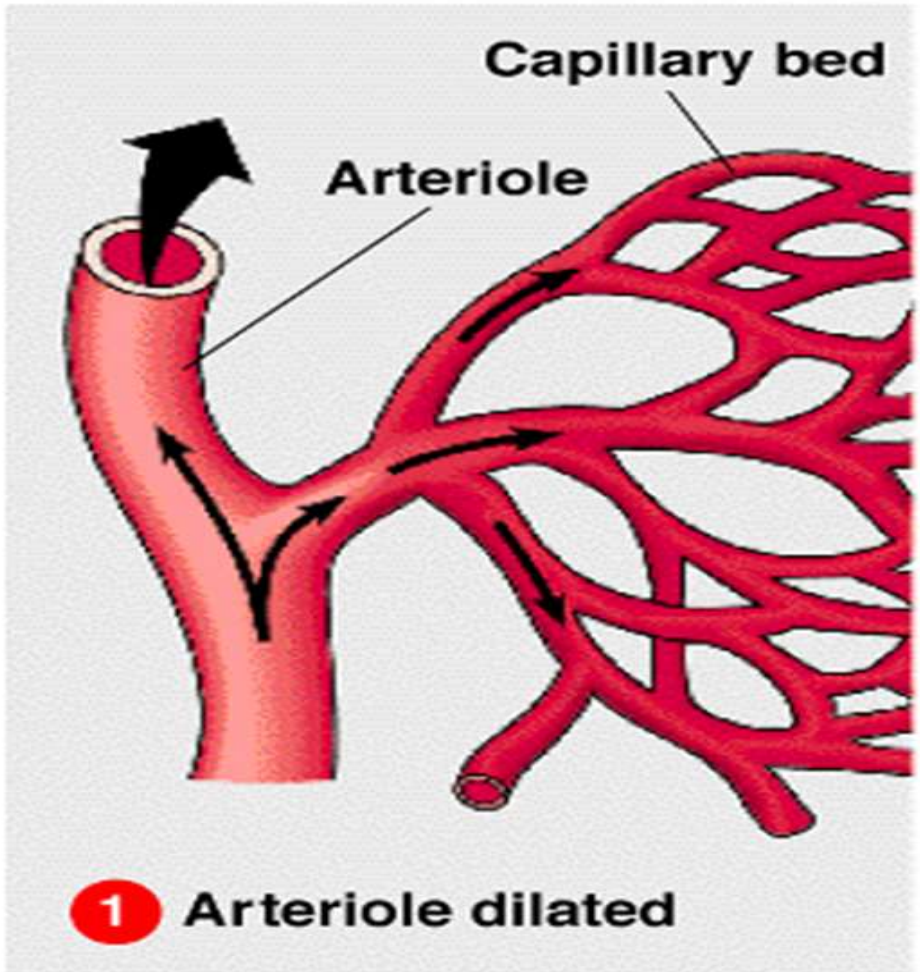
Increasing blood pressure.

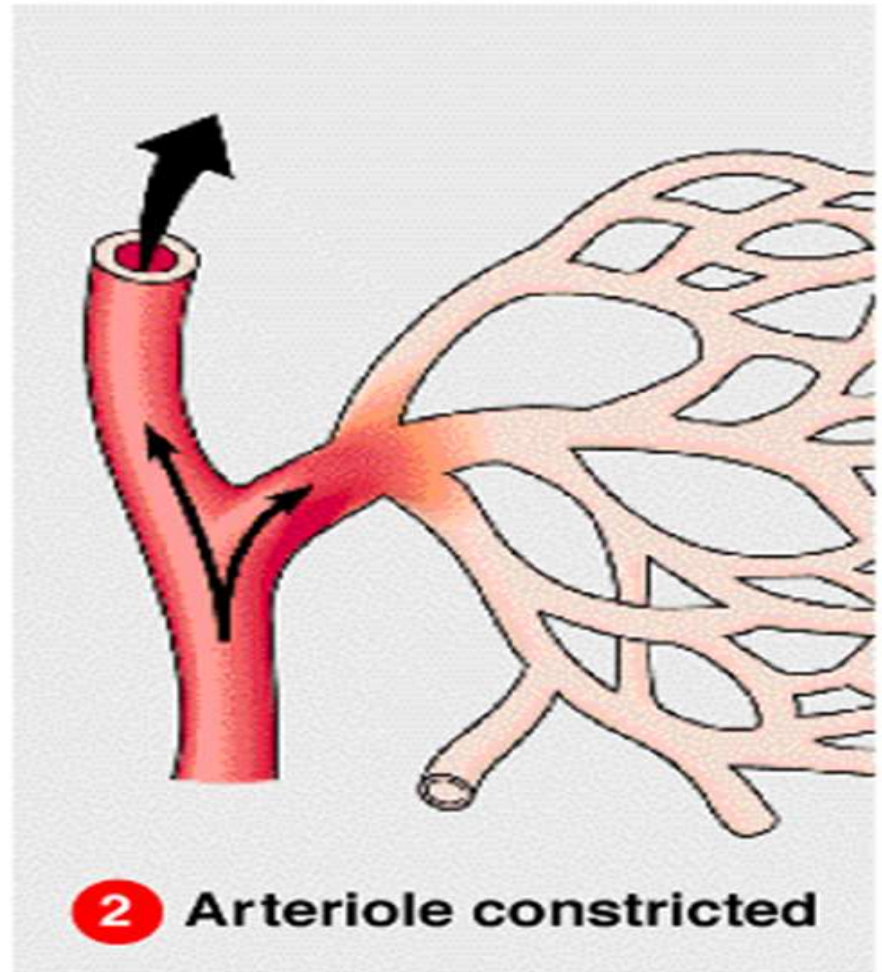
Vasodilation: Arteries relax:

Increasing blood flow into capillaries.

Decreasing blood pressure.

Control of Capillary Blood Flow by Arteriole Constriction





Types of Blood Vessels

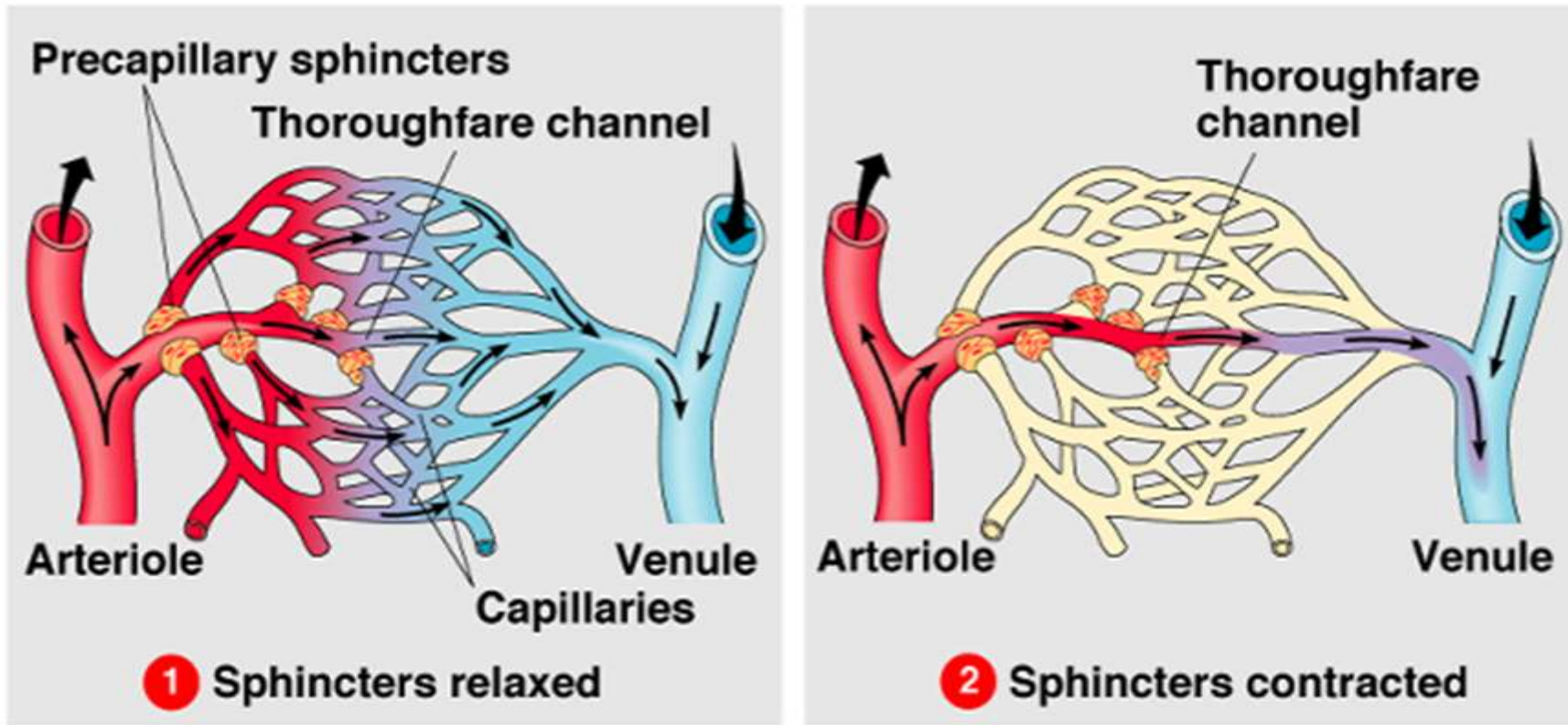
Capillaries: Only blood vessels whose walls are thin enough to permit gas exchange.

Blood flows through capillaries relatively slowly, allowing sufficient time for diffusion or active transport of substances across walls.

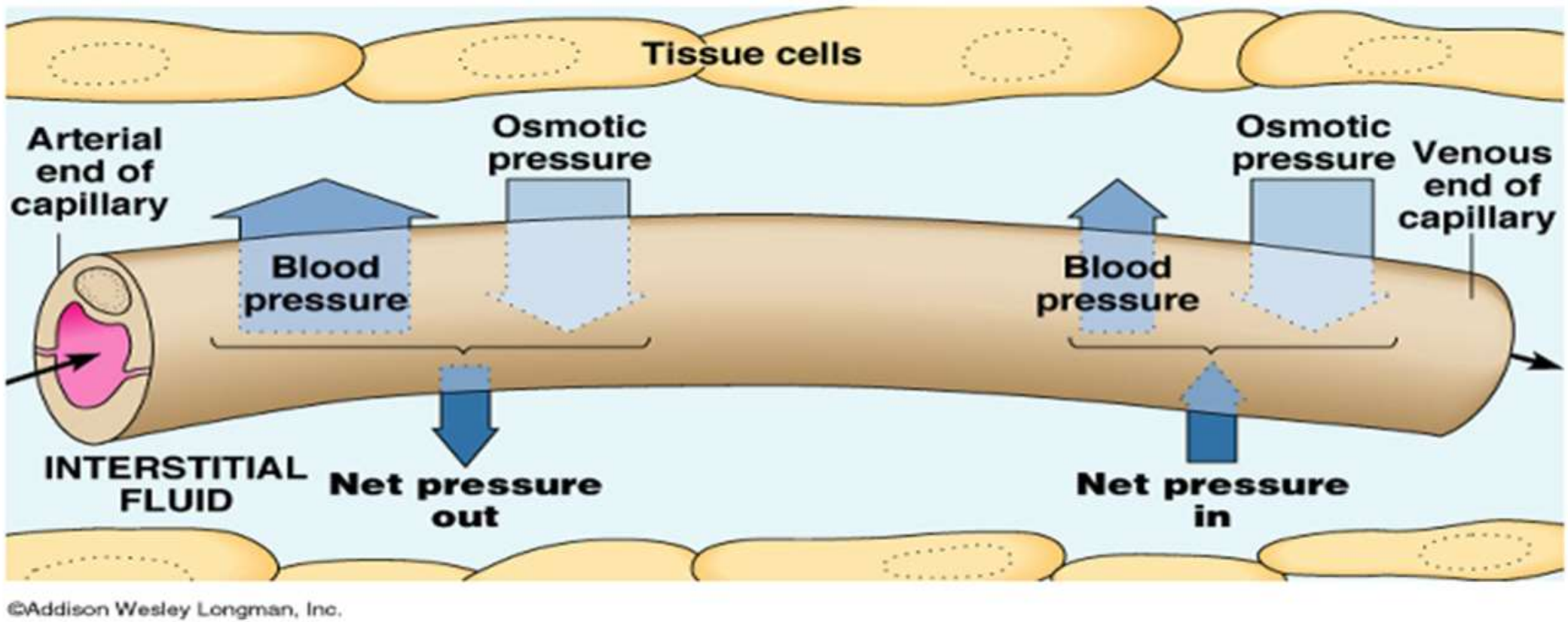
Only about 5 to 10% of capillaries have blood flowing through them. Only a few organs (brain and heart) always carry full load of blood.

Blood flow to different organs is controlled by *precapillary sphincters* of smooth muscle.

Control of Capillary Blood Flow by Precapillary Sphincters



Movement of Fluid Across Capillary Walls



99% of fluid that leaves capillary at arteriole end, reenters at venous end. Remaining 1% is returned by lymphatic vessels.

Types of Blood Vessels

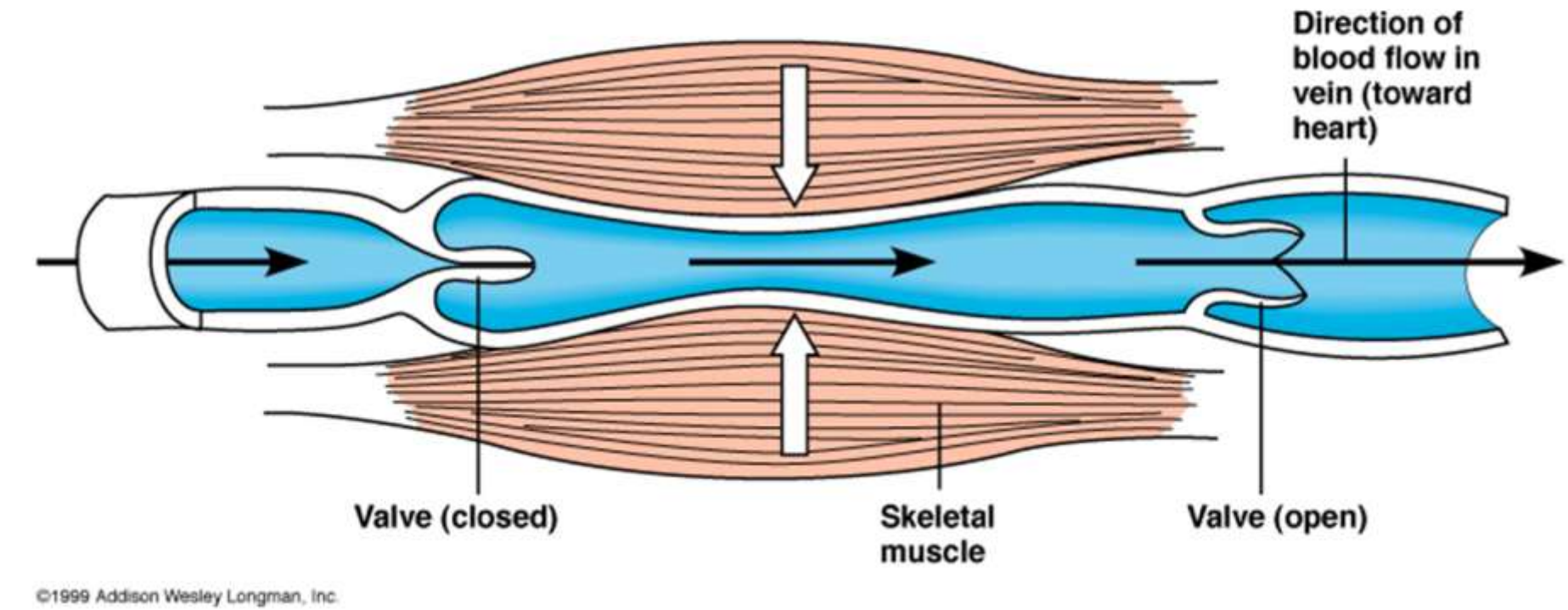
Veins and Venules:

- Collect blood from all tissues and organs and carry it back towards heart.
- Have low pressure and thin walls.
- Veins have small valves that prevent backflow of blood towards capillaries, especially when standing. If the valves cease to work properly, may result in:

  Varicose veins: Distended veins in thighs and legs.

  Hemorroids: Distended veins and inflammation of the rectal and anal areas.

Veins Contain Valves to Prevent Backflow of Blood




Thank You