Musculoskeletal System

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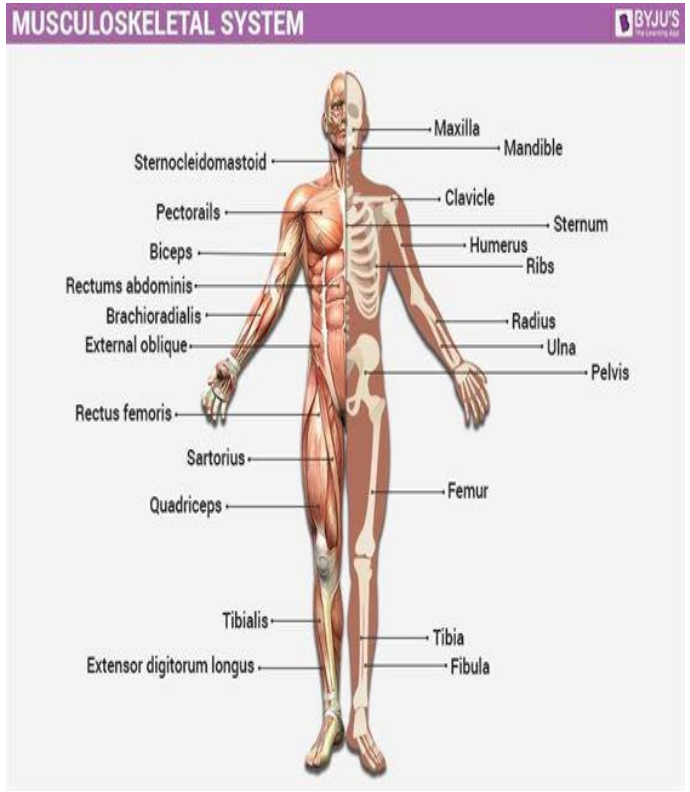
Musculoskeletal System

- Musculoskeletal system provides a mechanical support to our body and protects our internal organ
- It includes our bones, cartilage, skeletal muscles, joints, connective tissues(tendons and ligaments)
- It provides a framework for our muscles and other soft tissues.
- They support our body's weight
- Maintain our posture and help us to move.



Topics on discussion

- Bone
- Joint
- Suture
- Cartilage
- Frontanelle
- Muscle
- Tendon
- Fascia

Bones

Bone-Are specialized connective tissue composed of calcified extracellular materials, the bone matrix and three major cells types

1. Osteocytes
2. Osteoblasts
3. Osteoclasts

1.Osteoblast:

- Immature cells
- are the cells required for bone synthesis and mineralization, during the initial formation of bone
- play a vital role in bone development

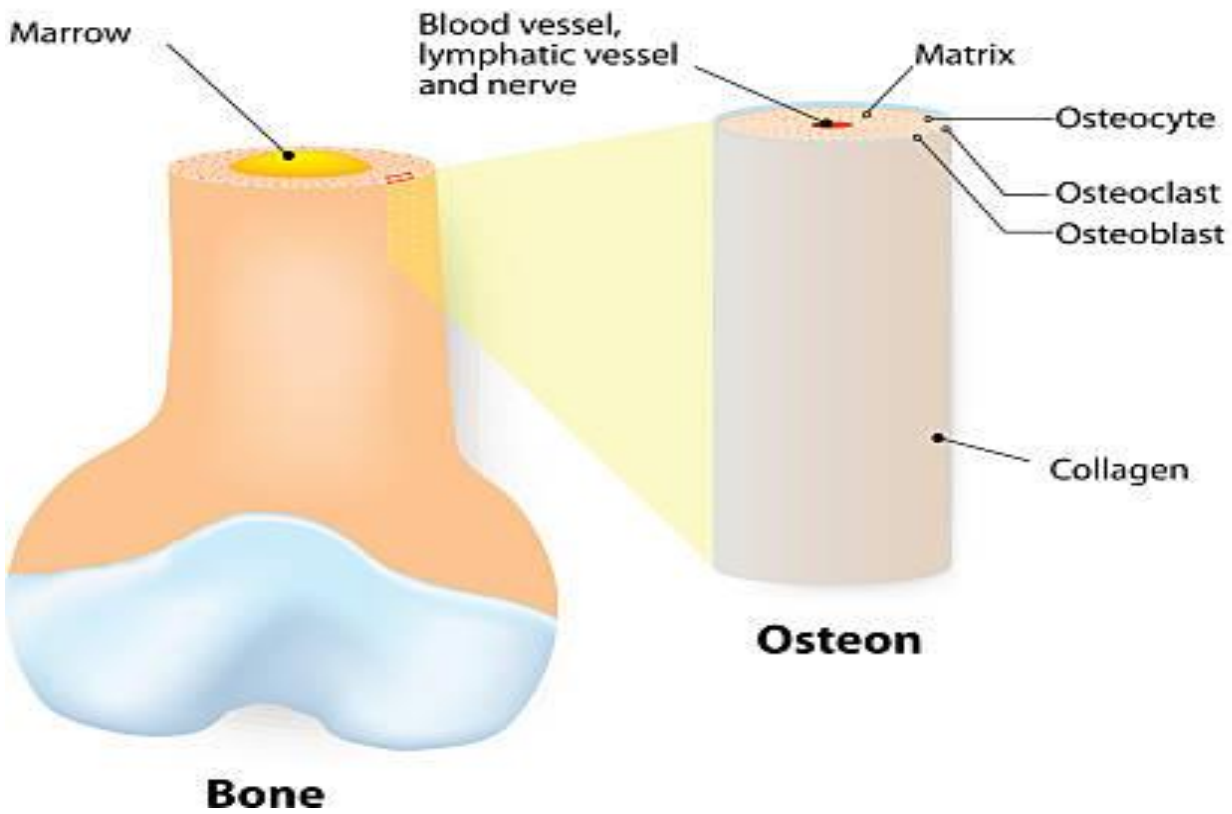
2.Osteocytes:

- Are the cells inside the bone.
- Derived from osteoblast.
- Osteocytes play a vital role in bone maintenance.

3.Osteoclast:

- Help in resorption of bone.
- Is large cell with multiple nuclei, posses eosinophilic cytoplasm
- Break down of bone tissue

INTERNAL STRUCTURE OF A BONE



Osteoblast

synthesize bone

Osteocyte

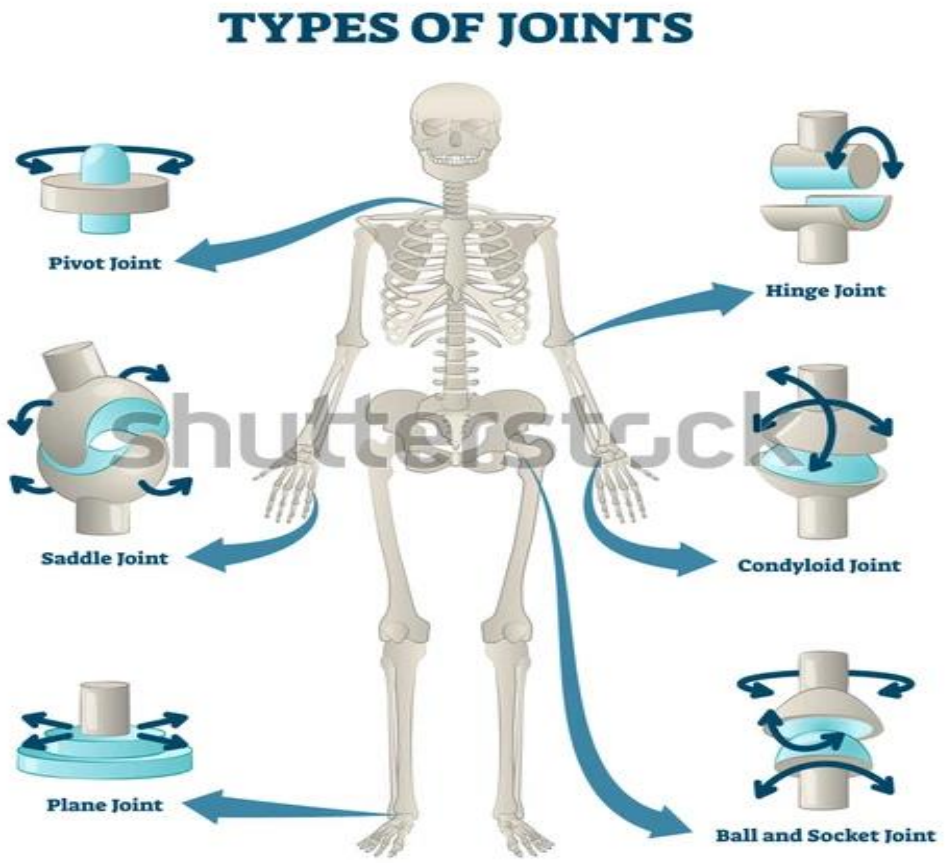
are formed from osteoblasts

Osteoclast

breaks down bone tissue

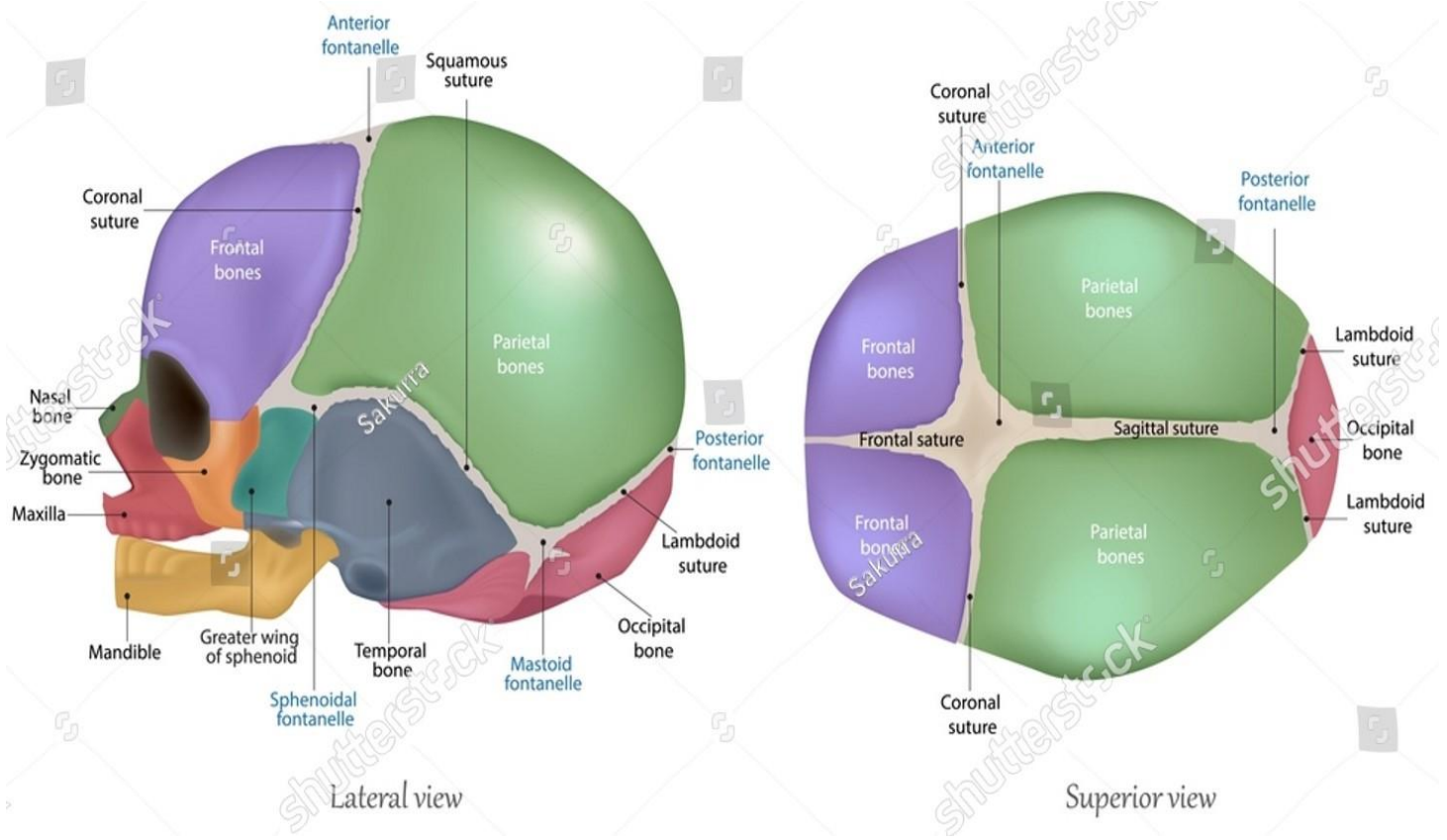
Joints

- Joints are the areas where two or more bones meet.
- Joints are meant for movements



Suture

- A line of junction or the joint between two articulating bones, especially of the skull



Cartilage

- Specialized connective tissue that protects our joints and bones
- It reduces the friction and prevents them from rubbing together

Features

- Avascular
- Non nervous

Perichondrium

- it is a connective tissue membrane which surrounds most cartilage.
- It has

(a) An outer fibrous layer, is composed mostly of fibroblasts and collagen fibers

(b)A inner cellular or chondrogenic layer, is composed of chondroblast and chondrogenic cell

Types of Cartilage

Hyaline Cartilage

- Presence of perichondrium
- Undergoes calcification
- Cell types- Chondroblasts, chondrocytes

Distribution

Tracheo-bronchial cartilage, costal cartilage of rib and nasal cartilage, most of the laryngeal cartilage Thoracolumbar cartilage

Elastic Cartilage

- Presence of perichondrium
- Undergoes calcification- No
- Cell types- Chondroblasts, chondrocytes
- Distribution

Pinna of external ear, epiglottis, auditory tube, some laryngeal cartilage,corniculate, cuneiform

Fibroblastic Cartilage

- Perichondrium- Absent
- Undergoes calcification-Yes (during bone repair)
- Cell types- Chondrocytes , fibroblast
- **Distribution** e.g Intervertebral discs and pubic symphysis, articular discs of temporo-mandibular, sternoclavicular joint , menisci of the knee joint)

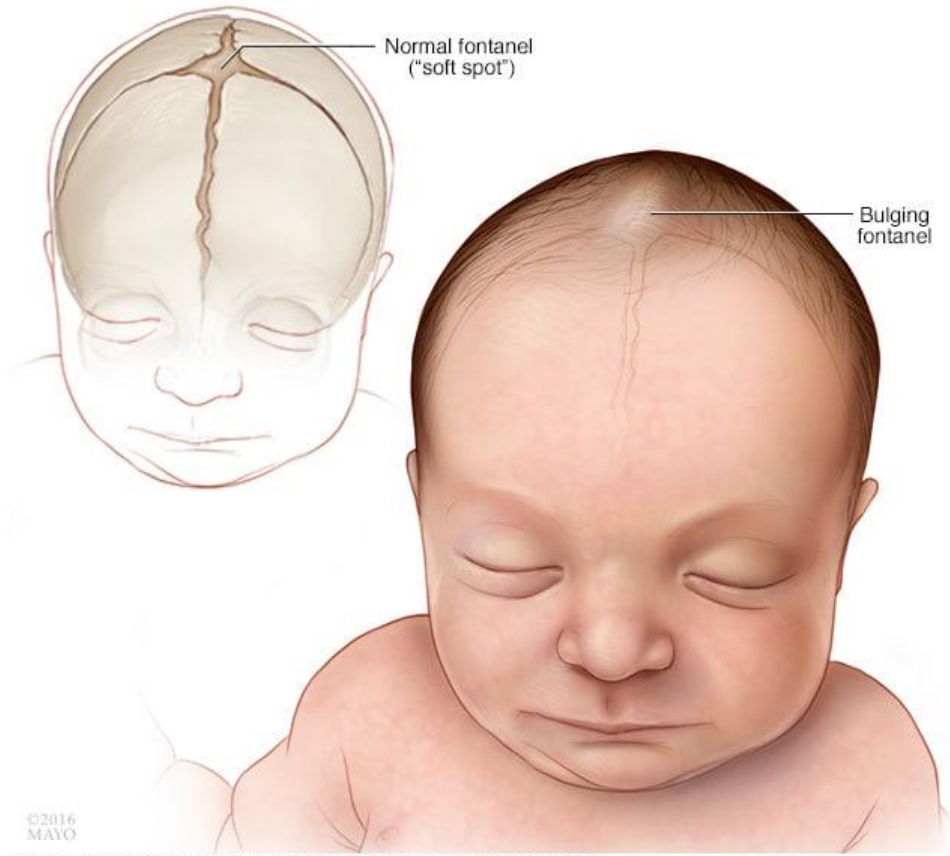
Frontanelles

- one of the most prominent anatomical features of the newborn's skull
- Fontanelles are the soft spots on an infant's head where the bony plates that make up the skull have not yet come together.
- It is normal for infants to have these soft spots, which can be seen and felt on the top and back of the head.

- There are 2 fontanelles (the space between the bones of an infant's skull where the sutures intersect) that are covered by tough membranes that protect the underlying soft tissues and brain.

  The fontanelles includes:

- **Anterior fontanelle (also called soft spot).** This is the junction where the 2 frontal and 2 parietal bones meet. The anterior fontanelle remains soft until about 18 months to 2 years of age.
- **Posterior fontanelle.** This is the junction of the 2 parietal bones and the occipital bone. The posterior fontanelle usually closes first, before the anterior fontanelle, during the first several months of an infant's life.



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Muscle

- Is largest soft tissues of the musculoskeletal system.
- Muscle is derived from the Latin word “musculus” meaning “little mouse”.
- Its contractile tissue which brings about movement.
- Muscle compromises 40% to 50% of body weight
- There are more than 600 muscles in the human body

Properties of muscle

- Excitability- Ability to response the stimulus
- Contractibility-Ability of muscle cells to forcefully shorten
- Extensibility- Ability to stretched
- Elasitcity – Ability to recoils

Function: 1) movement

2) maintain posture and body position

3) joint stability

4) maintain the body temperature

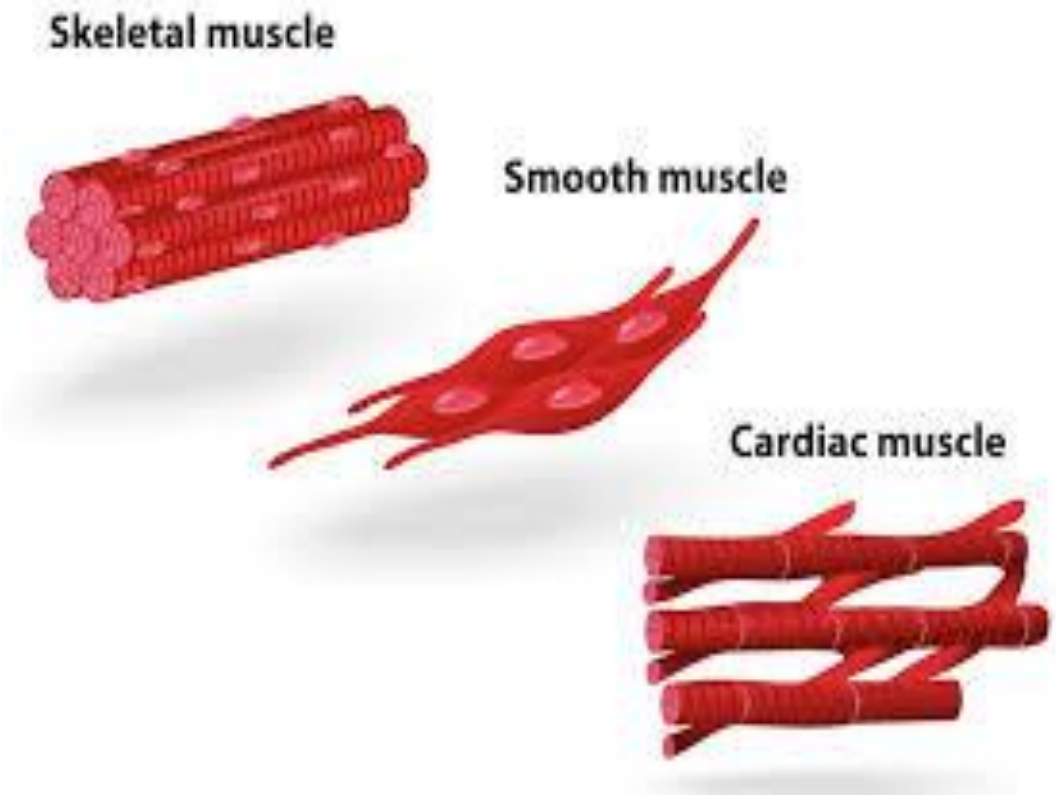
Types of Muscles

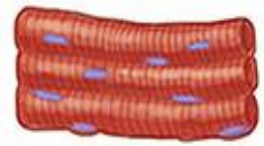
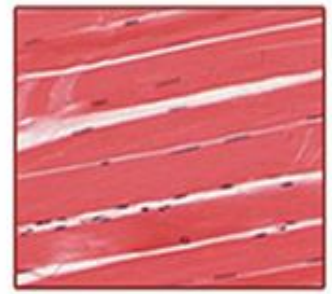
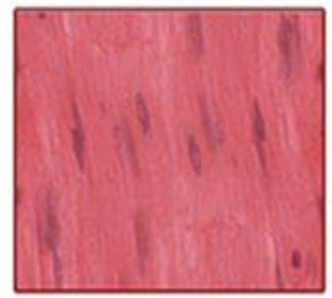
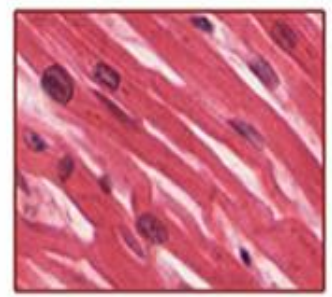
There are 3 types of muscles

1 Skeletal muscle

2. Smooth muscle

3. Cardiac muscle



	Main features	Location	Type of cells	Histology
Skeletal muscle	- Fibers : striated, tubular and multi nucleated - Voluntary - Usually attached to skeleton			
Smooth muscle	- Fibers : non-striated, spindle-shaped, and uninucleated. - Involuntary - Usually covering wall of internal organs.			
Cardiac muscle	- Fibers : striated, branched and uninucleated. - Involuntary - Only covering walls of the heart.			

Tendon

- A tendon is a fibrous connective tissue that attaches muscle to bone
- Helps to move the bone or structure.

Achilles tendon

- Origin from gastrocnemius and soleus muscle
- Insertion on calcaneal tuberosity

Fascia

- Fascia is a layer
- is made up of sheets of connective tissue that found below the skin which surround muscles, groups of muscles, blood vessels, and nerves
- Avascular structure
- e.g thoracolumbar fascia, fascia lata and plantar fascia

Types

- Superficial fascia-which is mostly associated with the skin
- Visceral fascia-which is mostly associated with the internal organs
- Deep fascia-which is mostly associated with the muscles, bones, nerves and blood vessels;

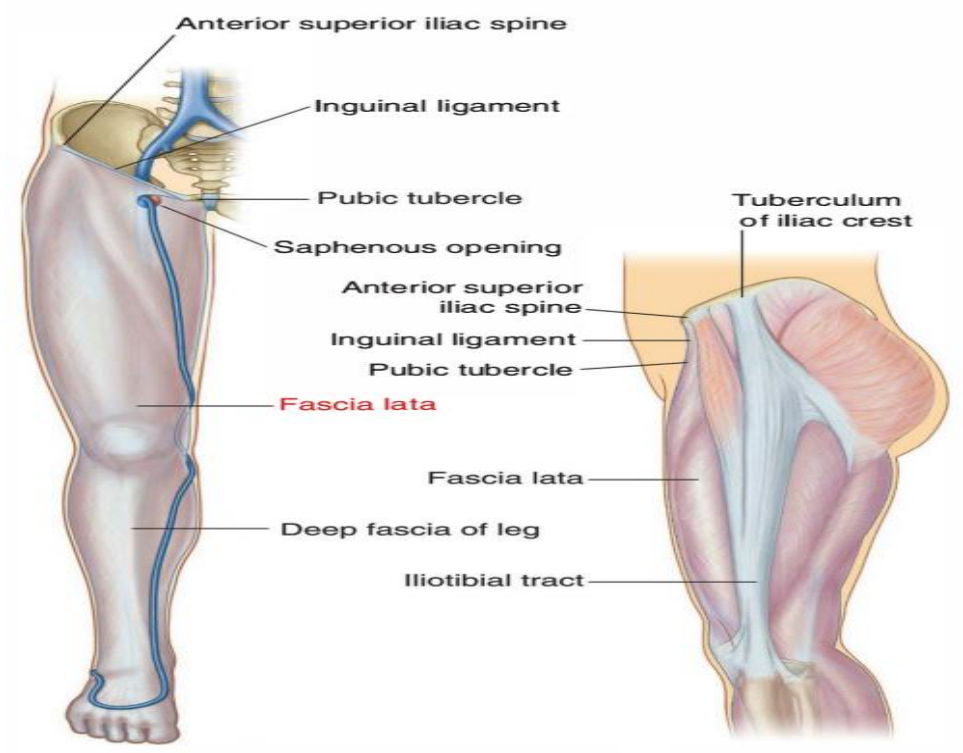


Fig. Fascia lata

Thank You