

## READING MATERIAL

### POINTS TO REMEMBER:

**Fascicle:** Bundles of muscles.

**Fascia:** Collagenous connective tissue layer that surrounds muscle bundles.

**Floating ribs:** The ribs that remain free anteriorly.

**False ribs:** The ribs that joins the sternum through the 7<sup>th</sup> rib.

**Myoglobin:** A red coloured pigment present in sarcoplasm of muscle.

**Sarcomere:** A portion of myofibril between two successive 'Z' lines.

**Sarcolemma:** The plasma membrane of a muscle.

**Suture:** Immovable joints between skull bones.

**Synovial joint:** Freely movable joints between limb bones.

**Patella:** : A cup shaped cover the knee ventrally.

**LMM :** Light meromyosin

**HMM :** Heavy meromyosin

### Types of Movement

**1. Amoeboid movement:** It is affected by pseudopodia formed by the streaming of protoplasm (as in amoeba)

**2. Ciliary movement:** These movement occurs in internal organs which are lined by ciliary epithelium.

**3. Muscular Movement:** This movement involve the muscle fibres, which have the ability to contract and relax.

## Properties of Muscle

- (i) Excitability
- (ii) Contractility
- (iii) Extensibility
- (iv) Elasticity

## Types of Muscles

**(a) Skeletal muscles or striated muscles:** - These muscles involve in locomotion and change of body postures. These are also known as voluntary muscles.

**(b) Visceral muscles or smooth muscles:** - These are located in inner wall of hollow visceral organ, smooth in appearance and their activity are not under control of nervous system.

**(c) Cardiac muscles:** - These are muscles of heart, involuntary in nature, striated and branched, these are uninucleated.

## Structure of myofibril

- Each myofibril consist of alternate dark and light band.
- **Dark band** :- contain myosin protein and is called A-band or Anisotropic band.
- **Light band** : - Contain actin protein and is called I Band or Isotropic band.
- I Band is bisected by an elastic fiber called 'Z' line. Actin filament (thin filament) are firmly attached to the 'Z' lines.
- Myosin filament (thick filament) in the 'A' Band are also held together in the middle of 'I' Band by thin fibrous membrane called 'M' line.
- The portion between two successive 'Z' lines is considered as functional unit of contraction and is called a sarcomere.

**Mechanism of Muscle contraction:** Sliding filament theory.

The contraction of muscle fiber takes place by the sliding of actin (thin filament) on myosin ( thick filament).

- Muscle contraction is initiated by a signal sent by the CNS via a motor neuron.
- Impulse from motor nerve stimulates a muscle fiber at neuromuscular junctions.
- Neurotransmitter releases here which generates an action potential in

sarcolemma.

- These causes release of  $\text{Ca}^{2+}$  into sarcoplasm.
- These  $\text{Ca}^{2+}$  binds with troponin, thereby remove masking of active site.
- Myosin head binds to exposed active site on actin to form a cross bridge, utilizing energy from ATP hydrolysis.
- This pulls the actin filament towards the center of 'A' band. 'Z' lines also pulled inward thereby causing a shortening of sarcomere i.e. contraction. 'I' band get reduced, whereas the 'A' band retain the length.
- During relaxation, the cross bridge between the actin and myosin break.  $\text{Ca}^{2+}$  pumped back to sarcoplasmic reticulum.
- Actin filament slide out of 'A' band and length of 'I' band increases.
- This returns the muscle to its original state.





