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 7th 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 Ca²⁺ into sarcoplasm.

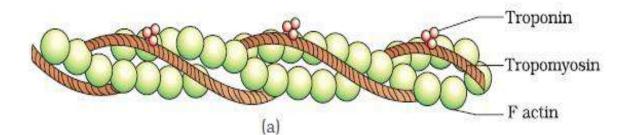
• These Ca²⁺ binds with troponin, thereby remove masking of active site.

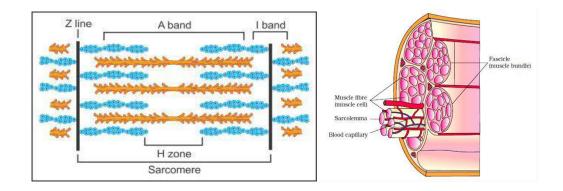
• Myosin head binds to exposed active site on actin to form a cross bridge, utilizing energy from ATP hydrolysis.

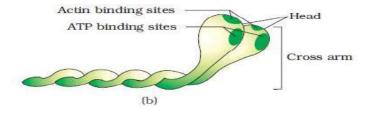
• This pulls the actin filament towards the center of 'A' band. 'Z' lines also pulled inward thereby causing a shortening of sarcomere i.e. contraction. 'I' band get reduced, whereas the 'A' band retain the length.

• During relaxation, the cross bridge between the actin and myosin break. Ca²⁺ 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.









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