Chapter-20

LOCOMOTION AND MOVEMENT

POINTS TO REMEMBER

Arthritis : an enflamm atory joint diease characteresed by enflammation of joints.

Coccyx : tail bone formed by fusion of four coccygeal vertebrae in man.

Dicondylic Skill : A Skull with two occipital condyles.

Endo Skeleton : A skeleton present outside the body.

Fascicule : Bundles of muscles febers held together by connective tissue.

Fascia : Collagenous connective tissue layer that surrounds muscle bundles.

Floating ribs : The ribs that remain free anteriorly.

False ribs : The ribs whose sternal part are join to sternal part of a true rib.

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

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

Sarcocolema : The plasma membrane of a muscle.

Gout : Inflammation of joints due to accumulation of uric acid crystal.

Suture : immovable joints between skull bones.

Synovial joints : Freely movable joints between limb bones.

Patella : A sesamoid bone acting as kneecap

Intervertebral disc : Fibro carti lagenous pad present between the vertebrae and act as shock absorbers.

L.M.M. : Light meromyosin

HMM : Heavy meromysoin

Types of Movement :

1. Amoeboid movement : These movement takes place in phagocytes where leucocytes and macrophages migrate through tissue. It is affected by pseudepodia formed by the streaming of protoplasm (as in amocba)

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

3. Muscular Movement : This movement involve the muscle fibers, which have the ability to contract and relex.

Properties of Muscle : (i) Excitability (ii) Contractility (iii) Extensibility (iv) Elasticity

Types of Muscles :

(a) Skeletal muscles or striated muscles - These involved in locomotion and change of body postures. Thes 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 - The muscles of heart, involuntary in nature, steriated and branched, These are uni nucleated.

Structure of myofibril :

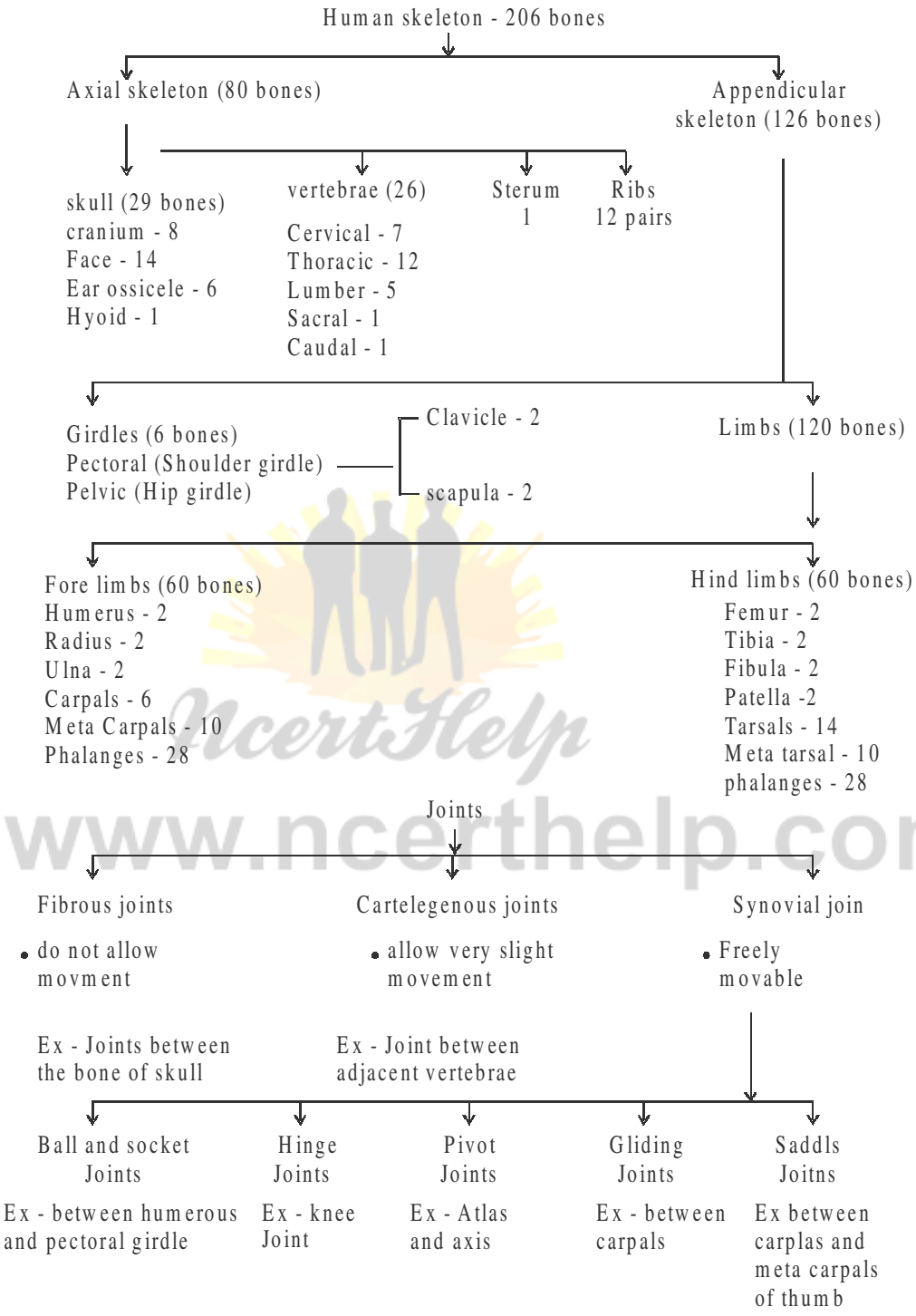
- Each myofibril consist of alternate dark and light band.
- Dark band - contain myosim protien and is called A-band or Anisotroic band.
- Light band - Contain actin protien and is called I Band or Isotropic band.

- I Band is bisected by an elastic fiber called 'Z' line. Actin filament (thin flament) 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.

Mechenism of Muscle contraction : Sliding filament theory.

The contraction of musle fiber takes place by the sliding of actin (thin flament) 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 neuro muscular junctions.
- Neurotransmitter releases here which generates an action potential in sarcolema.
- These causes release of Ca^{++} into sarcoplasm. These Ca^{++} binds with troponin, thereby remove masking of active site.
- Myosin head binds to exposed active site on actin to form a cross bridge, utilising energy from ATP hydrolysis.
- This pulls the acin filament towards the centre of 'A' band.
- 'Z' lines also pulled inward thereby causing a shortning of sarcomere i.e. contraction.
- 'I' band get reduced, whereas the 'A' band retain the length.
- During relexation, the cross bridge between the actin and myosin break. Ca^{++} pumped back to sarcoplasmic cesternae. Actin filament slide out of 'A' band and length of 'I' band increases. This returns the muscle to its original state.



QUESTIONS

Very Short Answer Questions (1 mark each)

1. How many bones are present in each limb?
2. Why do skeletal muscle show steriation.
3. Name last two pairs of ribs.
4. Write the name of chemical that causes fatigue in the museles.
6. What lubricate the freely movable joints at the shoulder.
7. Name of longest bone of human body.
8. Give the first vertebra.
9. Define a sarcomere.
10. Name the cup shaped bone that constitues the knee cap.

Short Answer Questions-II (2 marks each)

11. Wrtie any two difference between cardiac muscle and skeletal muscle.
12. Distinguish between red fibre and white fiber.
13. Name the two types of girdles found in human body and write their role.
14. State the role of calcium ions and ATP in muscle contraction.
15. Name the bones of fore limb (hand) of human body. Give their number in each limb.

Short Answer Questions-I (3 marks each)

16. What makes the synovial joints fredy movable? List any four types of synovial joints.
17. Name the category of bones forming the ribcage. How are these articulated to each other to form the cage ?
18. How are actin and myosin filament arrenged in a muscle fibre?
19. Mention the factor which is responsible for the following :

    (i) Tetany (ii) Gout (iii) osteoporosis

Long Answer Questions (5 marks each)

20. Explain the important steps of sliding filament theory of muscle contraction.

ANSWERS

Very Short Answers (1 mark)

1. 30 bones.
2. Due to distribution pattern of actin and myosin protien.
3. Floatign ribs.
4. Actin and myosin
5. Lactic acid
6. Synovial flivd
7. Femur
8. Atlas
9. A portion of myofibril between two successive 'Z' lines.
10. Knee cap

Short Answers -II (2 marks)

11. Refer NCERT book Page 303.
12. Refer NCERT book Page 308.
13. Refer NCERT book Page 311.
14. Refer NCERT book Page 307 and 308.
11. Refer NCERT book Page 311.

Short Answers -I (3 marks)

16. Refer NCERT book Page 312.
17. Refer NCERT book Page 310.
18. Refer NCERT book Page 305.
19. Refer NCERT book Page 312.

Long Answer (5 marks)

20. Refer NCERT book Page 307.