FREE NOTES · NCERT + NEET LEVEL

Locomotion & Movement

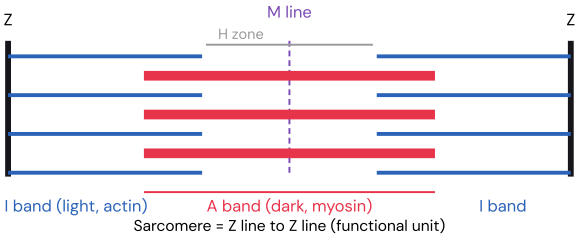
Movement ke types, skeletal muscle ki banawat, contractile proteins, sliding filament theory, skeletal system, joints aur muscles/haddiyon ki bimariyan.

01 Movement ke types
02 Skeletal muscle ki banawat
03 Contractile proteins
04 Muscle contraction ka mechanism
05 Skeletal system
06 Joints aur bimariyan
07 Extra + tricks
08 Important Q&A
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01 Movement ke types

- **Amoeboid**: protoplasm bahne se pseudopodia (macrophages, leucocytes); microfilaments.
- **Ciliary**: trachea (dhool hataana), fallopian tube (ovum le jaana).
- **Muscular**: haath-pair, jabda, jeebh. Locomotion = jagah badalne wali movement.
- Muscle mesoderm se; gun: excitability, contractility, extensibility, elasticity.
- Muscle types: skeletal (striated, voluntary), visceral (smooth, involuntary), cardiac (striated, involuntary).

02 Skeletal muscle ki banawat



Ek sarcomere

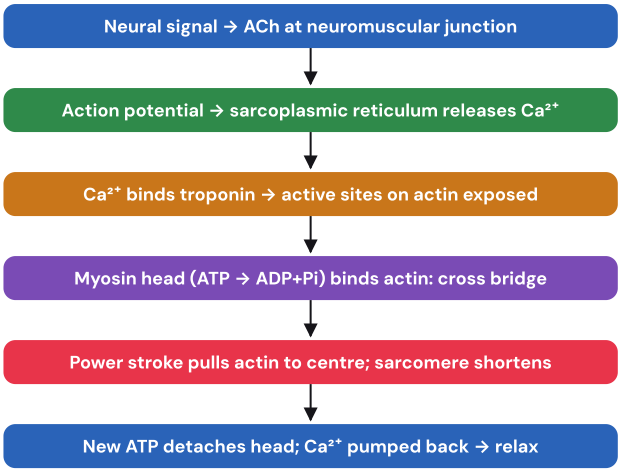
- Muscle → fascicles (bundles, fascia se dhake) → muscle fibres (syncytium; sarcolemma, sarcoplasm, kai nuclei, sarcoplasmic reticulum me Ca^{2+}) → myofibrils.
- Myofibrils me baari-baari gehre **A bands** (anisotropic, myosin) aur halke **I bands** (isotropic, actin). Z line I band ko kaatti; A band ke beech M line; H zone = A band ka beech wala hissa jahan thin filaments nahi.

03 Contractile proteins

Filament	Kisse bana	Details
Thin (actin)	2 F-actin (G-actin ke polymer) lipte hue + tropomyosin + troponin	Aaraam me troponin actin ki binding sites dhakta
Thick (myosin)	Meromyosins ka polymer	Har meromyosin: heavy meromyosin (HMM: gol head + chhoti arm, cross arm) aur light meromyosin (LMM: poonch). Head ATPase hai, ATP aur actin ki binding sites

04 Muscle contraction ka mechanism

- **Sliding filament theory**: thin filaments thick filaments pe sarakte.
- Motor neuron + uske muscle fibres = **motor unit**.
- Contraction me: I band chhota, A band utna hi, H zone gayab, Z lines paas.
- Baar-baar activation ⇒ lactic acid jamta (glycogen ka anaerobic tootna) ⇒ **fatigue**.
- **Red fibres**: zyada myoglobin, mitochondria, aerobic. **White fibres**: kam myoglobin, zyada sarcoplasmic reticulum, anaerobic.



Contraction ke steps

05 Skeletal system

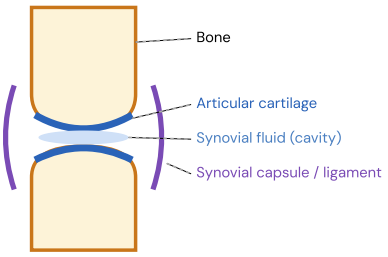
Part	Bones
Total	**206** bones in adult human; axial 80 + appendicular 126
Skull (22)	Cranium 8, face 14; hyoid (U-shaped) + 3 ear ossicles each side (malleus, incus, stapes); two occipital condyles (dicondylic)
Vertebral column (26)	Cervical 7, thoracic 12, lumbar 5, sacral 1 (fused), coccygeal 1 (fused). First vertebra = atlas
Sternum + ribs	Flat sternum; 12 pairs ribs: true ribs 1–7 (attached to sternum by hyaline cartilage), false 8–10 (vertebrochondral), floating 11–12
Limbs (30 each)	Forelimb: humerus, radius, ulna, 8 carpals, 5 metacarpals, 14 phalanges. Hindlimb: femur (longest bone), tibia, fibula, 7 tarsals, 5 metatarsals, 14 phalanges, patella (knee cap)
Girdles	Pectoral: clavicle (collar bone) + scapula (with glenoid cavity, acromion). Pelvic: two coxal bones (ilium, ischium, pubis) with acetabulum; pubic symphysis

06 Joints aur bimariyan

- **Fibrous** (hilte nahi): skull sutures. **Cartilaginous** (thoda hilte): vertebrae ke beech. **Synovial** (khulke hilte, synovial fluid): ball and socket (humerus–pectoral girdle), hinge (ghutna), pivot (atlas–axis), gliding (carpals), saddle (angoothe ka carpal–metacarpal).
- **Myasthenia gravis**: autoimmune, neuromuscular junction, thakan, kamzori, paralysis. **Muscular dystrophy**: genetic, dheere-dheere kharab. **Tetany**: body fluid me Ca^{2+} kam se tez jhatke.
- **Arthritis**: joints me sujan. **Osteoporosis**: umar se, bone mass kam, fracture; kam oestrogen ek kaaran. **Gout**: joints me uric acid crystals.

07 Extra + tricks

Skull (22)	Haddiyan
Cranium (8)	Frontal 1, parietal 2, temporal 2, occipital 1, sphenoid 1, ethmoid 1
Chehra (14)	Nasal 2, maxilla 2, zygomatic 2, lacrimal 2, palatine 2, inferior nasal concha 2, vomer 1, mandible 1



Synovial joint

- Kaan ki haddiyan: malleus, incus, stapes (stapes = sabse chhoti). Hyoid: U-shape, munh ke neeche.
- **Gomphosis**: daanton ko jabde me fix karne wala fibrous joint.
- Carpals 8 (kalaai), tarsals 7 (takhna); har haath aur pair me 14 phalanges.
- Vertebrae ka trick: "**nashta 7 baje, lunch 12 baje, dinner 5 baje**" = 7 cervical, 12 thoracic, 5 lumbar.

08 Important Q&A

Q1. Contraction me A band, I band, H zone ka kya hota?

A band same; I band chhota; H zone patla/gayab; sarcomere chhota.

Q2. Contraction me Ca^{2+} ka role?

Ca^{2+} troponin se judta, actin ki sites khulti, myosin jud pata.

Q3. Ribs gino aur classify karo.

12 jode: 7 true, 3 false (vertebrochondral), 2 floating.

09 Common mistakes

- Kehna ki contraction me A band chhota hota.
- Ghutne ko ball and socket kehna (hinge hai).
- Adult me 33 vertebrae likhna (fusion ke baad 26).
- Tetany (kam Ca^{2+}) aur tetanus (bacterial) mix karna.

10 Practice (NEET style)

1. Muscle ki functional unit?
2. Sabse lambi haddi?
3. Atlas aur axis ka joint?
4. Actin sites dhakne wala protein?
5. Har limb me haddiyan?

ANSWERS

1) Sarcomere · 2) Femur · 3) Pivot · 4) Troponin · 5) 30

11 Quick revision: exam se 5 minute pehle

MUSCLE

- A band myosin, I band actin
- Sarcomere Z se Z
- Red fibres: myoglobin, aerobic

CONTRACTION

- Ca^{2+} + troponin
- Cross bridge, ATP
- I band aur H zone chhote

SKELETON

- 206 = 80 + 126
- Vertebrae 7-12-5-1-1
- Ribs 7 true, 3 false, 2 floating

JOINTS/DISORDERS

- Synovial types
- Myasthenia gravis autoimmune
- Gout: uric acid

Koi doubt? padhaiadda.netlify.app pe AI Doubt Solver se poocho, ya is chapter ka mock test do.