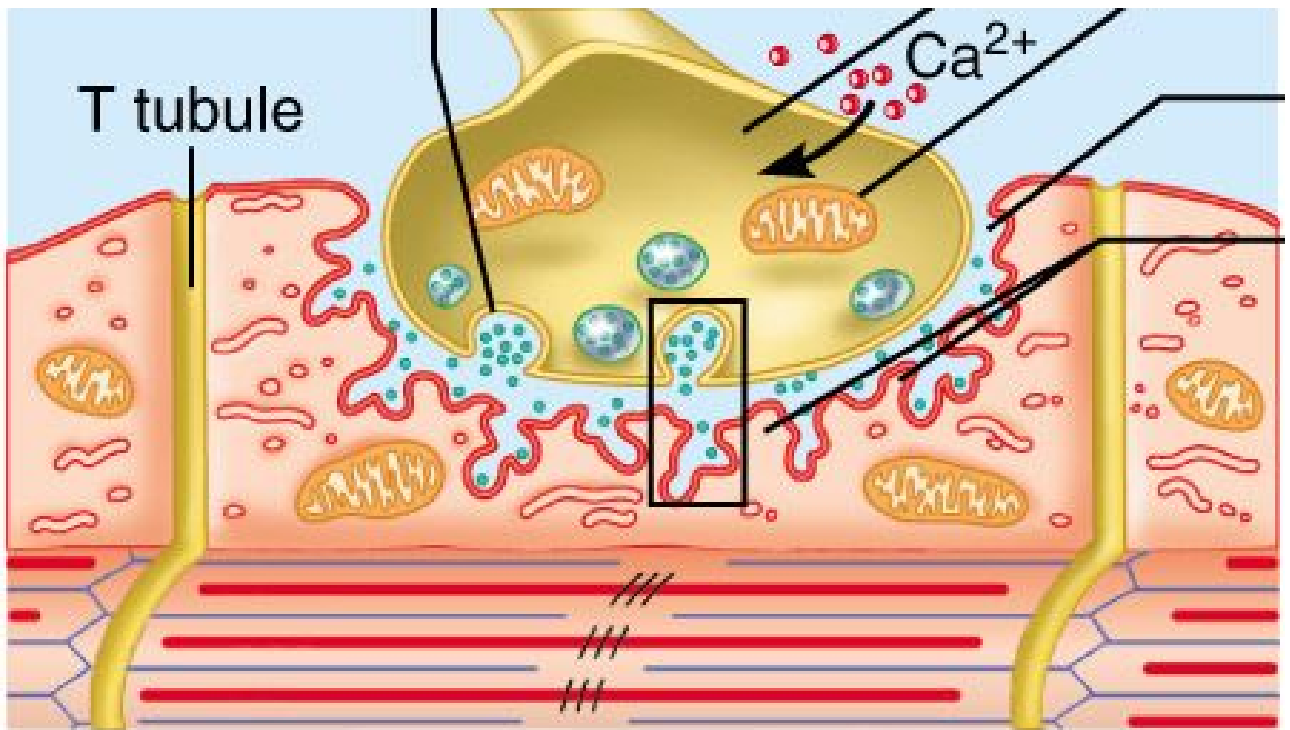


Muscles

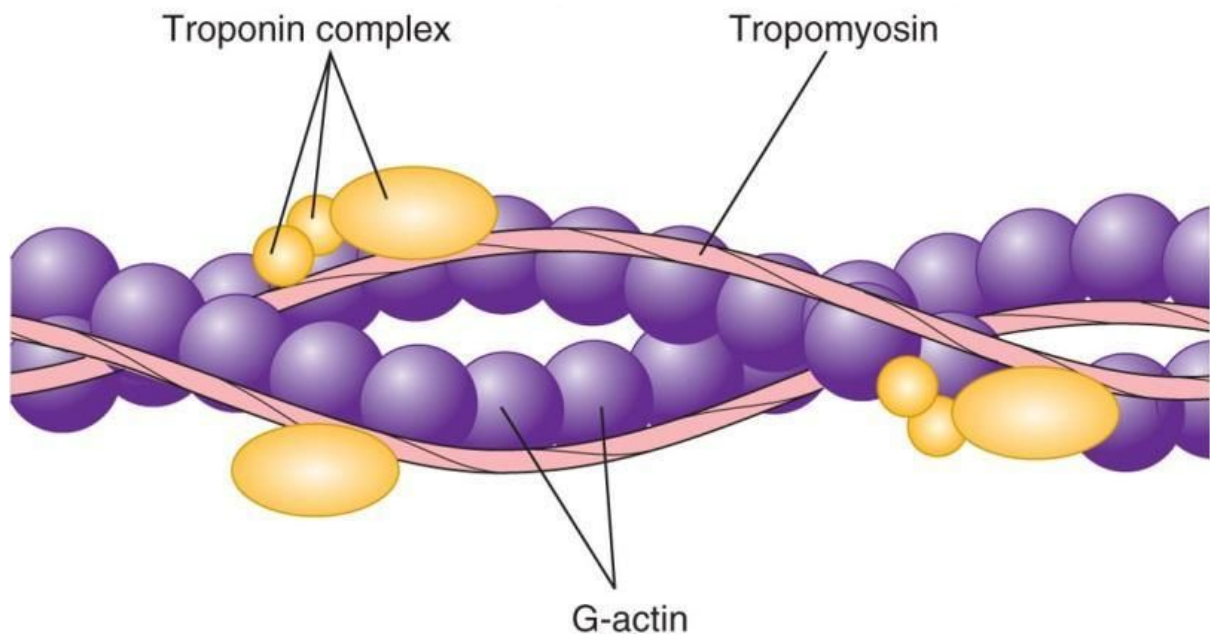
Neuromuscular junction (pg 370)



- Neurotransmitter diffuses deep into the muscle fibre using a system of tubules called the **T-tubules**
- Binds to Na⁺-channel proteins, which open, letting Na⁺ into the muscles
- Cytoplasm of the muscle (sacroplasm) contains ER called **Sarcoplasmic Reticulum** (SR) - stores Ca²⁺ ions
- Sacroplasm is rich in mitochondria

Muscle proteins (pg 368 & 372)

Actin

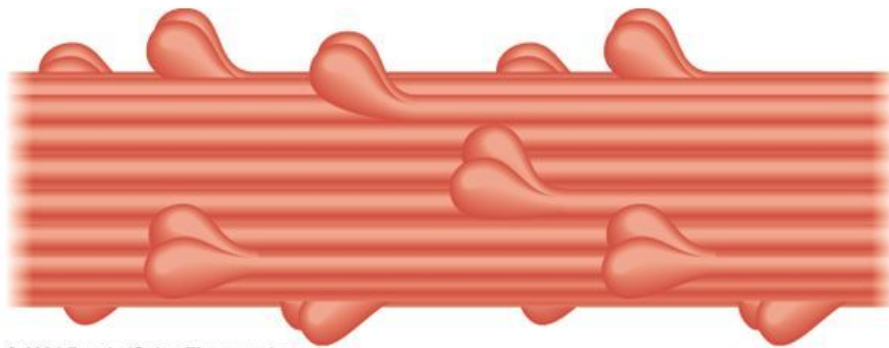


- **Actin** monomers, joined to form filaments
- Actin filaments stabilised by **Tropomyosin** (protein). In the resting state, tropomyosin **prevents** actin-myosin binding
- **Troponin** can bind to Ca^{2+} , and is also bound to tropomyosin

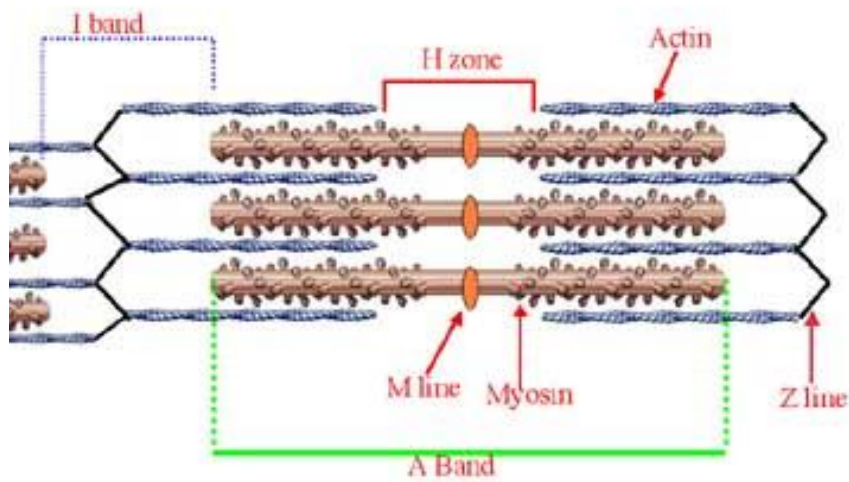
Myosin



Filamentous tail and two bulbous heads, arranged in the muscle as:



Sarcomere - basic contractile unit of a muscle fibre

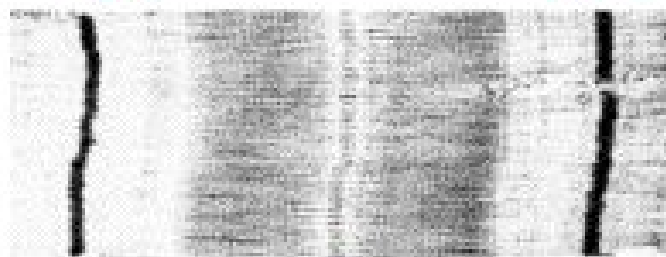


Z-line: two ends of the sarcomere

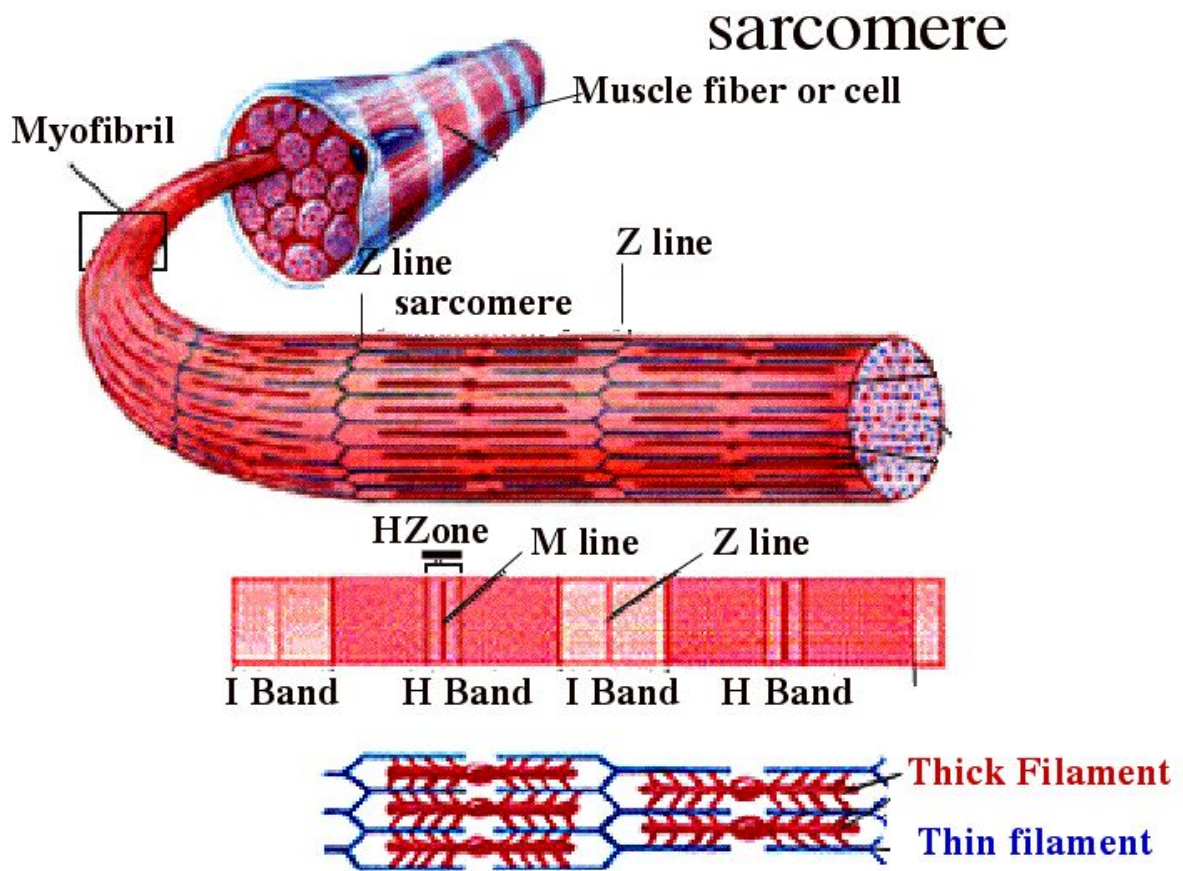
A-band: length of the myosin

H-zone: Myosin only (thick filament)

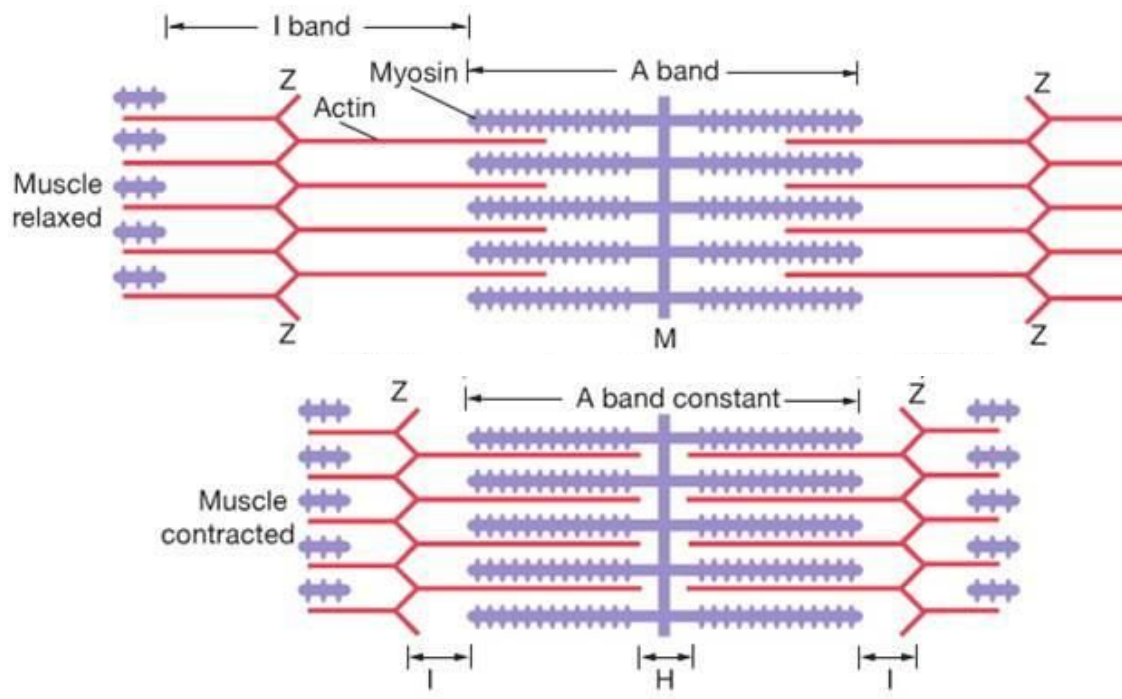
I-band: actin only (thin filament)



Sarcomere within the muscle fibre

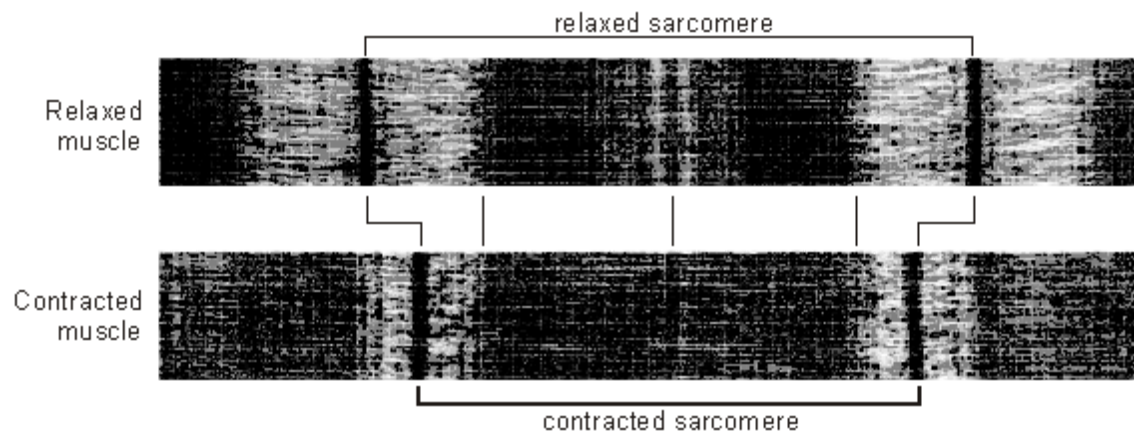


Sarcomere - relaxed and contracted

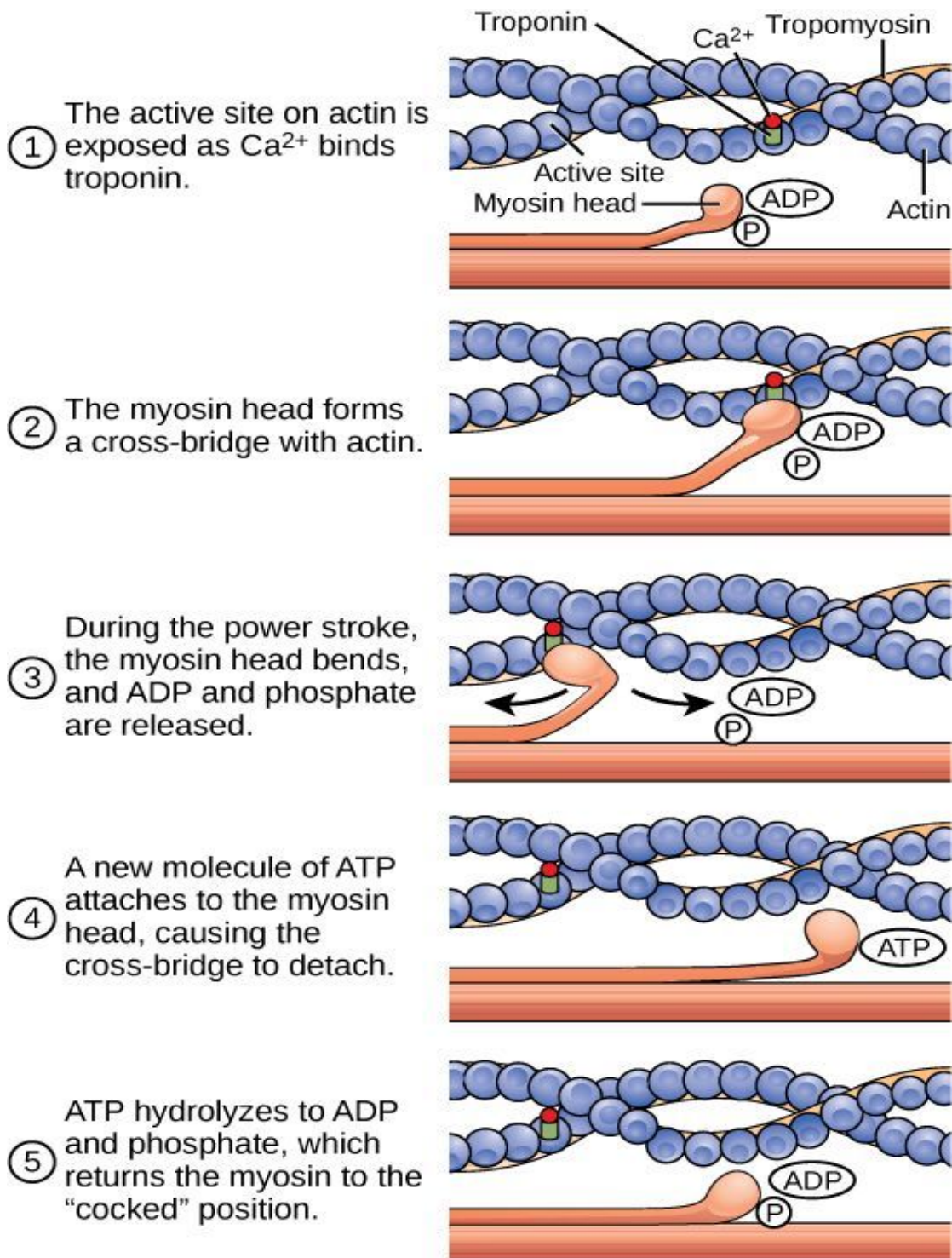


Actin moves over myosin, towards the centre of the sarcomere

- H-zone and I-band both shorten
- Z-lines come close together
- A-band remains unchanged



Sliding filament mechanism for muscle contraction (pg 374)



Slow twitch vs Fast twitch muscle fibres (page 369)

Slow twitch

- used for endurance activity
- uses aerobic respiration, does not fatigue easily
- large number of mitochondria and extensive network of capillaries
- contains myoglobin, a bright-red molecule, that can store oxygen in muscles

Fast twitch

- used for sprinting and explosive activity
- uses anaerobic respiration, and phosphocreatine



- large(r) stores of glycogen
- faster **myosin-ATPase** than slow twitch fibres
- more myosin filaments
- no myoglobin, fewer capillaries and mitochondria

Videos

<https://www.youtube.com/watch?v=BVcgO4p88AA>

https://www.youtube.com/watch?v=7O_ZHyPeIIA