

Homework for tomorrow:

Order sequence, copy diagram (Weebly), read notes

How muscles contract

The shortening of myofibrils, according to **sliding filament theory**, causes muscle contraction. The sequence of myofibril shortening is as follows:

- An action potential arrives via a motor neurone at the synapse (neuro-muscular junction) with the cell surface membrane (sarcolemma) of the muscle fibre.
- Action potentials are propagated through the T-tubules and along the sarcoplasmic reticulum, causing calcium ions (Ca^{2+}), which are stored in the sarcoplasmic reticulum, to be released into the cytoplasm (sarcolemma).
- Calcium ions cause ancillary proteins, which normally cover binding sites on the actin filaments, to be displaced and so uncover the binding sites.
- Heads of the myosin molecules next to the uncovered binding sites now attach to the actin filaments, forming acto-myosin 'bridges' between them.
- The myosin heads rotate or 'rock' back, pulling the thin actin filaments over the thick myosin filaments.
- ATP now binds with the myosin heads and the energy released from its hydrolysis (by ATPase) causes the myosin heads to detach from the actin filaments.
- The detached myosin heads regain the original position, and attach to another exposed binding site on the actin filament, so that the cycle of attachment, rotation and detachment is repeated.
- This process continues as long as action potentials are propagated through the muscle fibre.

Copy this!

Figure 22 illustrates how the sliding of actin filaments over myosin filaments causes the myofibril, and the muscle fibre, to shorten.

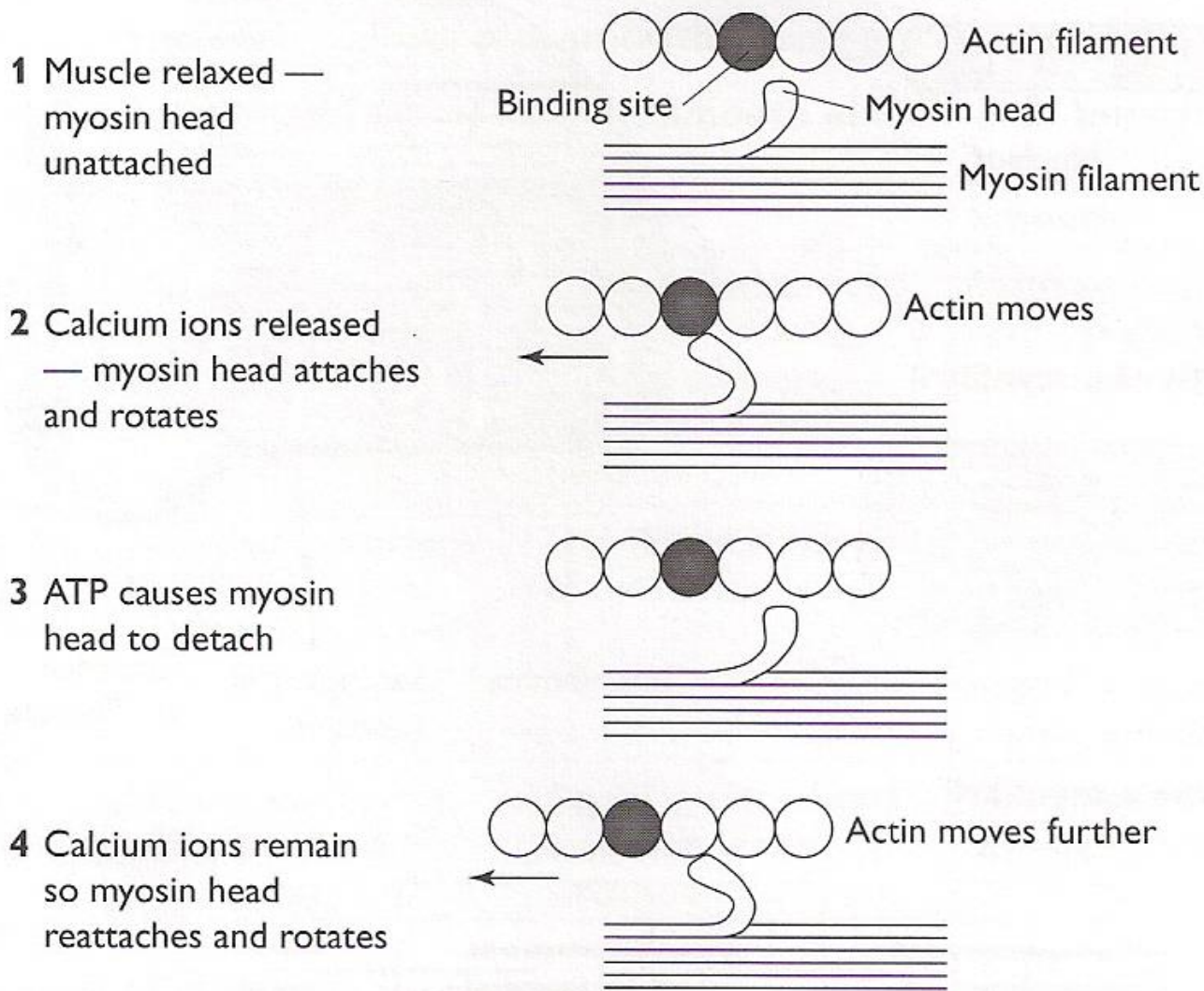


Figure 22 *Movement of the myosin head causes the actin filament to slide over the myosin filament*