Muscle-bone movement and muscle fatigue

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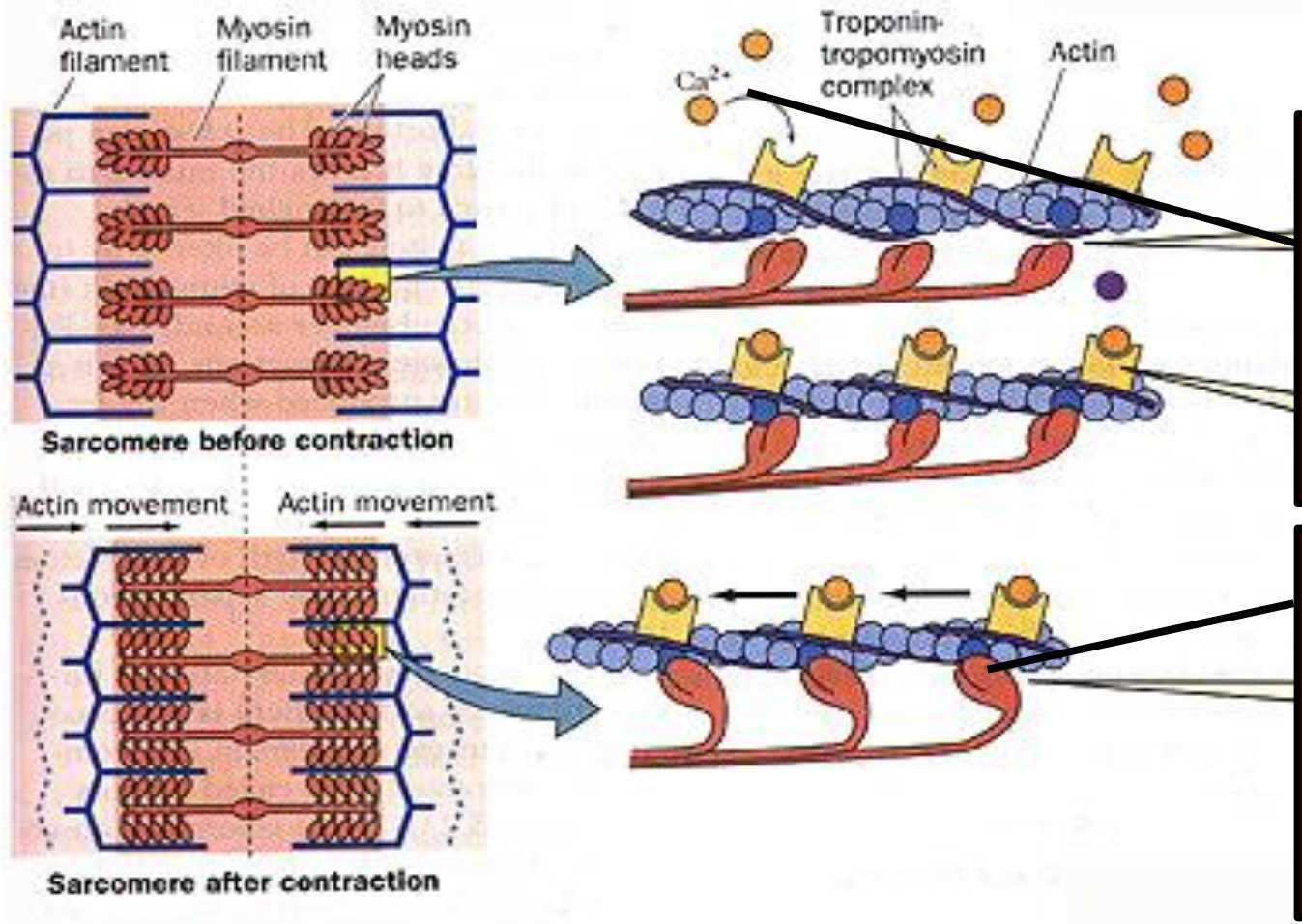
Actin-miyosin interactions = Muscle contraction



Calcium is needed for miyosin heads (thick filaments) to attach to actin filaments.

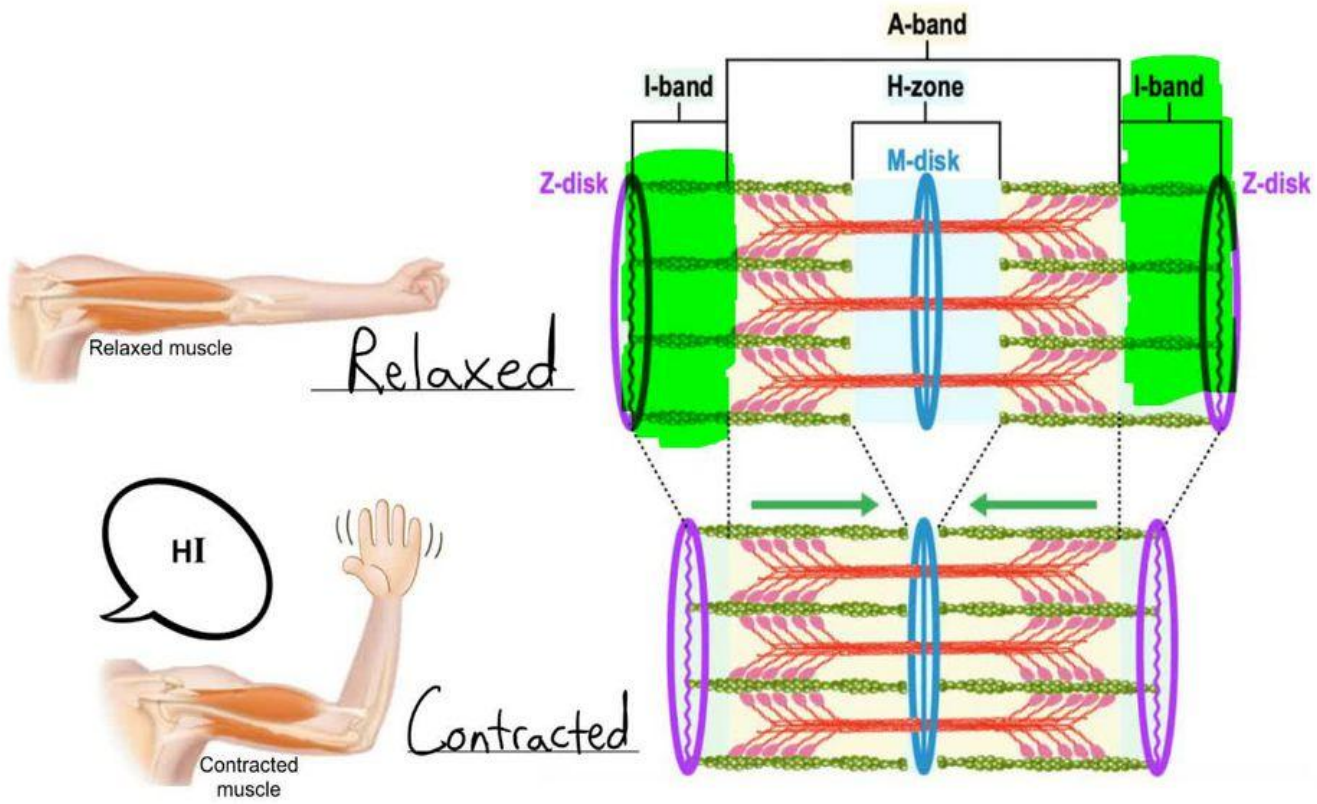
When actin-miyosin form cross bridges, then miyosin can pull actin filaments causing contraction in sarcomere (muscle fiber).

Relaxation-Contraction-Relaxation

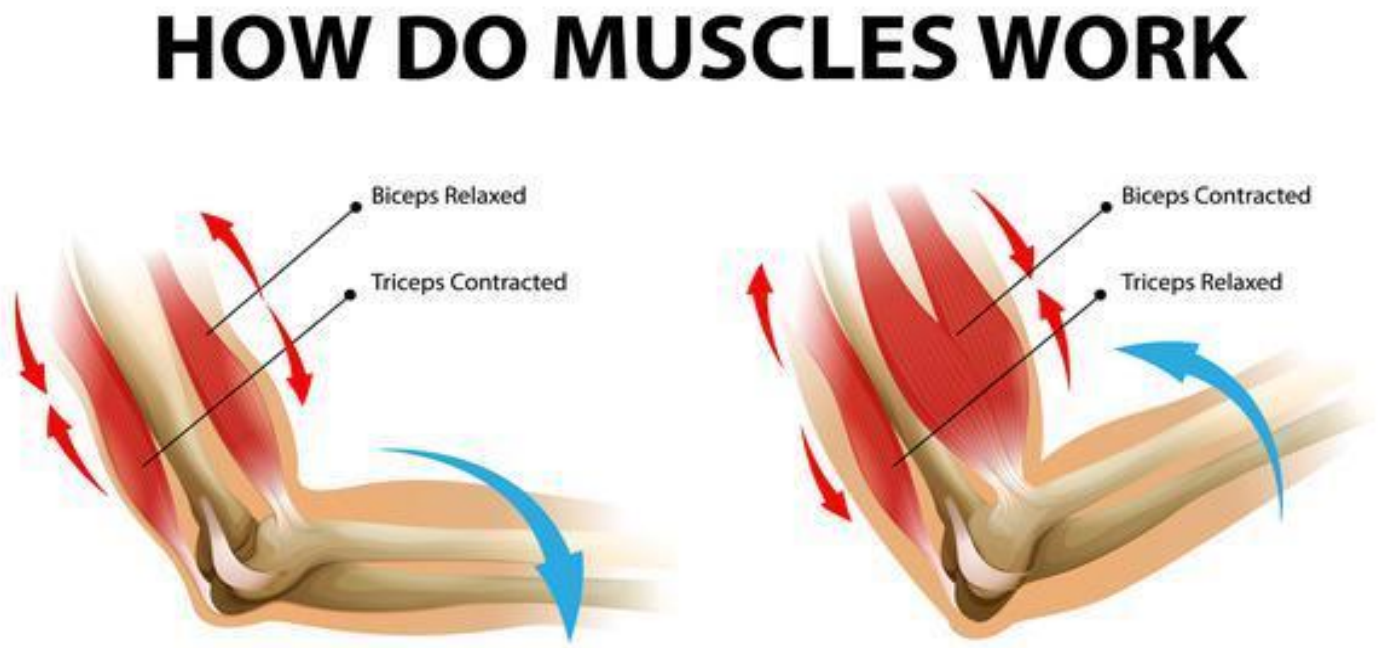
1. **In relaxed state:**
- Actin and miyosin don't interact with each other.

2. In contracted state:
- Electrical signal from neurons, causes secretion of Calcium.
- Calcium makes possible actin-miyosin cross-bridging.

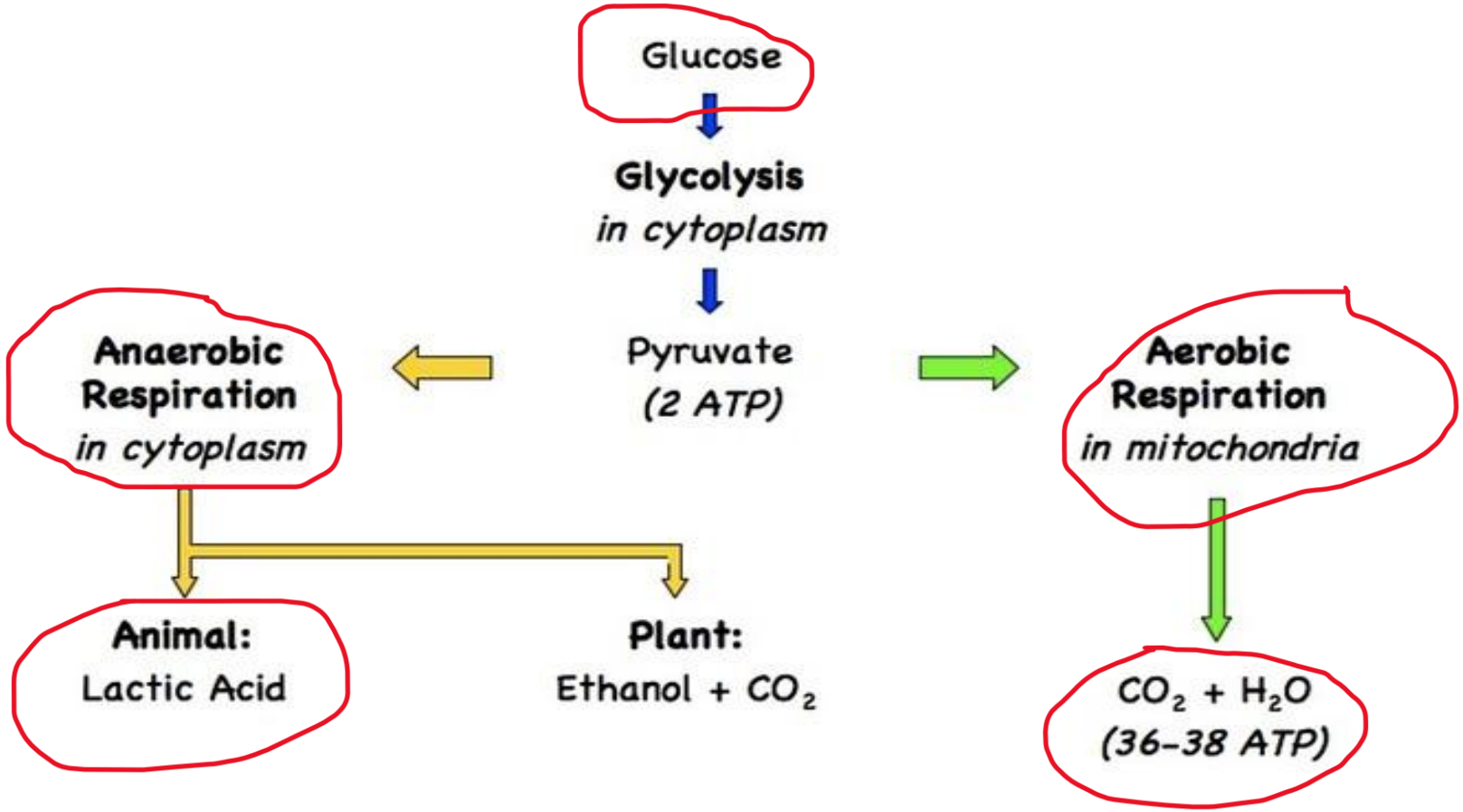
3. Turning back to relaxation state:
- Magnesium and Energy (in the form of ATP), are needed for myosin to detach from actin filaments.



While a muscle contracts, the other one relaxes



For de-attachment -> ATP is needed!



Recovery and getting rid of lactic acid

- After anaerobic respiration, the body is in **recovery** and must get rid lactic acid.

glucose → lactic acid + energy

The body is now at rest but the breathing rate and heart rate remain high. Why does this happen?

Oxygen is needed to **get rid of lactic acid** by turning it into carbon dioxide and water.

lactic acid + oxygen → carbon dioxide + water

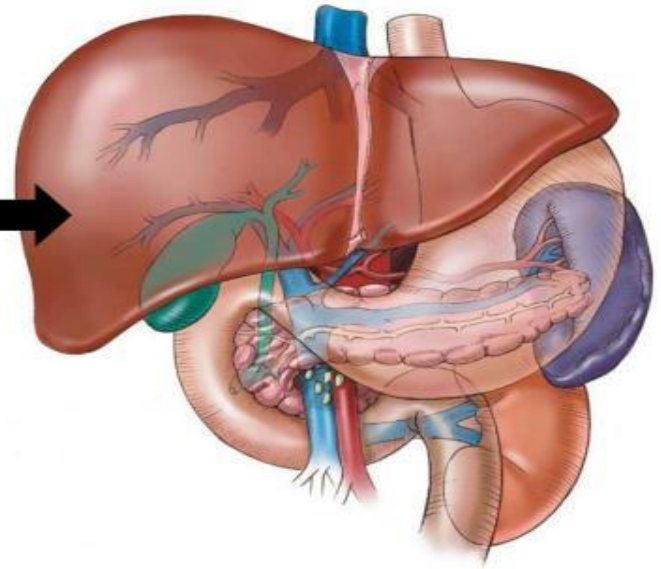
Why do the breathing and heart rates return to normal after a few minutes of recovery?

Oxygen Debt

- The **lactic acid** that has built up during anaerobic respiration needs to be **broken down**.

It gets broken down in the **liver**.

The blood carries the lactic acid there.



- Oxygen is required in the breakdown of lactic acid.
- **Heavy breathing** after exercise provides the extra oxygen required to break down lactic acid, and is known as the **oxygen debt.**
- This is followed by **panting** to allow aerobic respiration to resume.

Another approach toward muscle fatigue - Animation

https://www.youtube.com/watch?v=rLsimrBoYXc

Homework

What is the function of creatine phosphate in muscle cells?