

Module 8 LO3

Muscle Fiber Contraction and Relaxation

Dr. Lisa Brinn

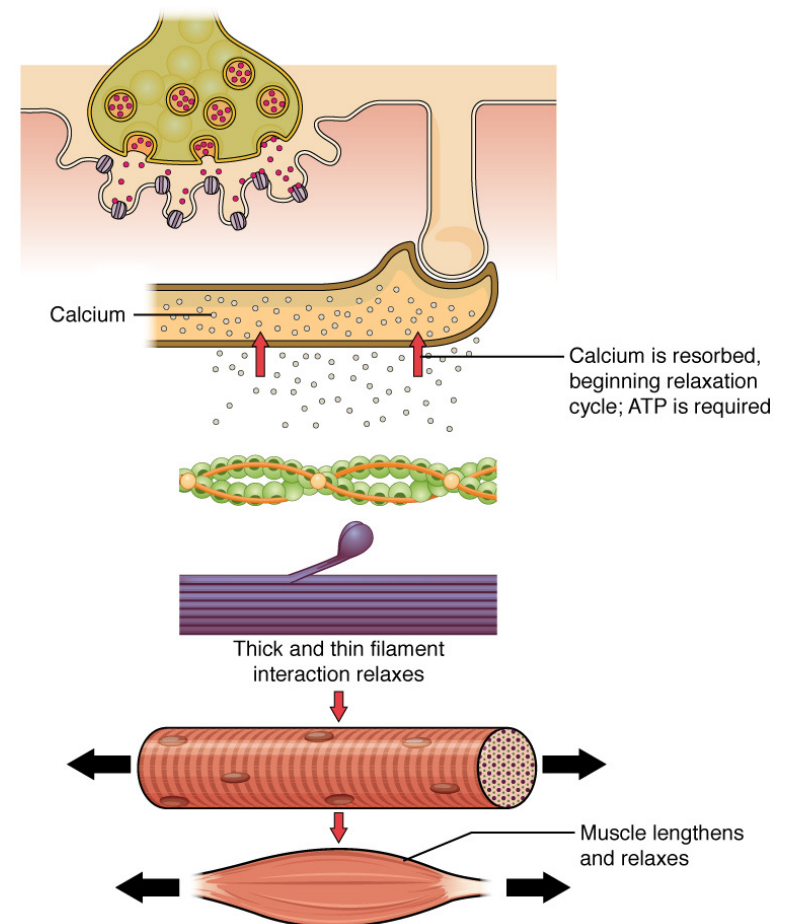
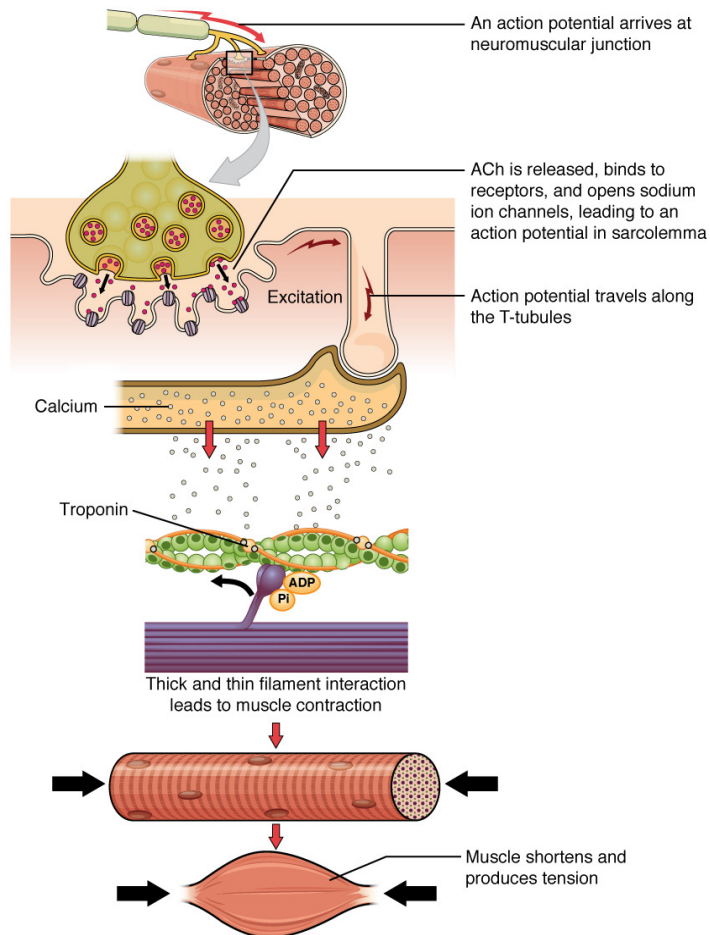
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[Video Recording Link](#)

3. Muscle Fiber Contraction and Relaxation

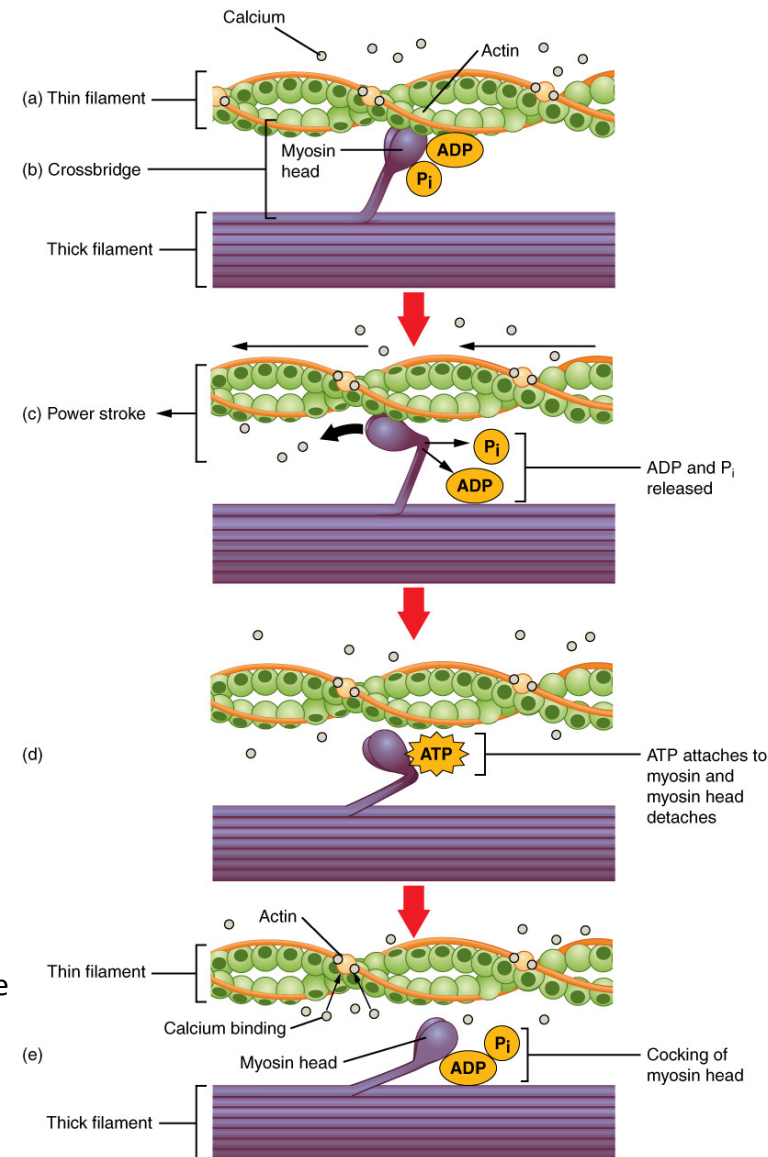
Contraction

Relaxation

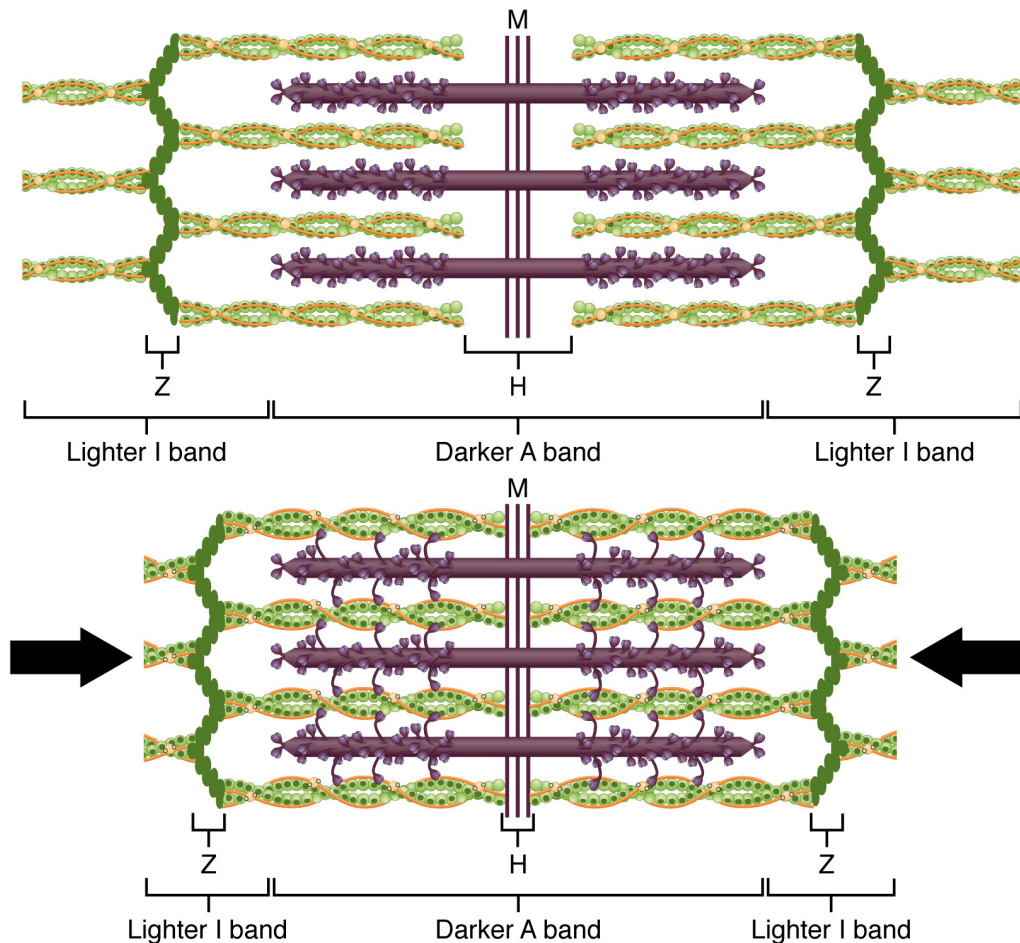


Cross-Bridge Formation

- Definition: attachment of myosin head to myosin binding site on the actin molecule of the thin filament
- Steps:
 1. Presence of Ca^{2+} from T-tubules
 2. Ca^{2+} binds to troponin
 3. Troponin releases tropomyosin which exposes myosin-binding site on actin molecules
 4. ATP present on the myosin head hydrolysis, energizing the myosin head
 5. Actin binding sites on myosin head binds to actin's myosin binding sites
 6. Formation of cross-bridge
 7. Occurrence of power stroke as a release of ADP
 - Thin filament slides past the thick filament towards M line
 8. Another ATP molecule binds to the ATP-binding site on myosin head
 9. Myosin head detaches from actin

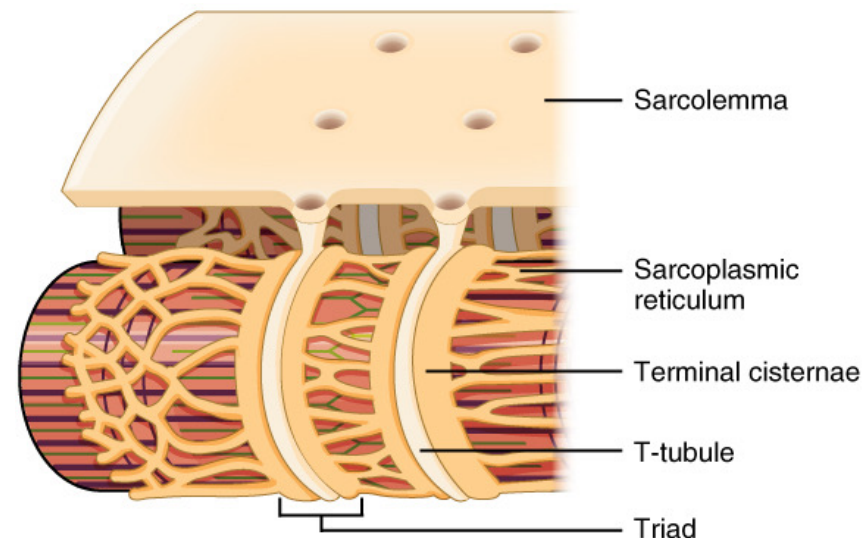


Sliding Filament Model of Muscle Contraction



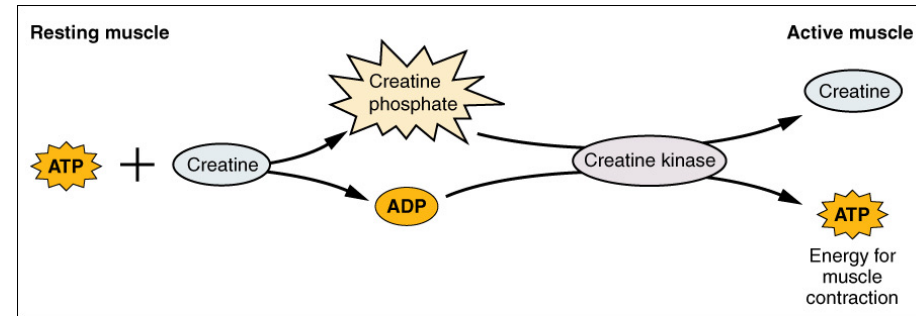
T-tubule

- Permit conduction of electrical impulses
- SR functions to regulate intracellular levels of calcium
- Triad
 - Two terminal cisternae (where enlarged SR connects to T-tubule)
 - One T-tubule
 - a “threesome” of membranes, with those of SR on two sides and the T-tubule sandwiched between them

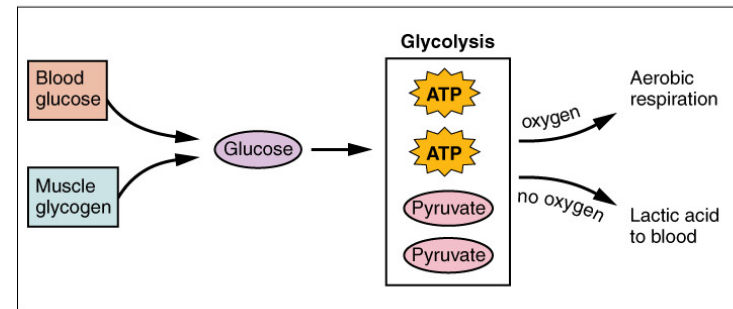


Muscle Metabolism

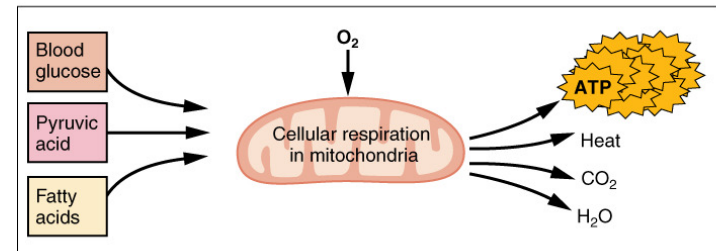
- ATP sources
 - Stored in resting muscle
 - Glucose molecules – produce 2 ATPs
 - Aerobic respiration



(a)



(b)



(c)