Microfilaments. Muscle Contraction

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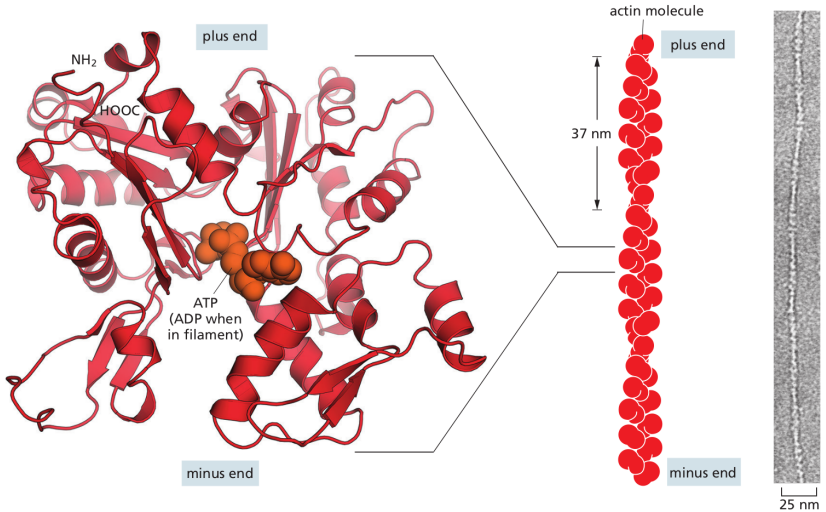
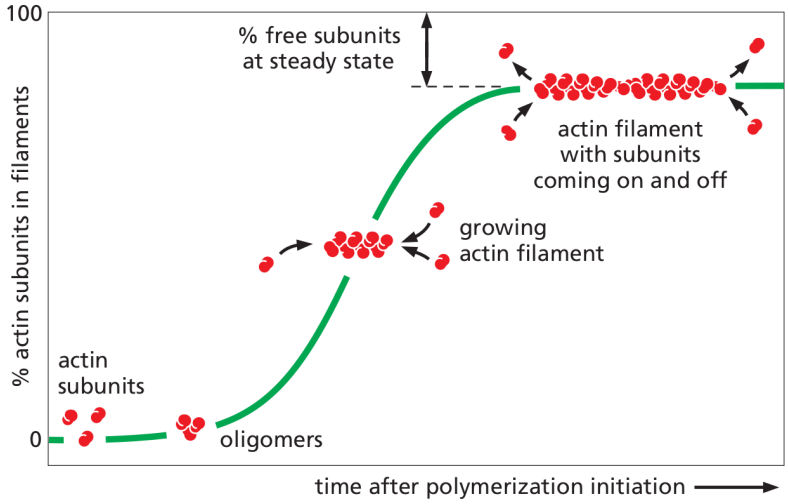
Structure of Actin



Alberts B. et al. Molecular Biology of the Cell (2022)

Actin Filament Dynamics



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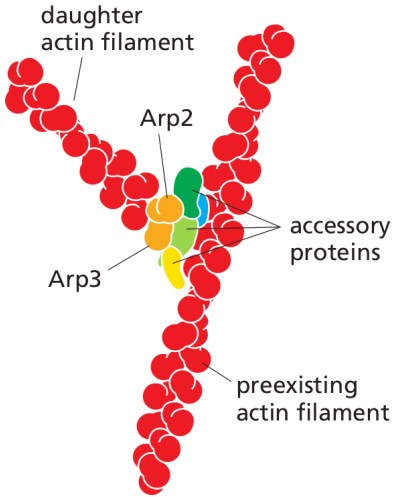
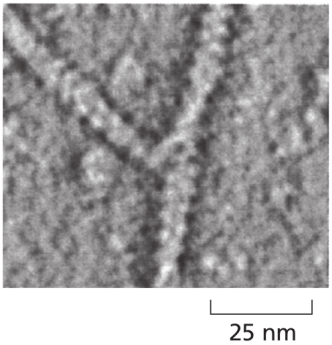
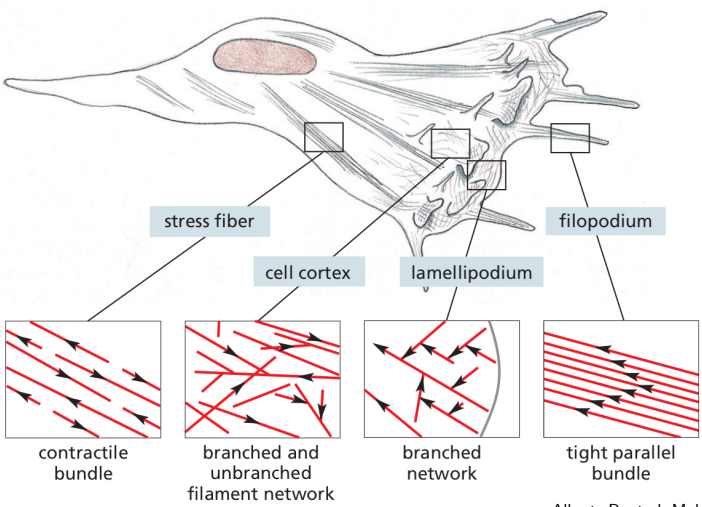
Arp2/3 Complex and Branching





Alberts B. et al. Molecular Biology of the Cell (2022)

Cell Motion



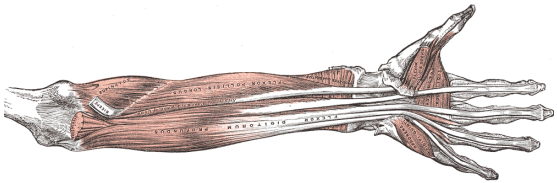
Alberts B. et al. Molecular Biology of the Cell (2022)

Three Types of Muscle Tissue

1. Skeletal muscle tissue:
   - skeletal fiber
   - usually voluntary movements
   - mesodermal origin
2. Cardiac muscle tissue:
   - cardiac muscle cells (cardiomyocytes)
   - intrinsic automatism
   - mesodermal origin
3. Smooth muscle tissue:
   - smooth muscle cells
   - involuntary movements
   - mesenchymal origin

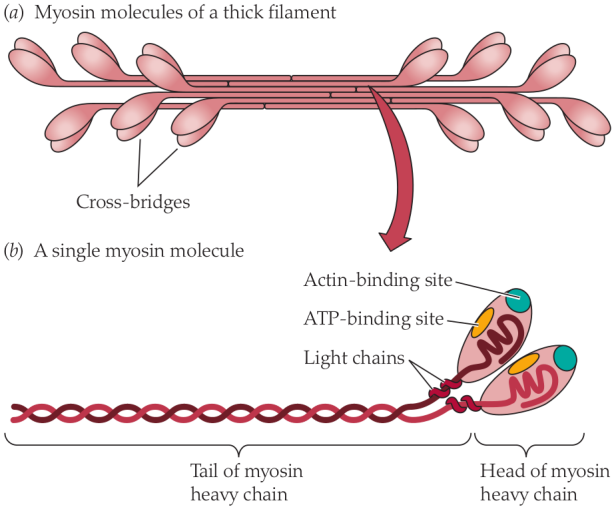
Skeletal Muscle

- Skeletal muscle fiber (myofilament) – syncytium
- Up to 30 cm long, $10 - 100\,\mu m$ in diameter
- Filled by regularly arranged myofibrils
- Controled by nerves – neuromuscular plate



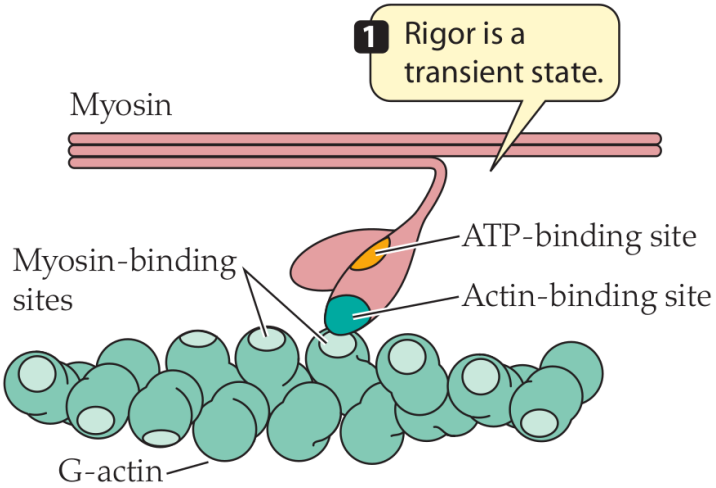
Gray's Anatomy (1918)

Structure of Myosin



R. W. Hill, G. A. Wyse, M. Anderson: Animal Physiology (2012)

Strong Bond of Actin to Myosin



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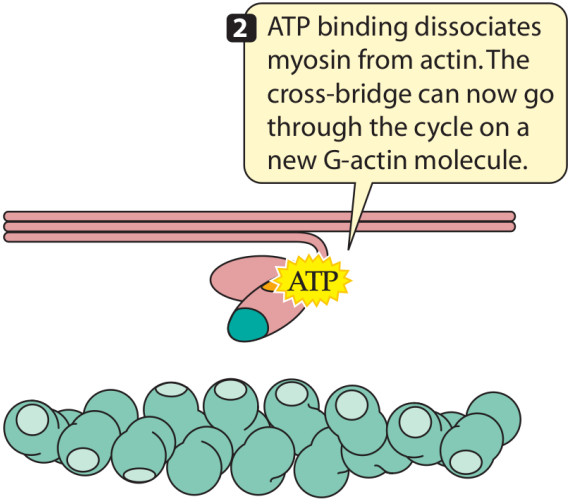
Disociacion of Actin from Myosin



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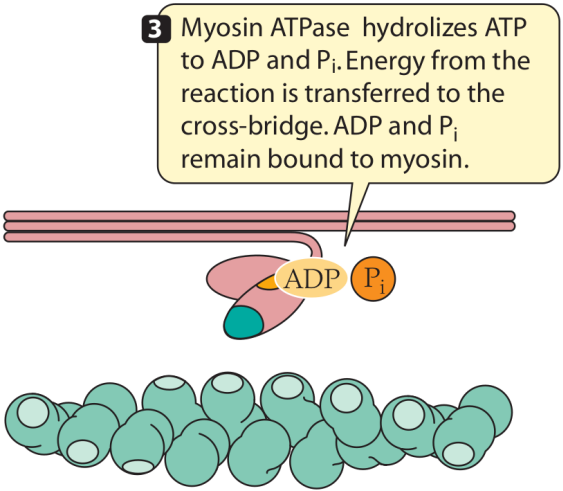
Hydrolysis of ATP



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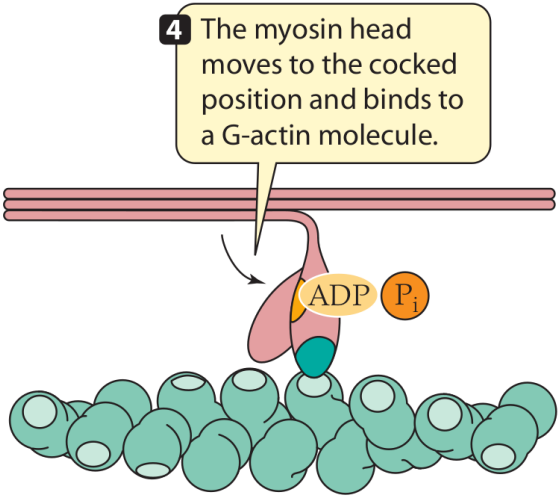
Myosin Changes the Shape



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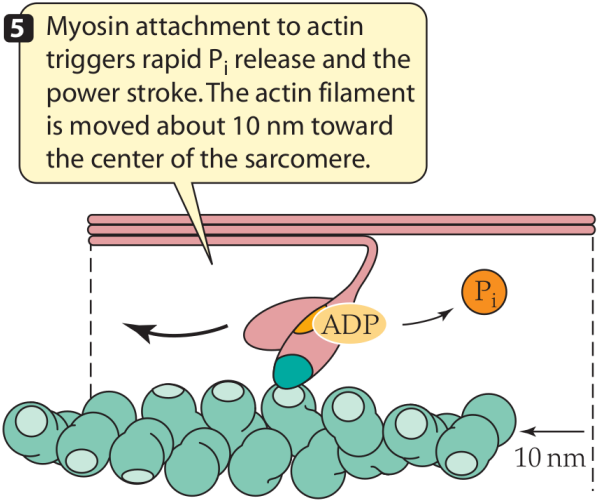
Shape of Myosin Goes Back



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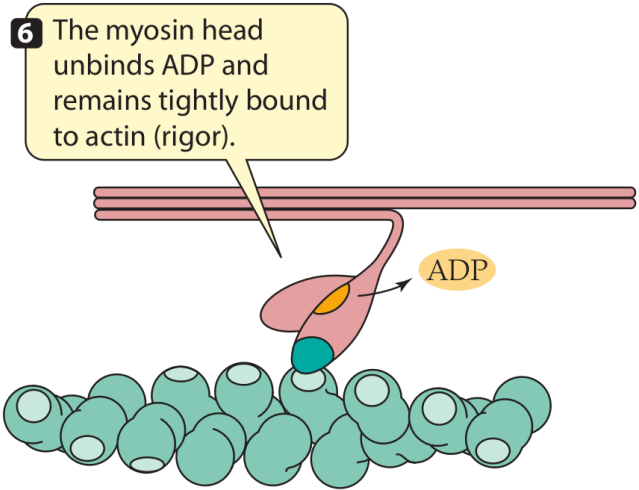
Releasing of ADP



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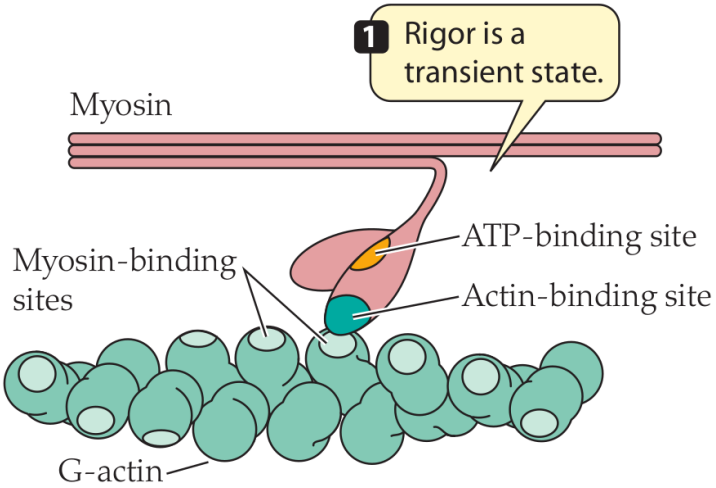
Can Start Again



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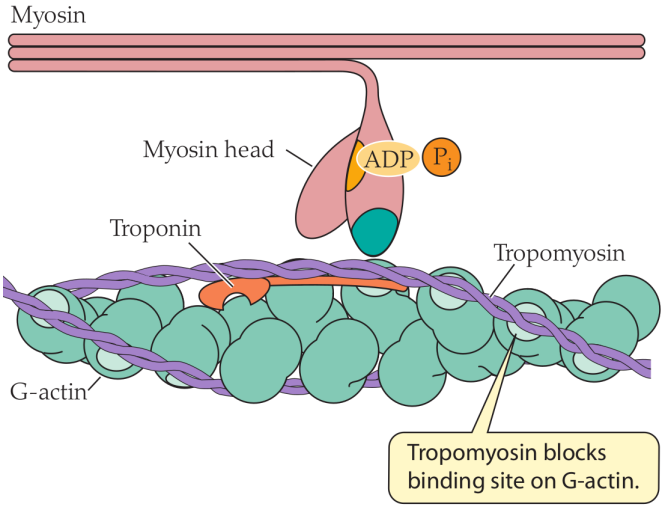
Control of Contraction: Tropomyosin and Troponin



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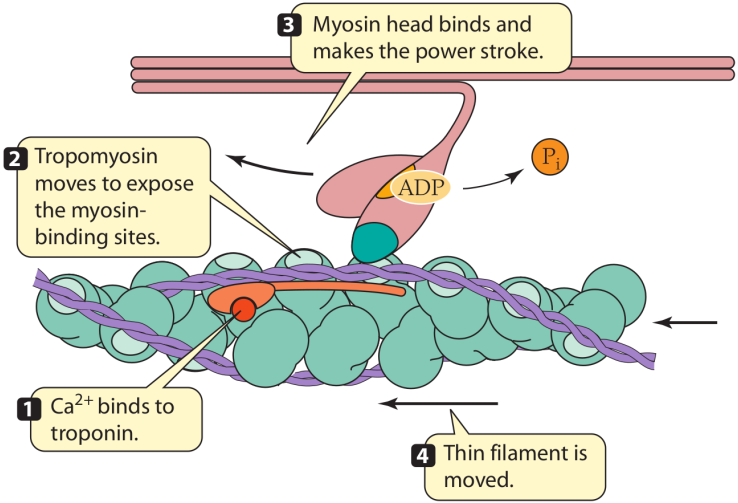
Calcium is Important



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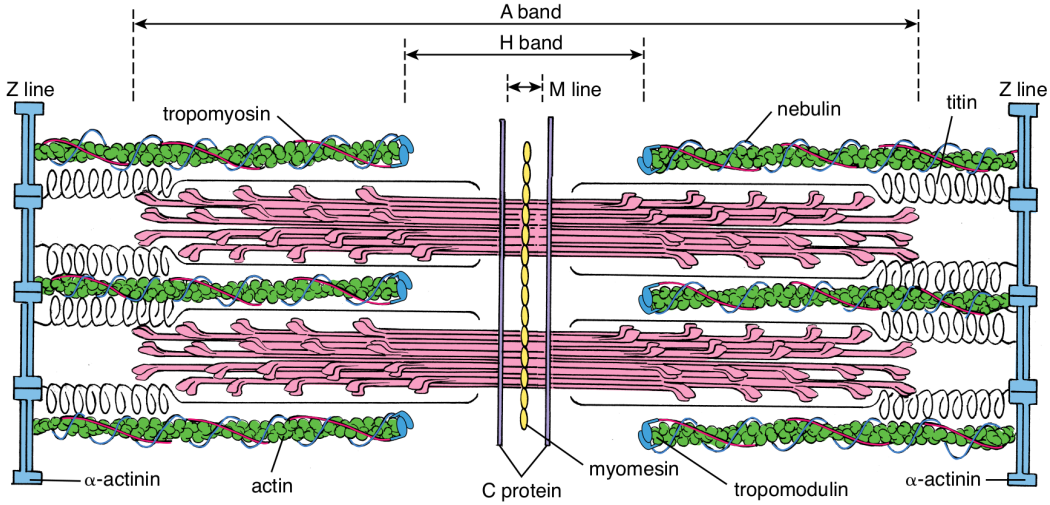
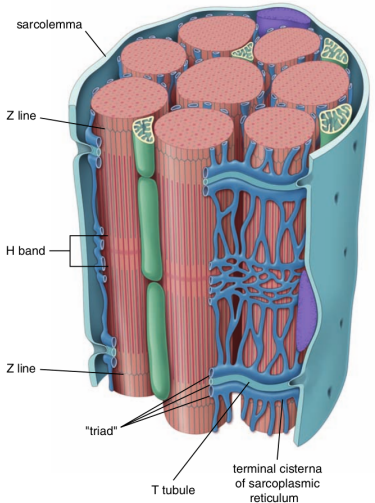
Sarcomere: Main Unit of Myofibrils



M. H. Ross, W. Pawlina: Histology: A Text and Atlas (2011)

Skeletal Muscle Fiber (Myofilament)



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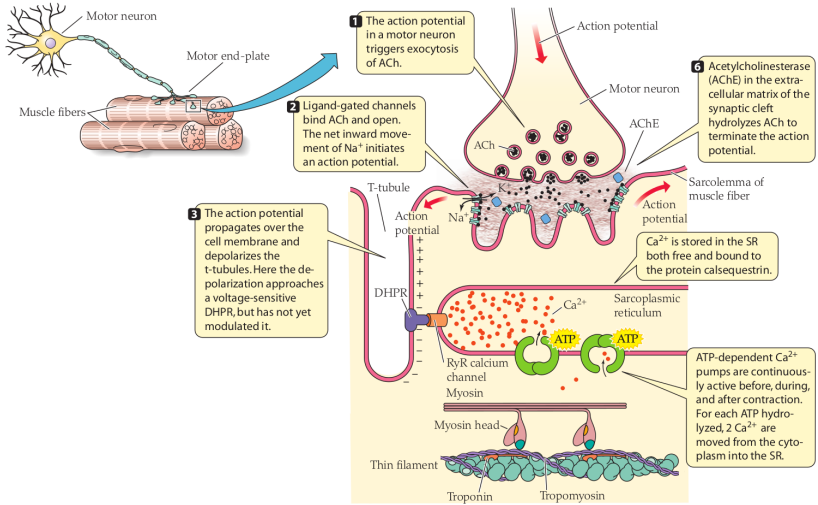
Neuromuscular Plate (Motor Plate)



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Time for Maté!

Jean Léon Palliere: Tomando mate (1861)