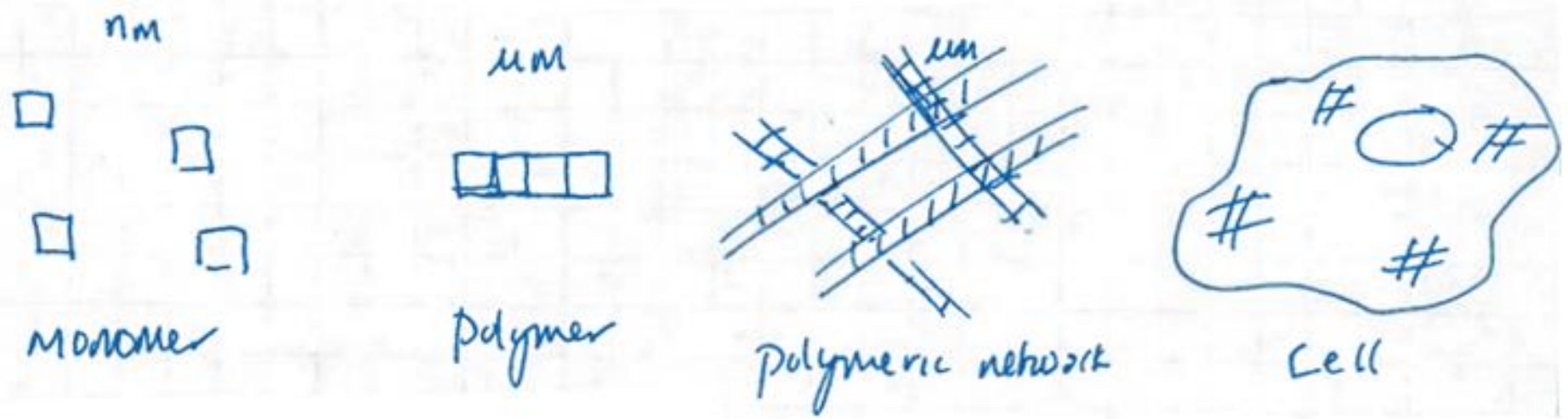
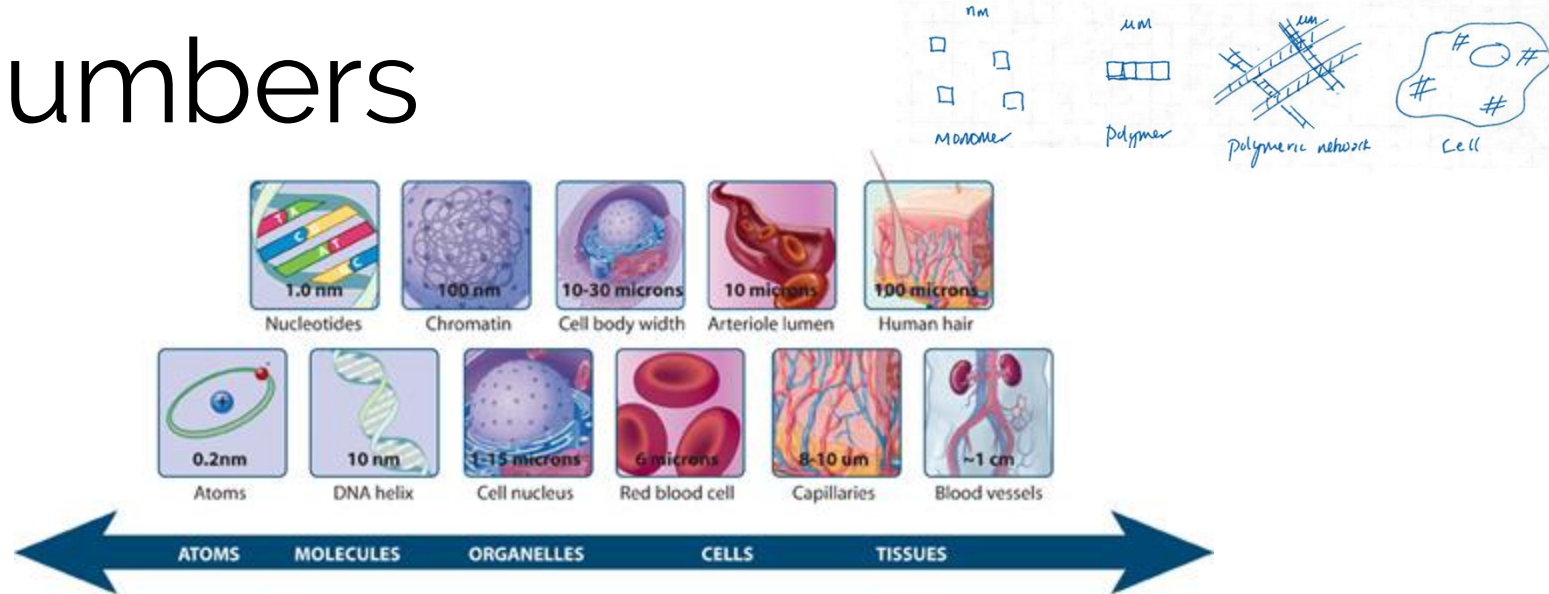


FROM CELLS TO TISSUE



- The Numbers
- Medical Implication
- How Cell's "Walk and Talk"
- Biological Hierarchy

The Numbers



Current data estimation $\sim 3.72 \times 10^{13}$

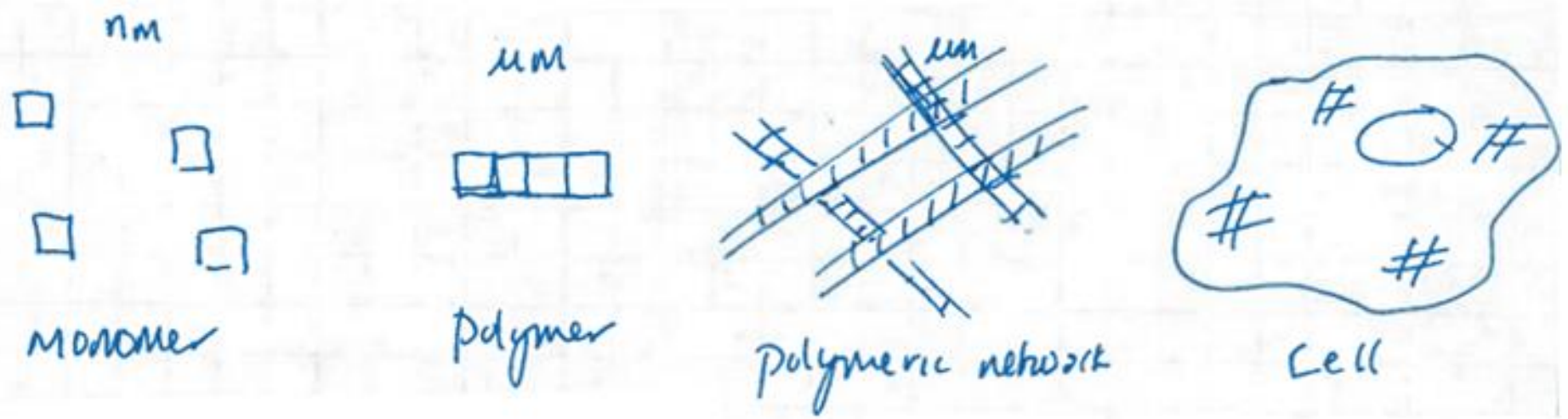
Types of cells ~ 210

Typical mass ~ 1 ng

Distance – microns

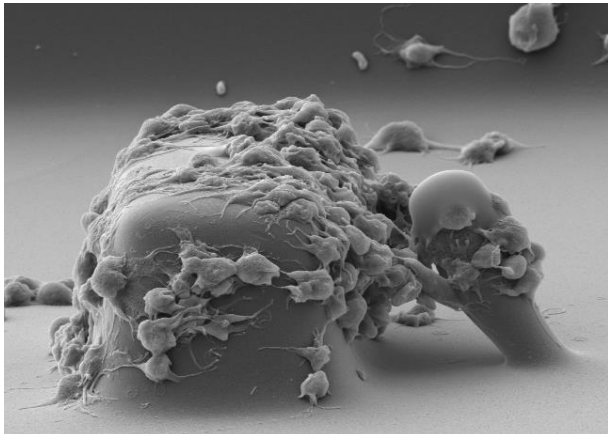
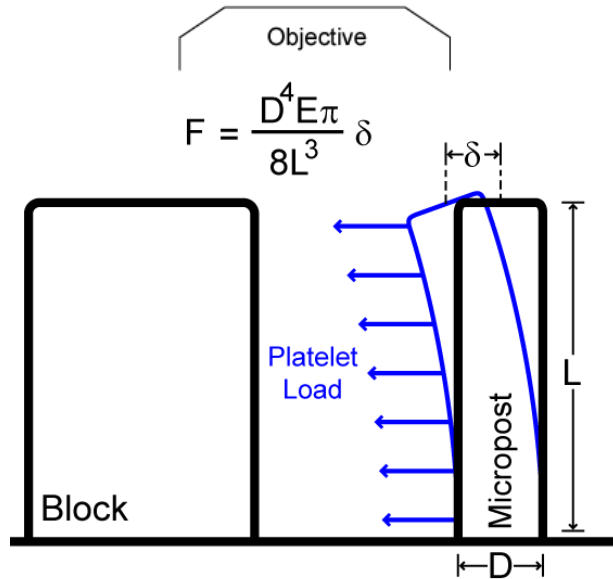
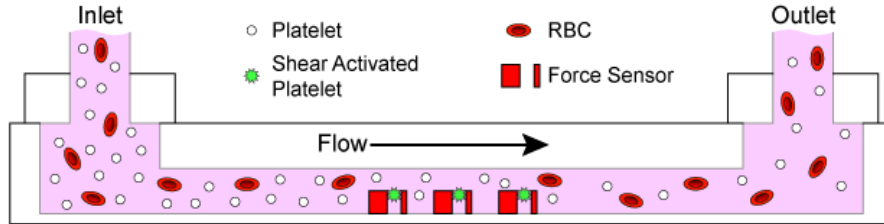
Force – pN to nN

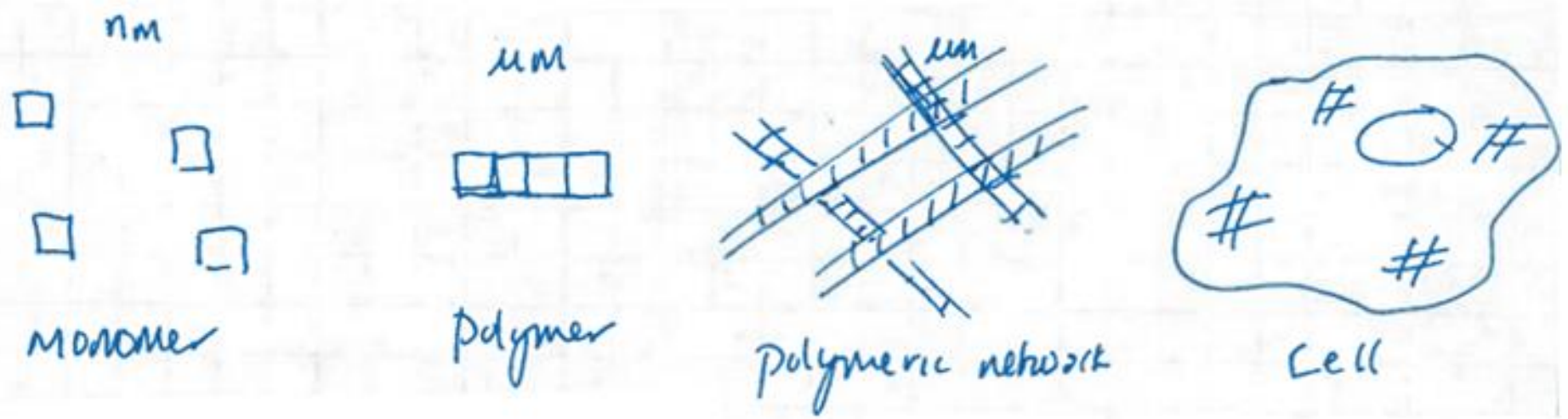
Stress – 1 Pa to 1 kPa



- The Numbers
- **Medical Implication**
- How Cell's "Walk and Talk"
- Biological Hierarchy

Medical Implications – Ex) TRAUMA





- The Numbers
- Medical Implication
- How Cell's "Walk and Talk"
- Biological Hierarchy

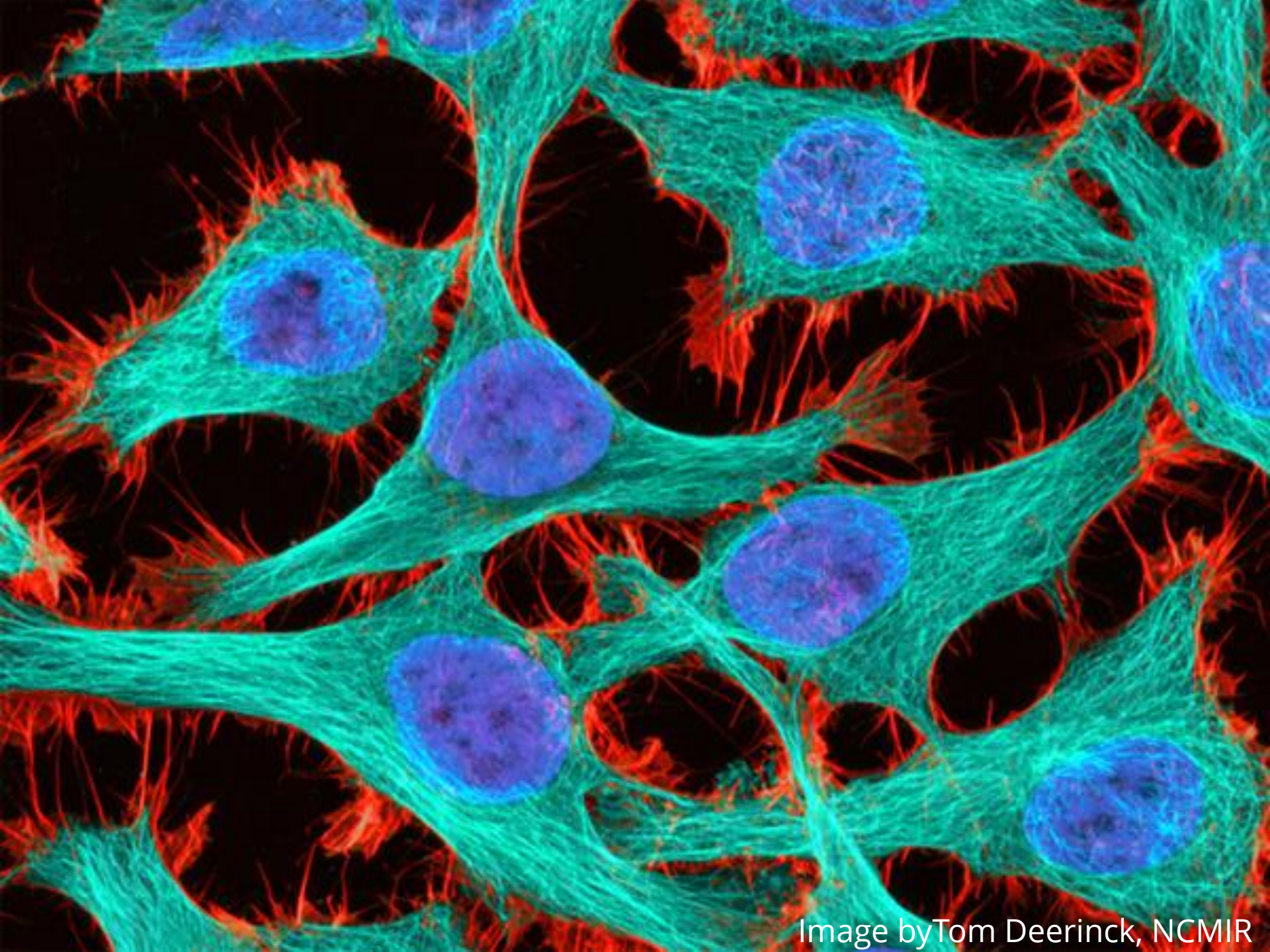
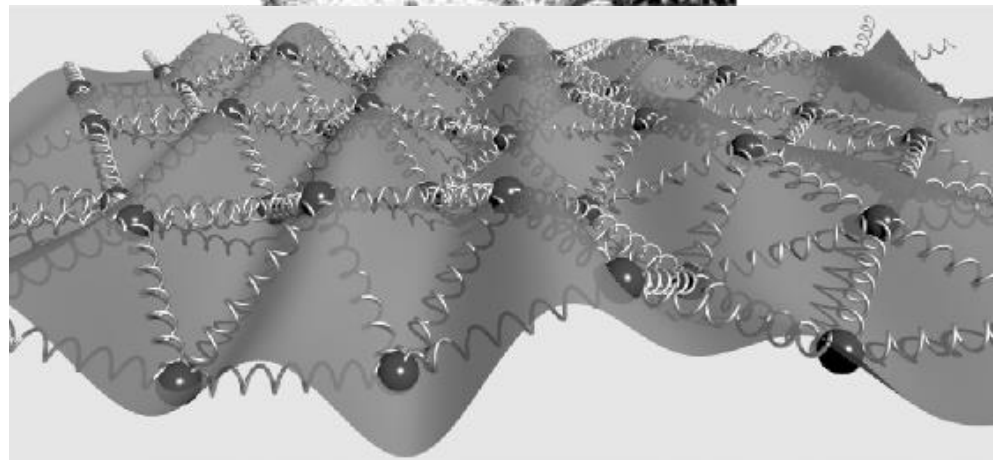
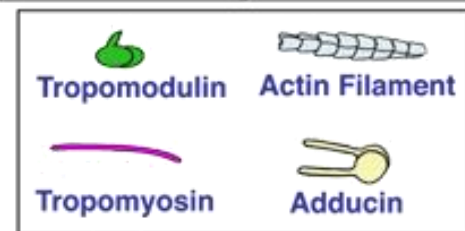
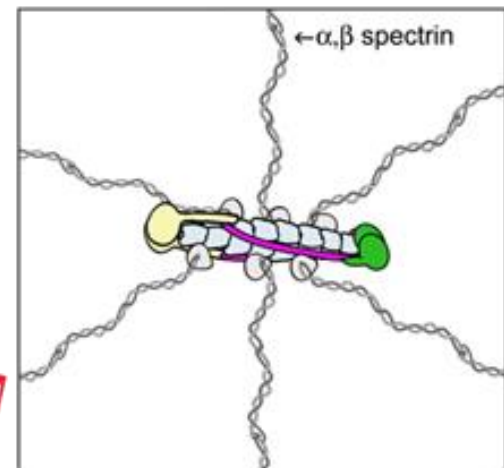
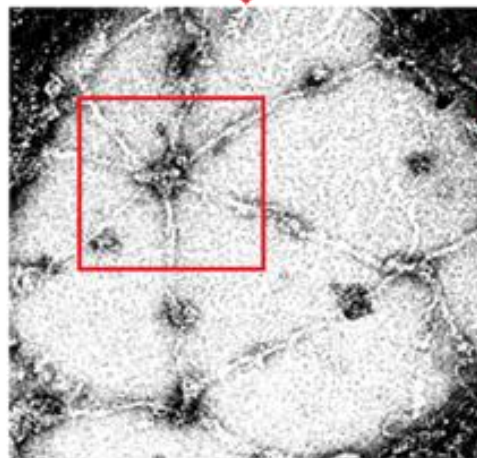
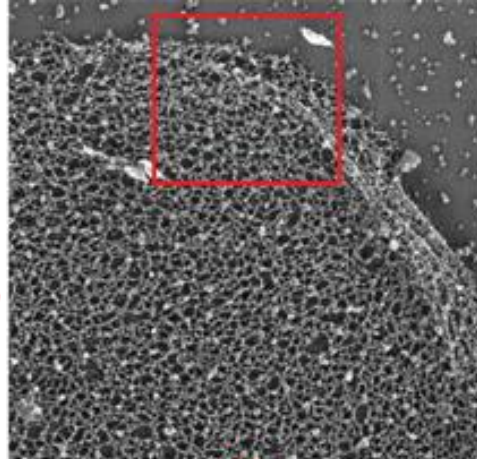
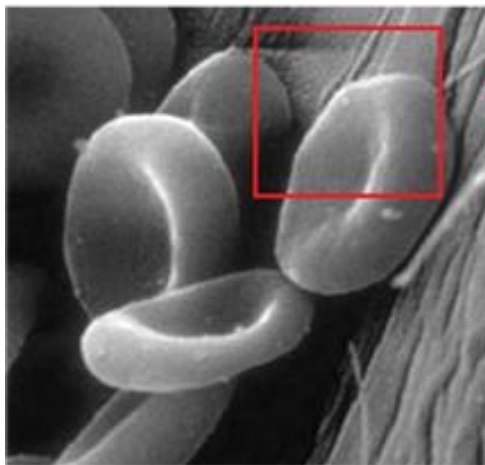
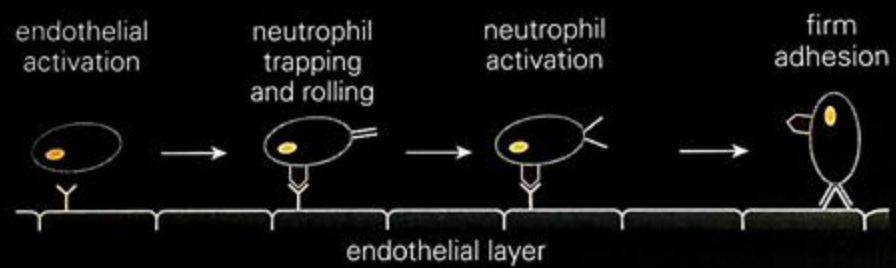
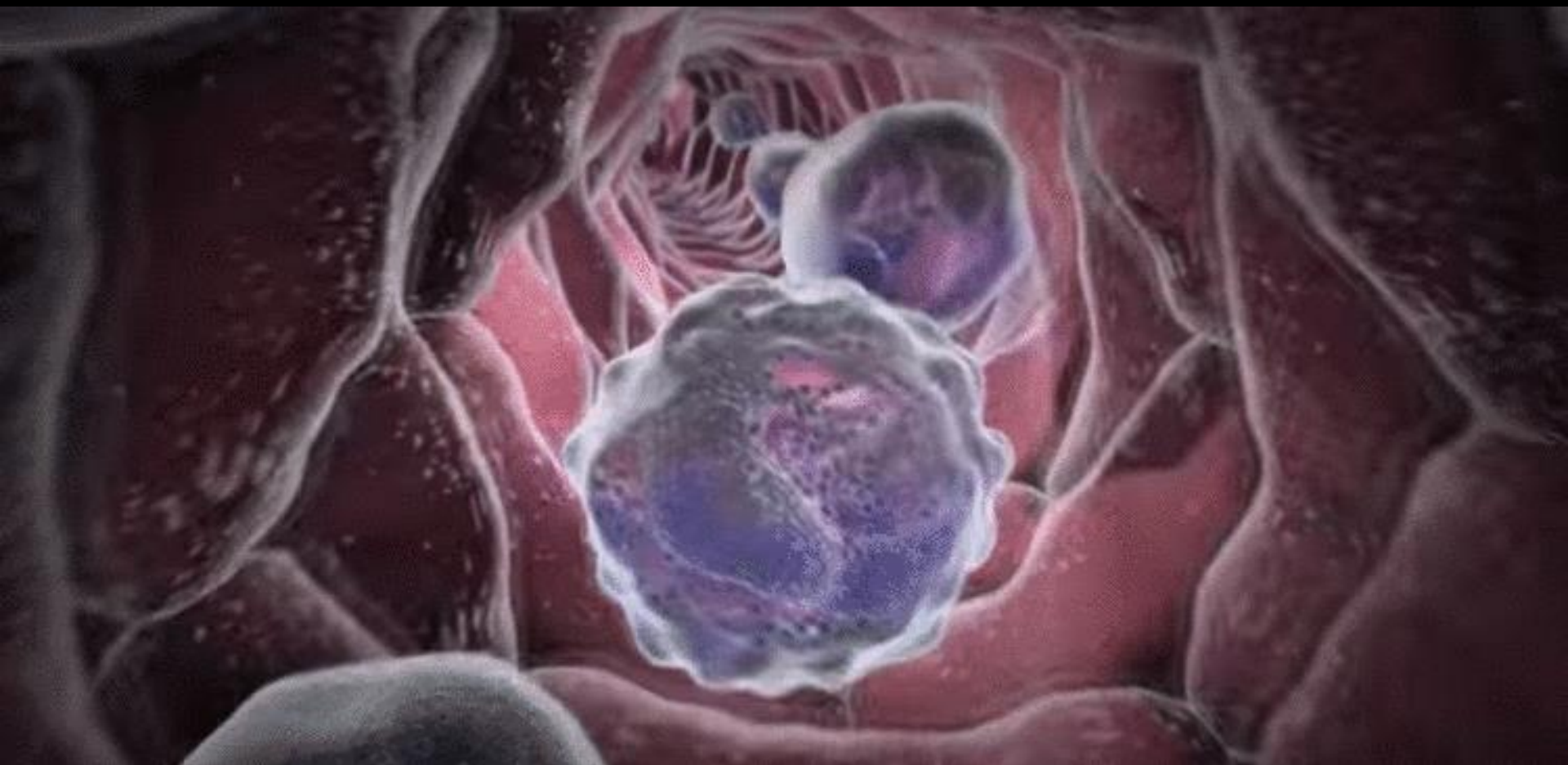
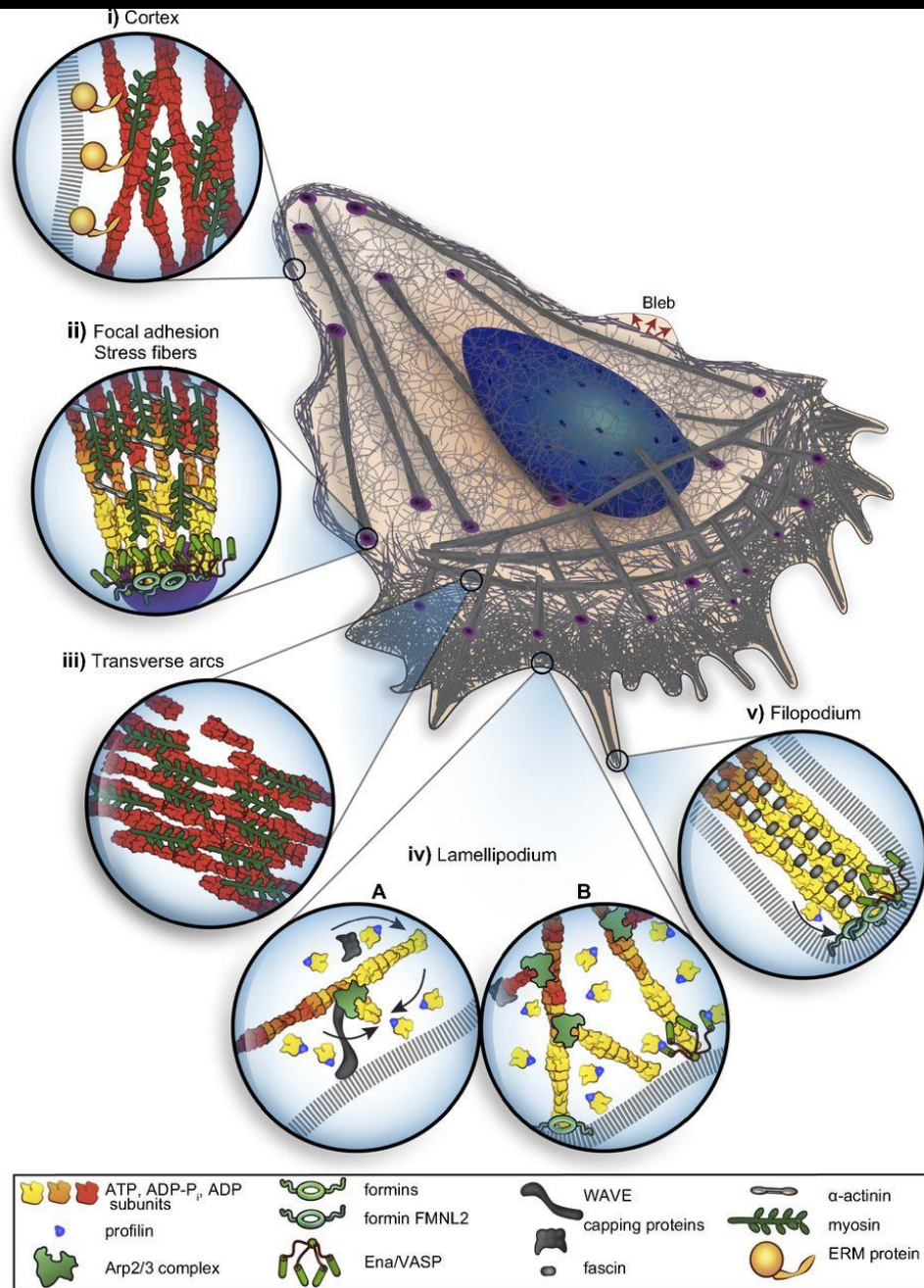
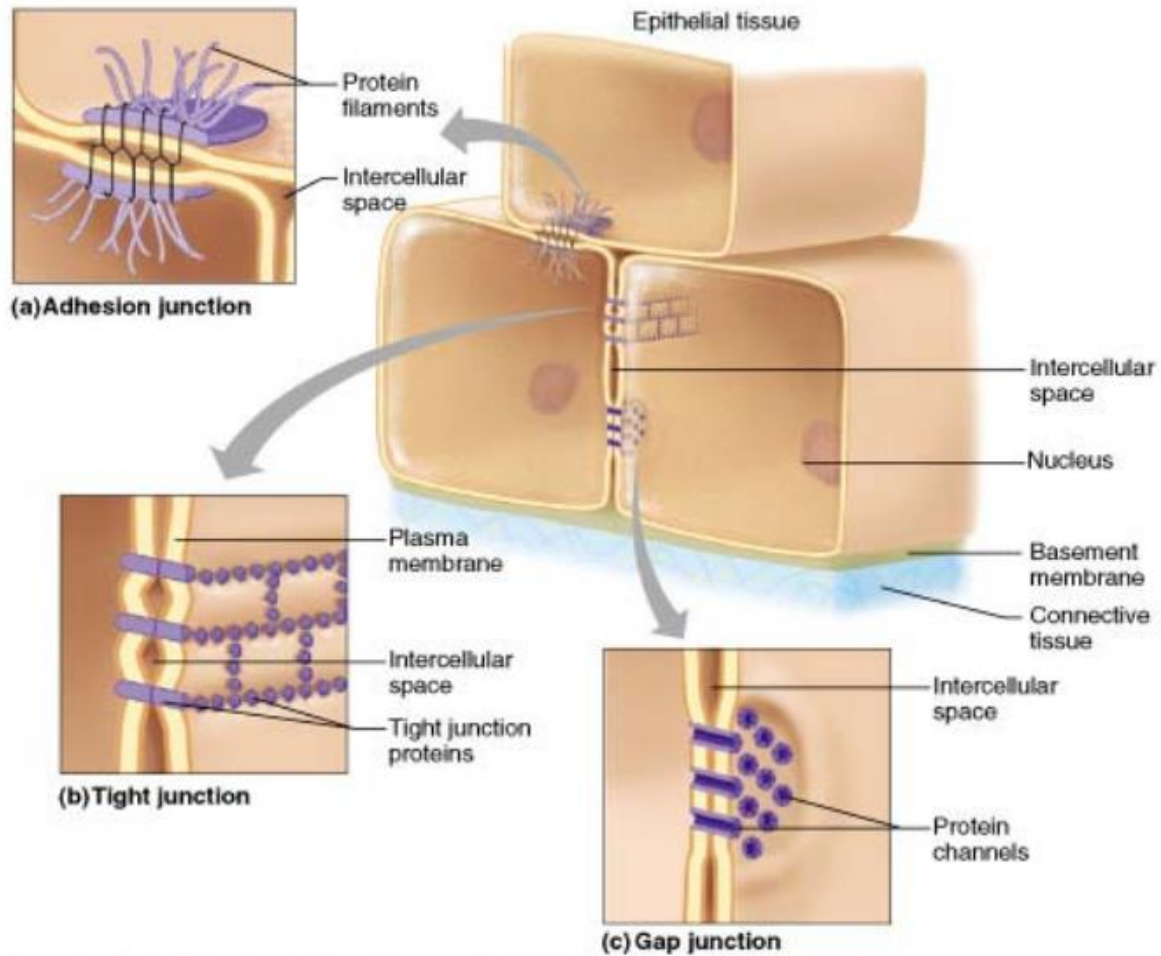


Image by Tom Deerinck, NCMIR

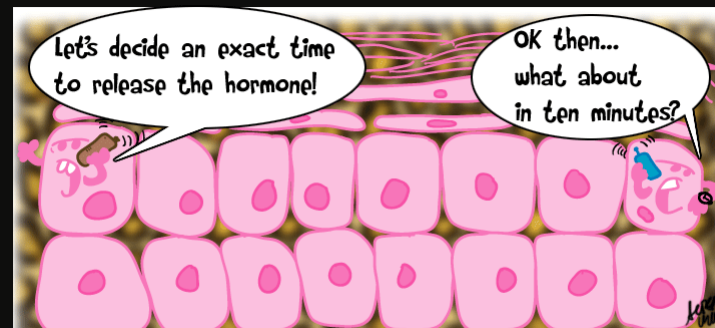








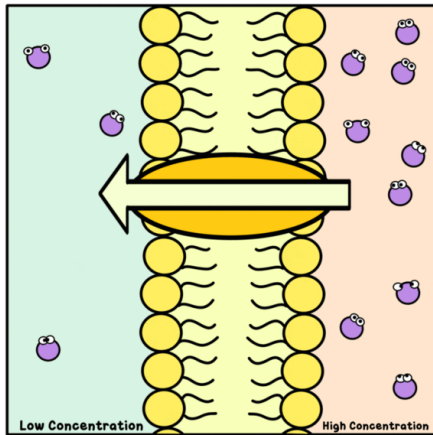
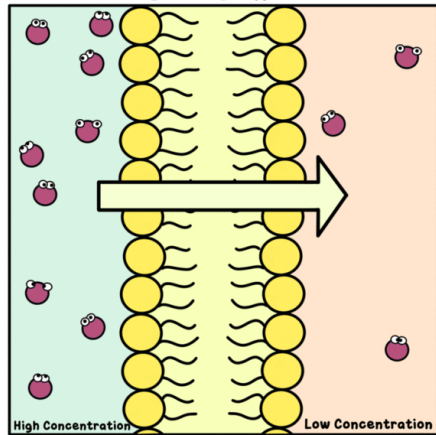
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Passive Transport

Diffusion

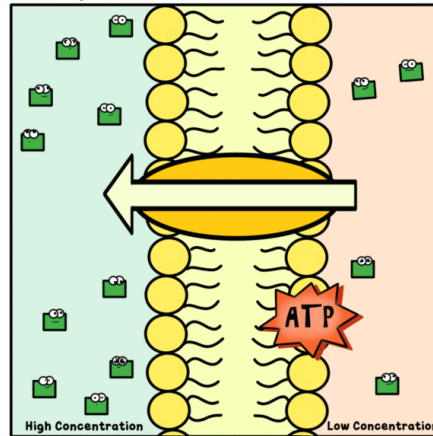
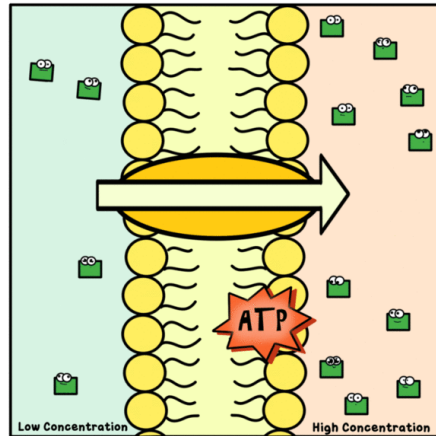
Facilitated Diffusion



Amoeba Sisters

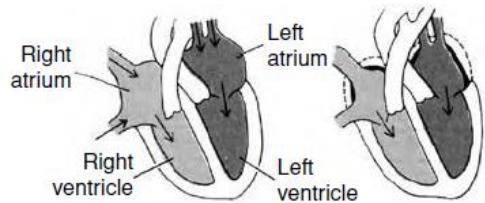
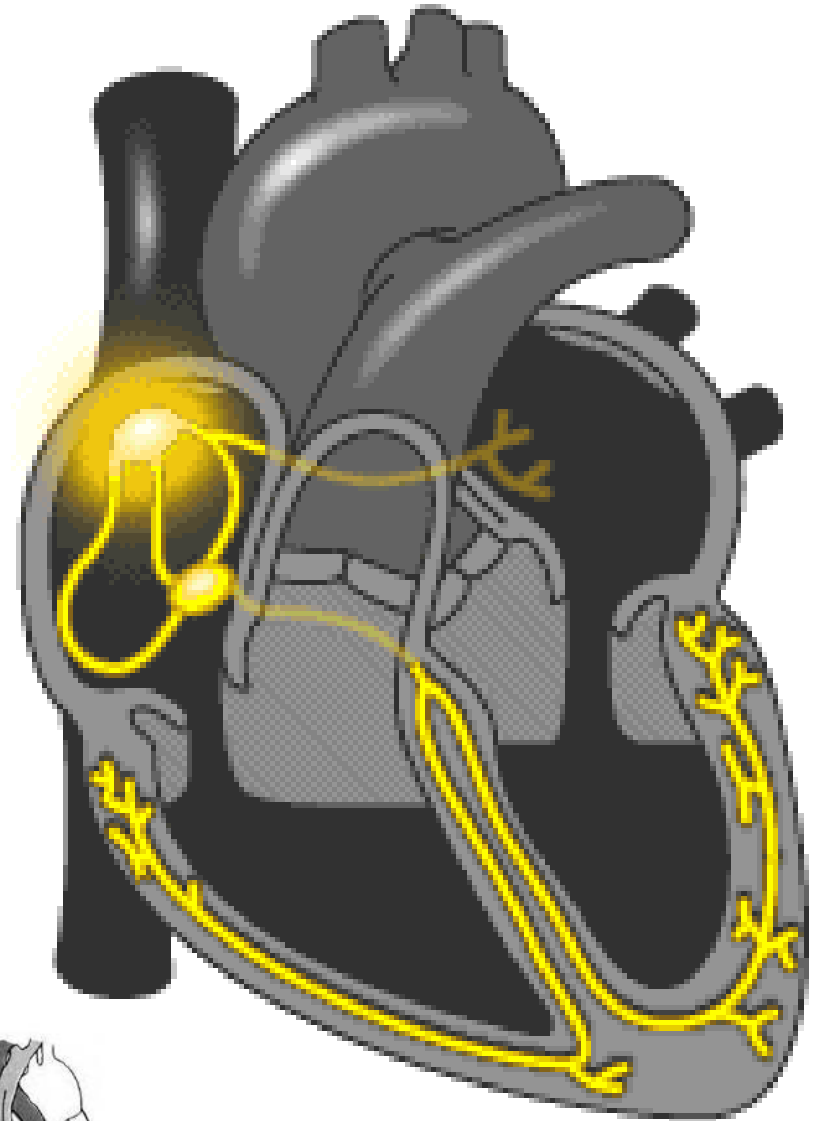
#AmoebaGIFS

Active Transport



Amoeba Sisters

#AmoebaGIFS



ATRIAL CONTRACTION



ISOVOLUMETRIC VENTRICULAR CONTRACTION



VENTRICULAR EJECTION

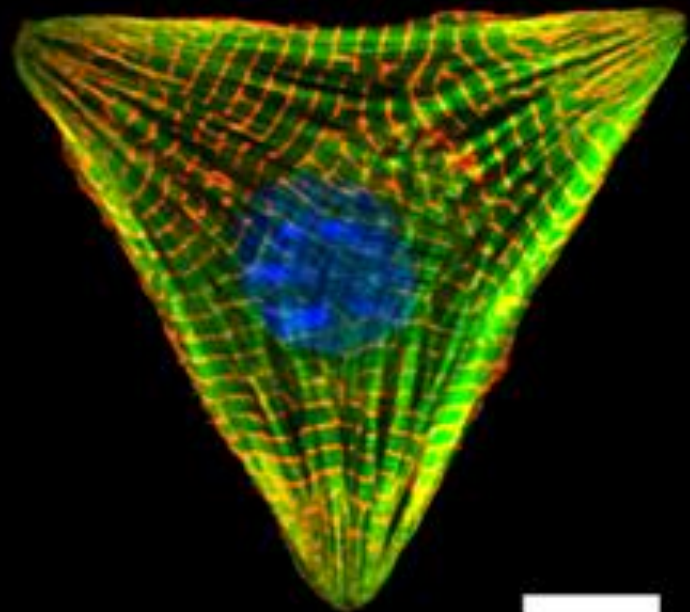
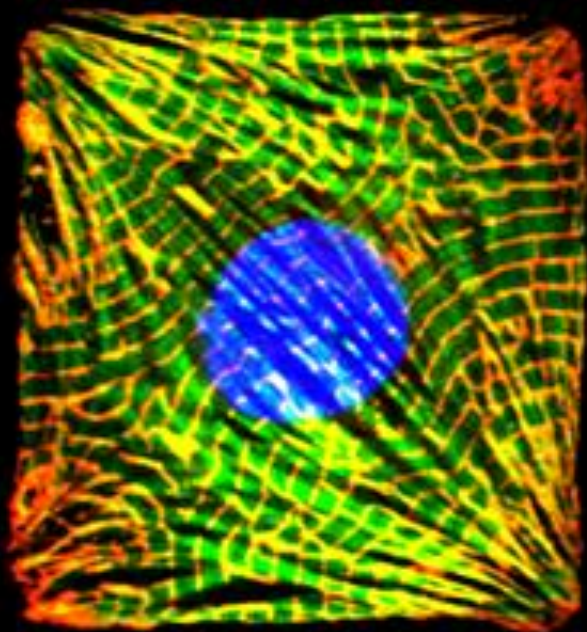
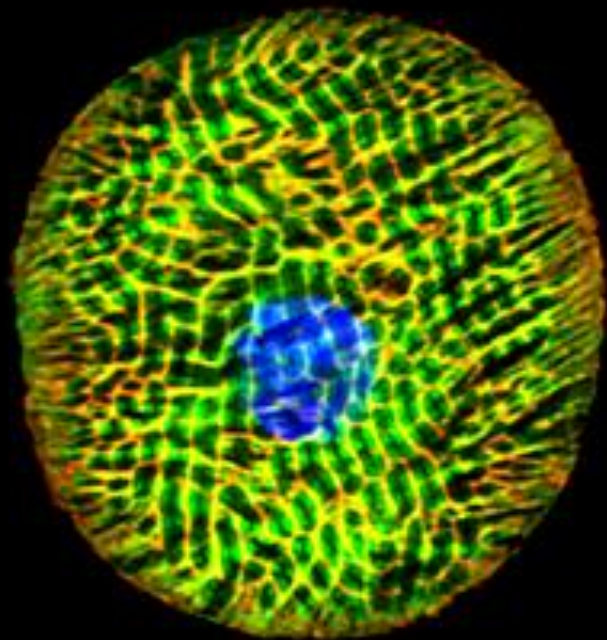
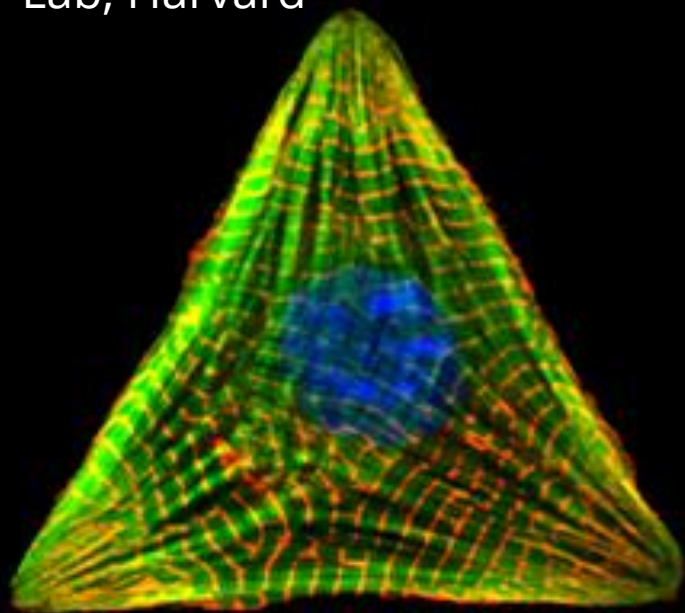


ISOVOLUMETRIC VENTRICULAR RELAXATION

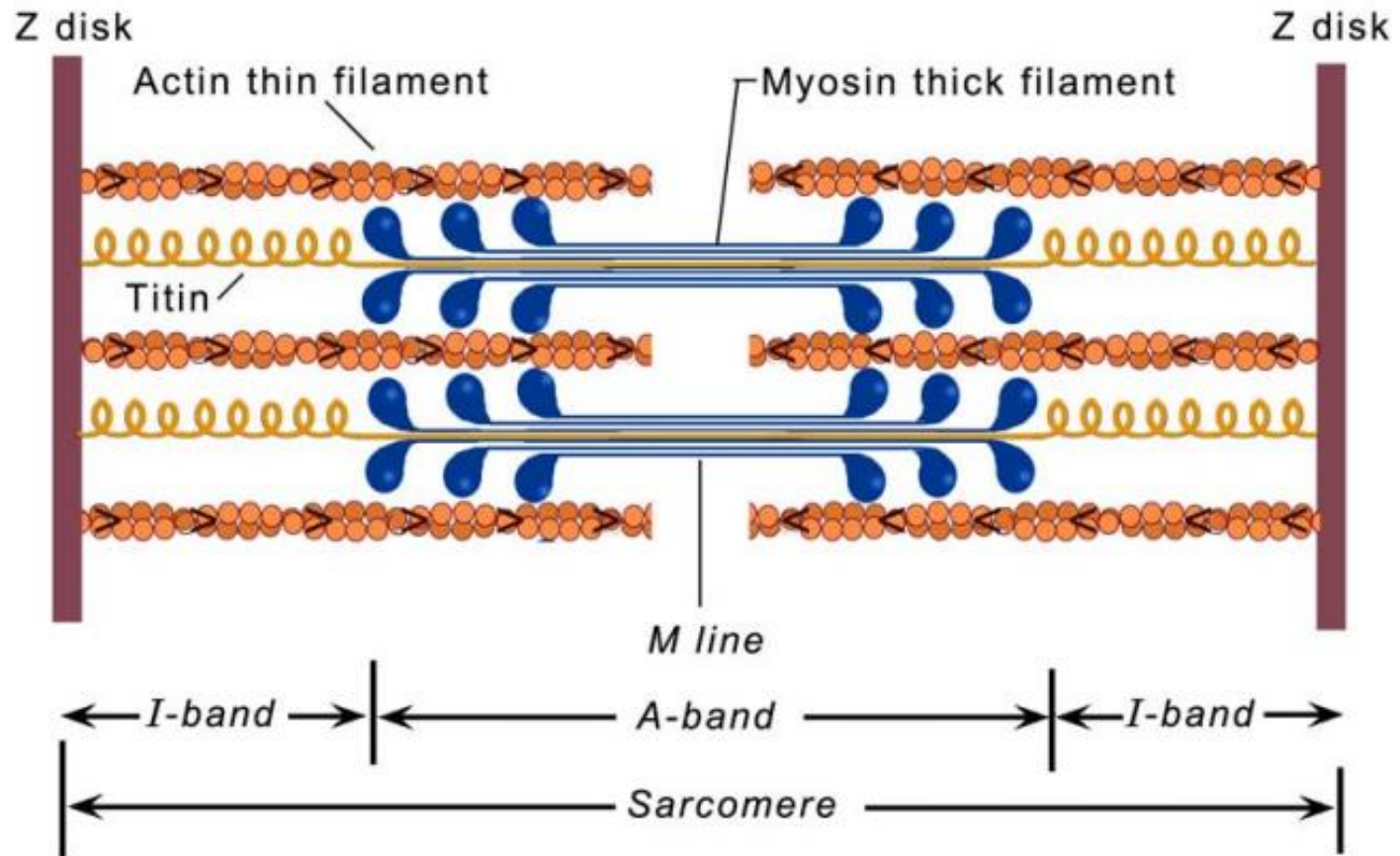
1
VENTRICULAR FILLING

2
(SYSTOLE)

4



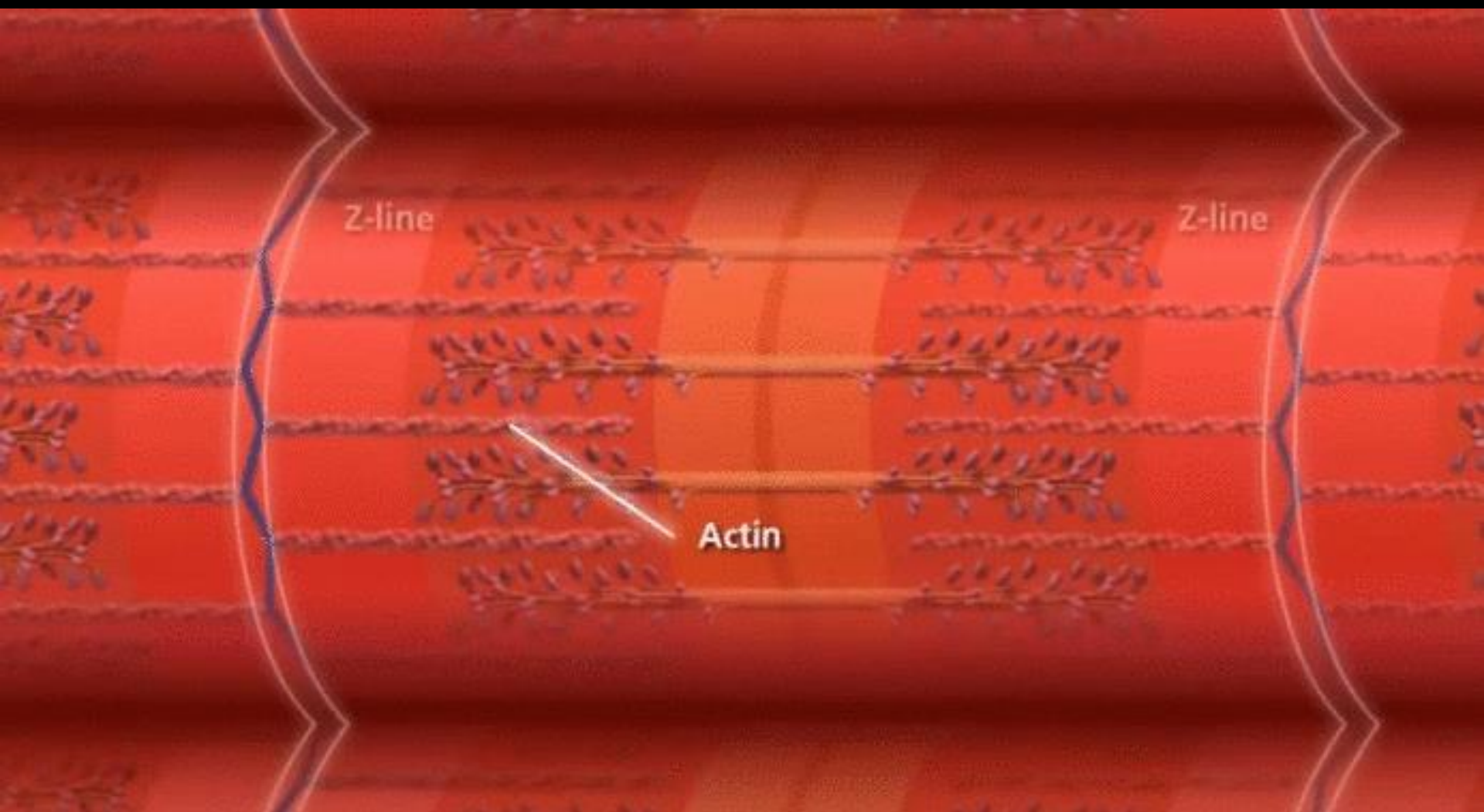
Biological Hierarchy (Proteins)



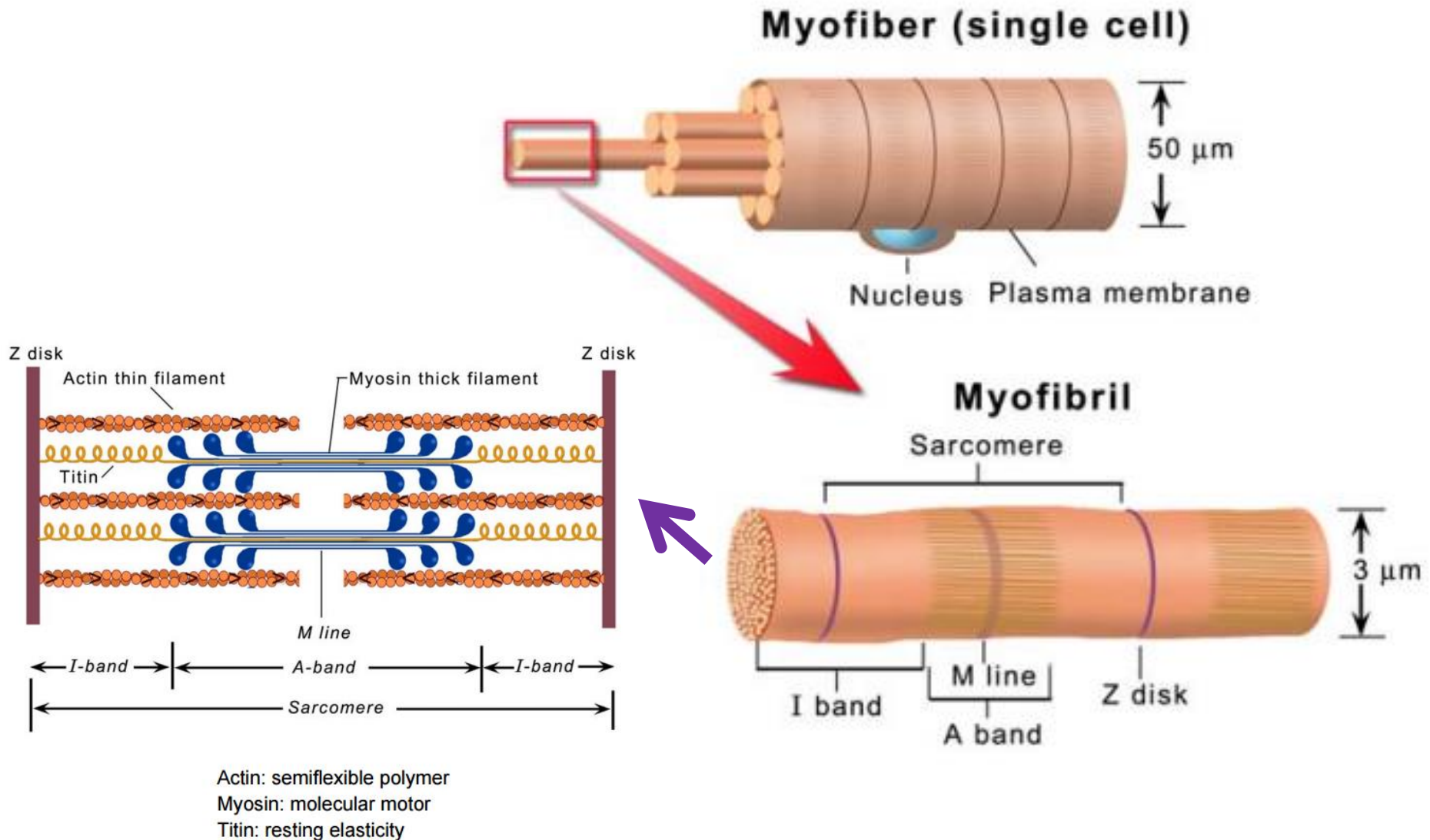
Actin: semiflexible polymer

Myosin: molecular motor

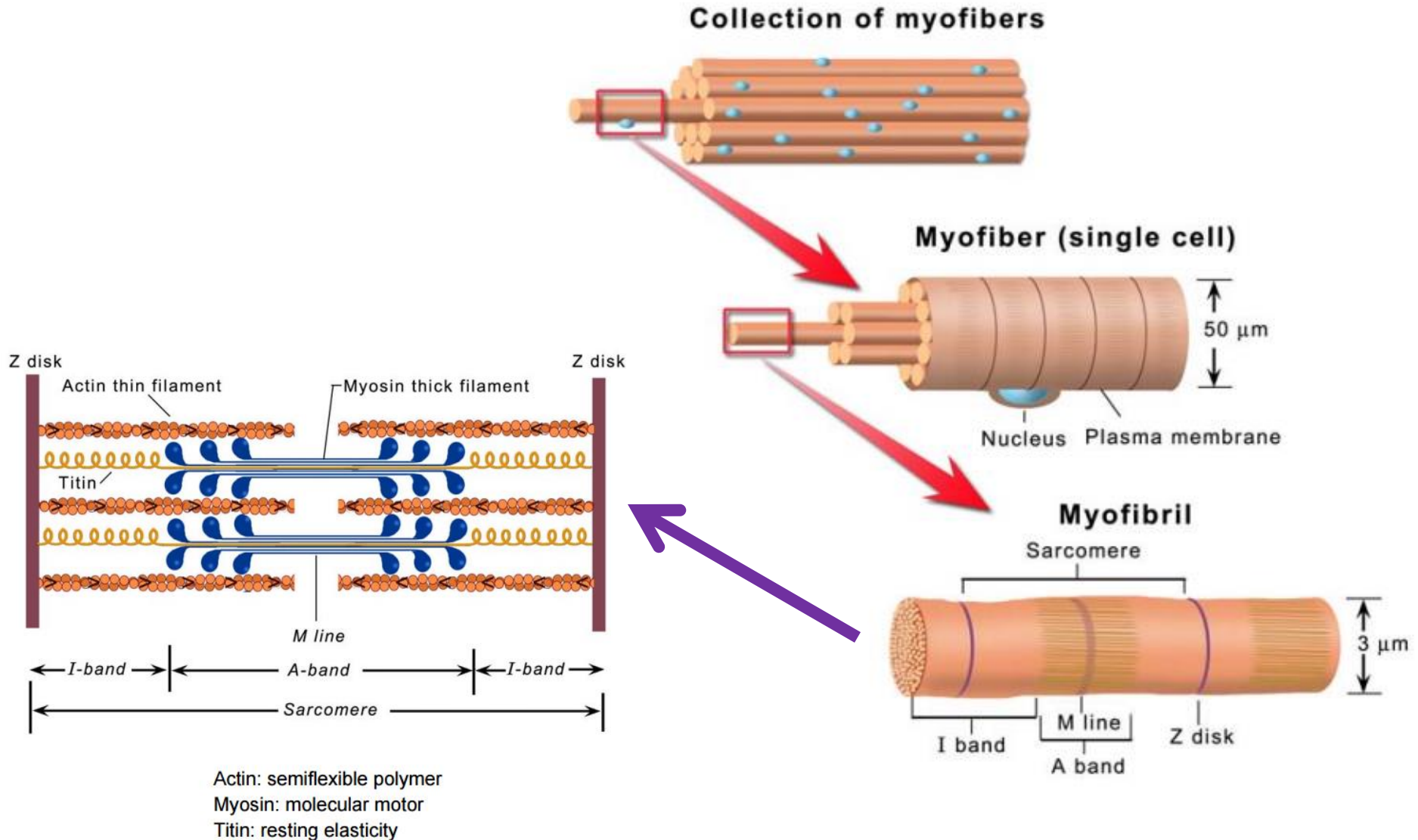
Titin: resting elasticity



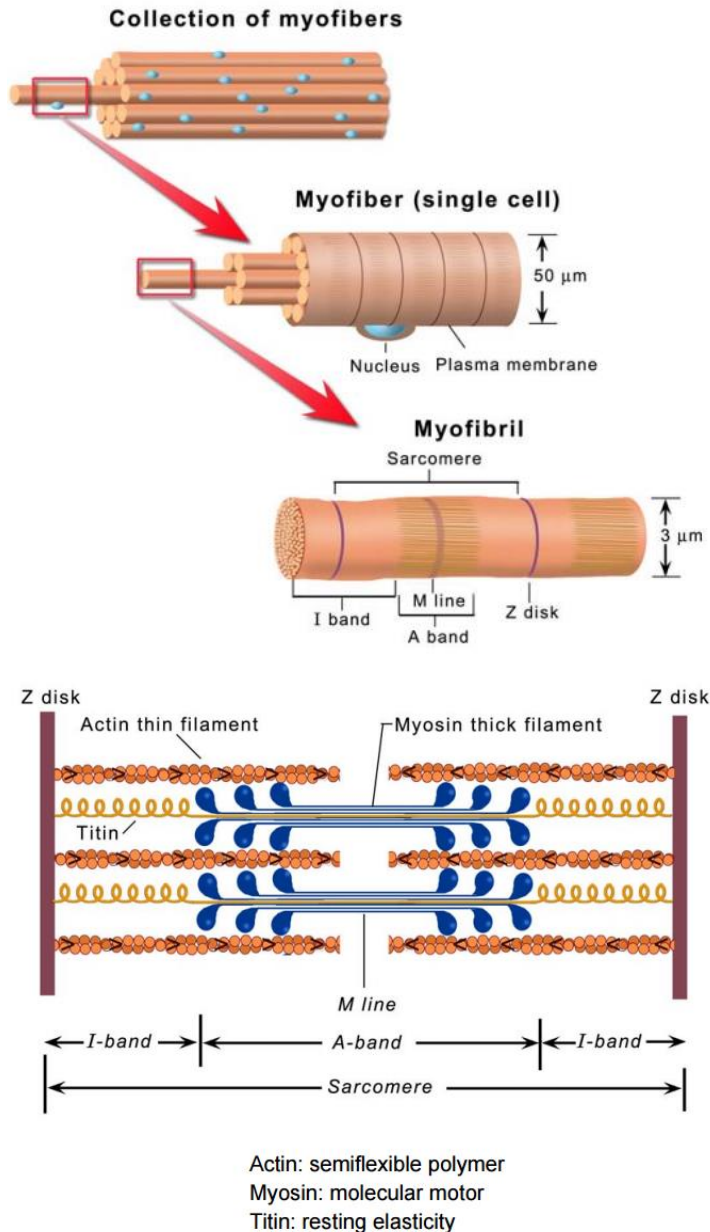
Biological Hierarchy – Proteins to Cells



Biological Hierarchy – Cells to Tissue



Biological Hierarchy – Tissue to Body



THANK YOU!

