

ME 411 / ME 511

# Biological Frameworks for Engineers

# Class Organization

- Hw 6 due Monday
- Lab 3 due Wednesday

# Class Organization

- Tiny Workhorses Project (Grads only)
  - All papers due Nov 30<sup>th</sup>
  - Presentations Schedule:

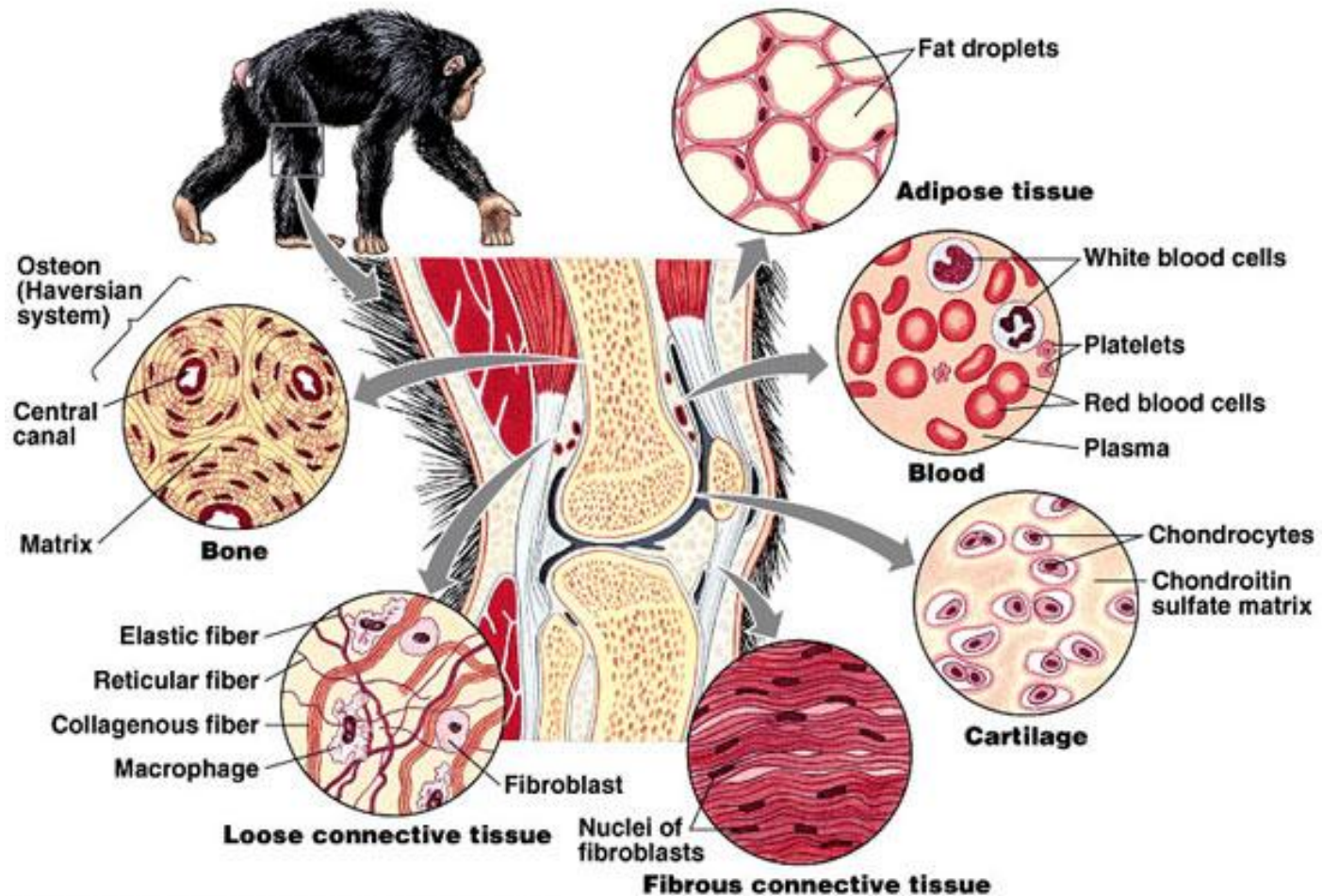
Who?	What?	When?
Corey & Cory	Mysoin II	Nov 28
Nathan & John	Kinesin	Nov 28
Babak & Alexi	Prestin	Nov 28
Hanna & Lei	F0F1-ATPase	Nov 30
Nikita & Wes	Rotaxane	Nov 30
Michael & Shane	Dynein	Nov 30



ME 411 / ME 511

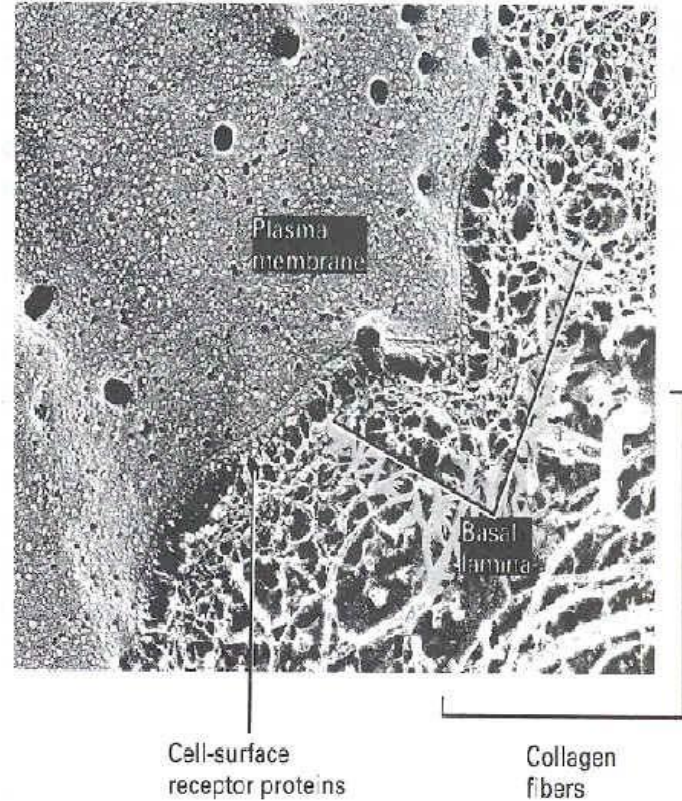
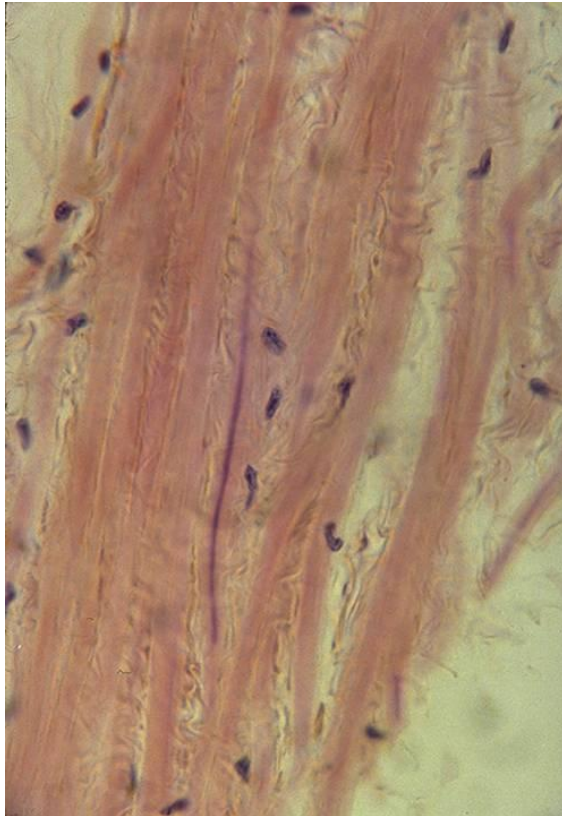
# Connective Tissue

# Connective Tissue Types





# Extracellular Matrix

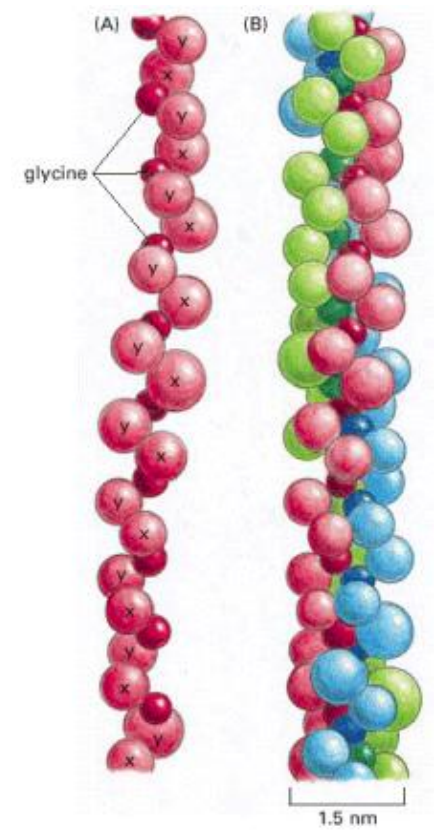
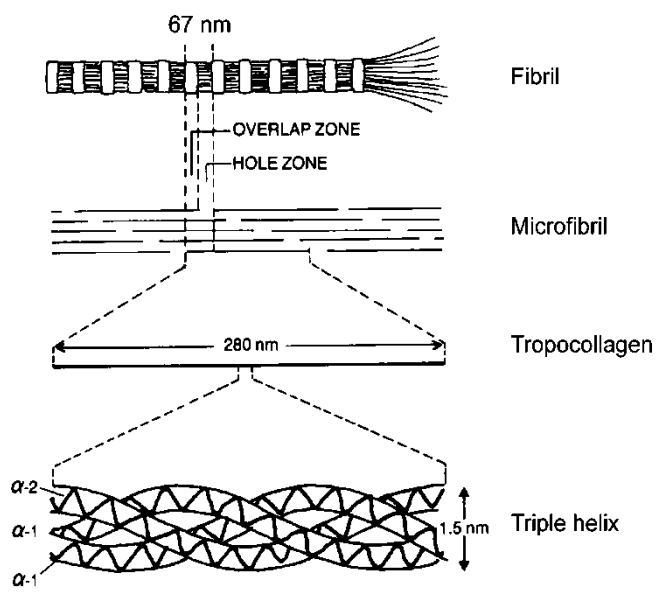


# ECM Constituents

Table 9.7. Biochemical constituents of soft connective tissues. The values for ligament refer to ligaments of the extremities; elastic ligaments (e.g., in the spine) have substantially more elastin (see the description of ligaments in Section 9.9.1). Minor non-collagenous proteins are not listed and make up the remainder of the dry weight.

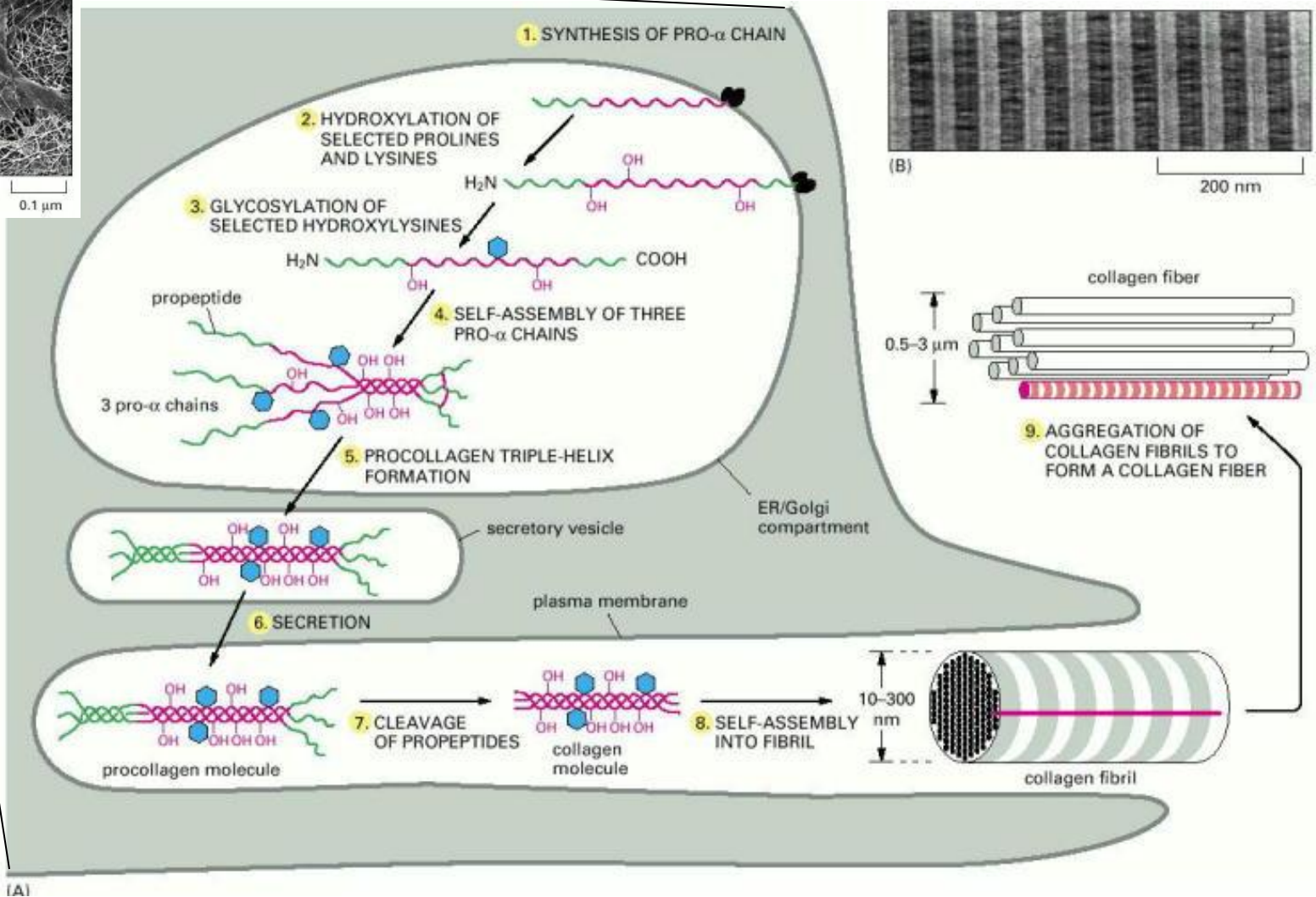
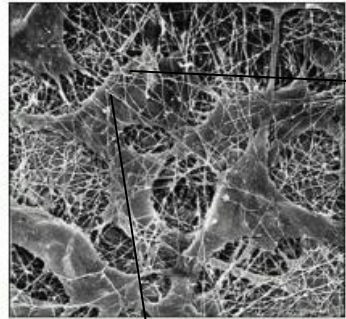
Tissue	% of dry weight			Weight % water in wet sample
	Collagen	Elastin	Proteoglycans	
Tendon	75–85	< 3	1–2	65–70
Ligament (extremity)	75–80	< 5	1–3	55–65
Articular Cartilage	50–75	Trace	20–30	60–80
Fibrocartilage	65–75	Trace	1–3	60–70

# Collagen Structure

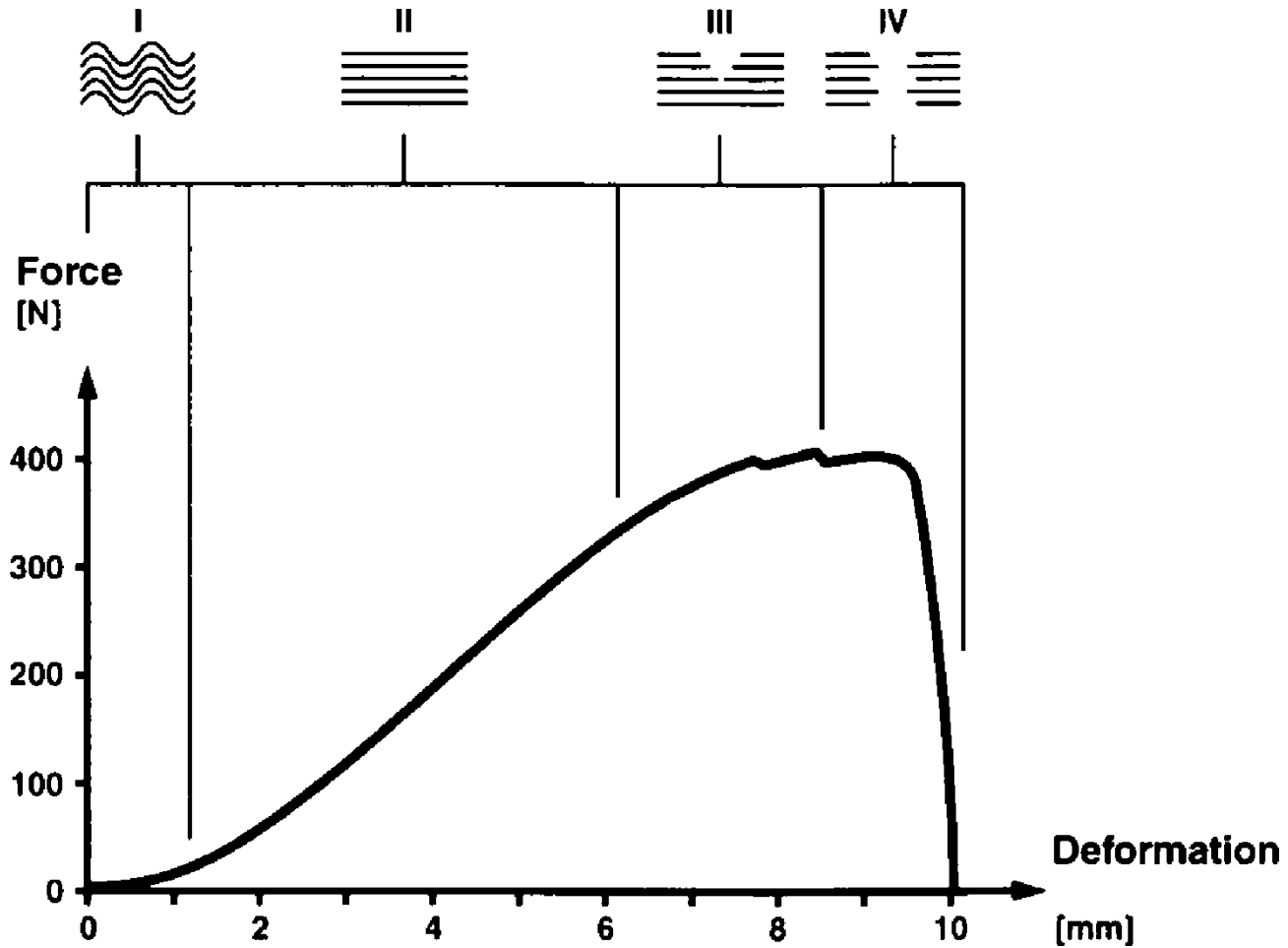




# Biosynthesis of Collagen



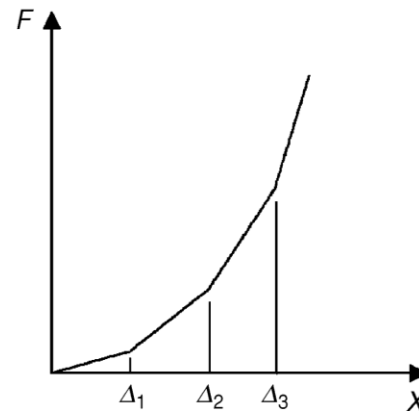
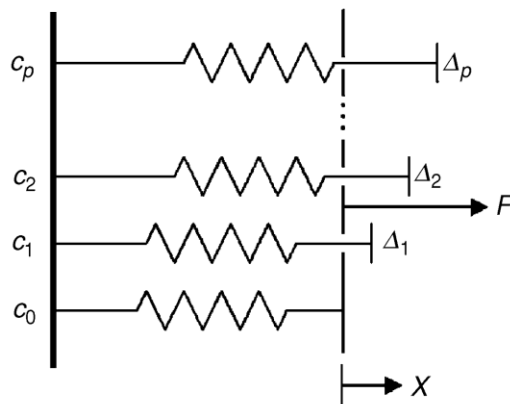
# Collagen Biomechanics



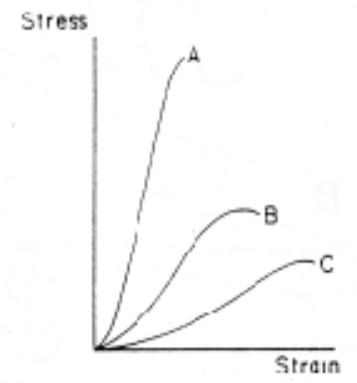
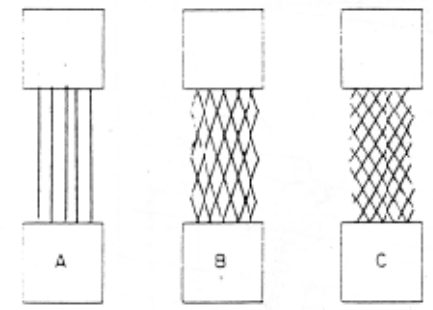
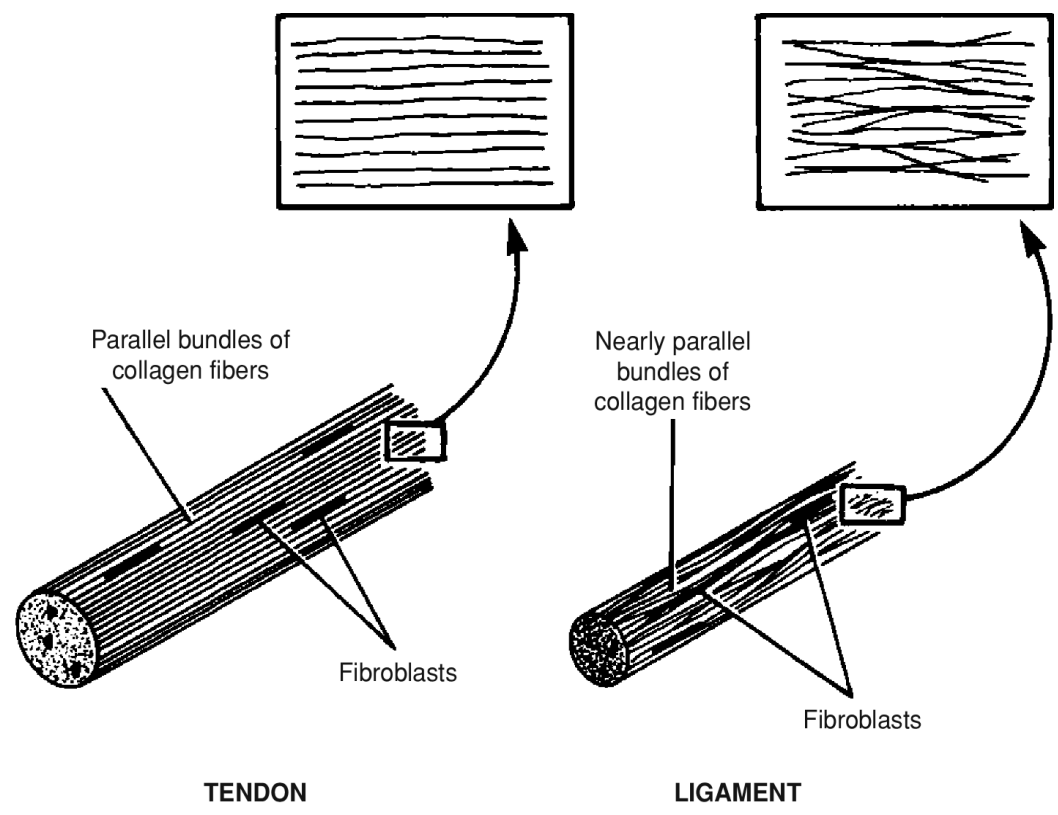
# Crimp



Staggered springs in parallel:

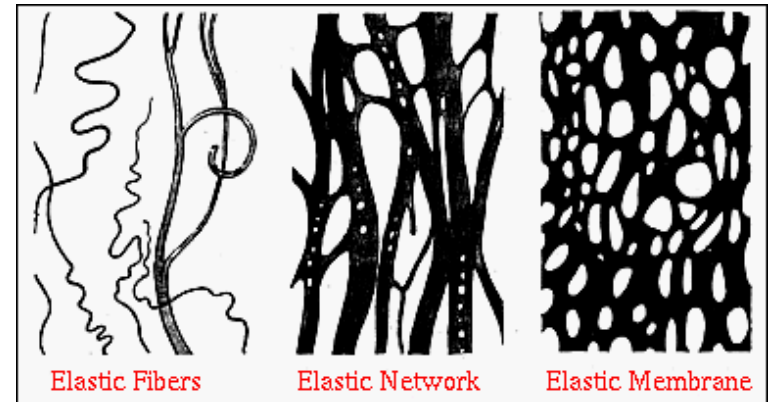
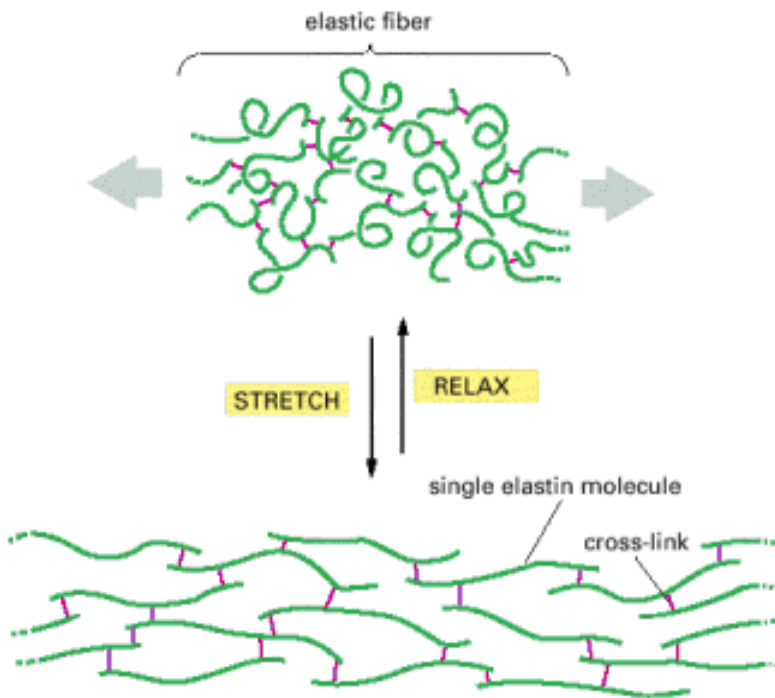


# Alignment

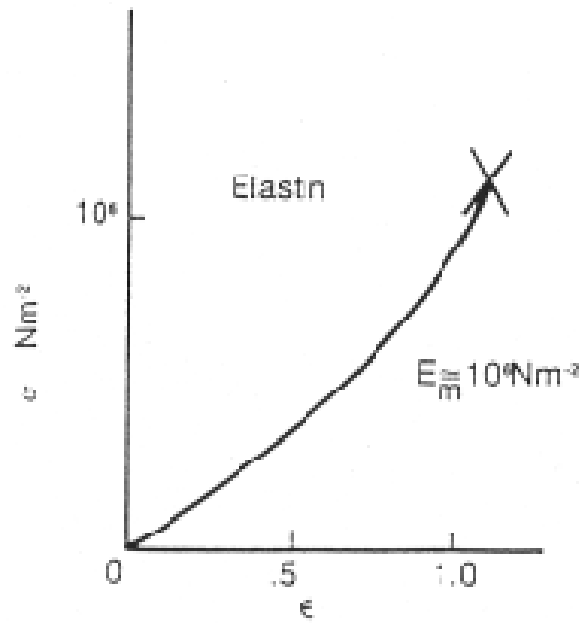




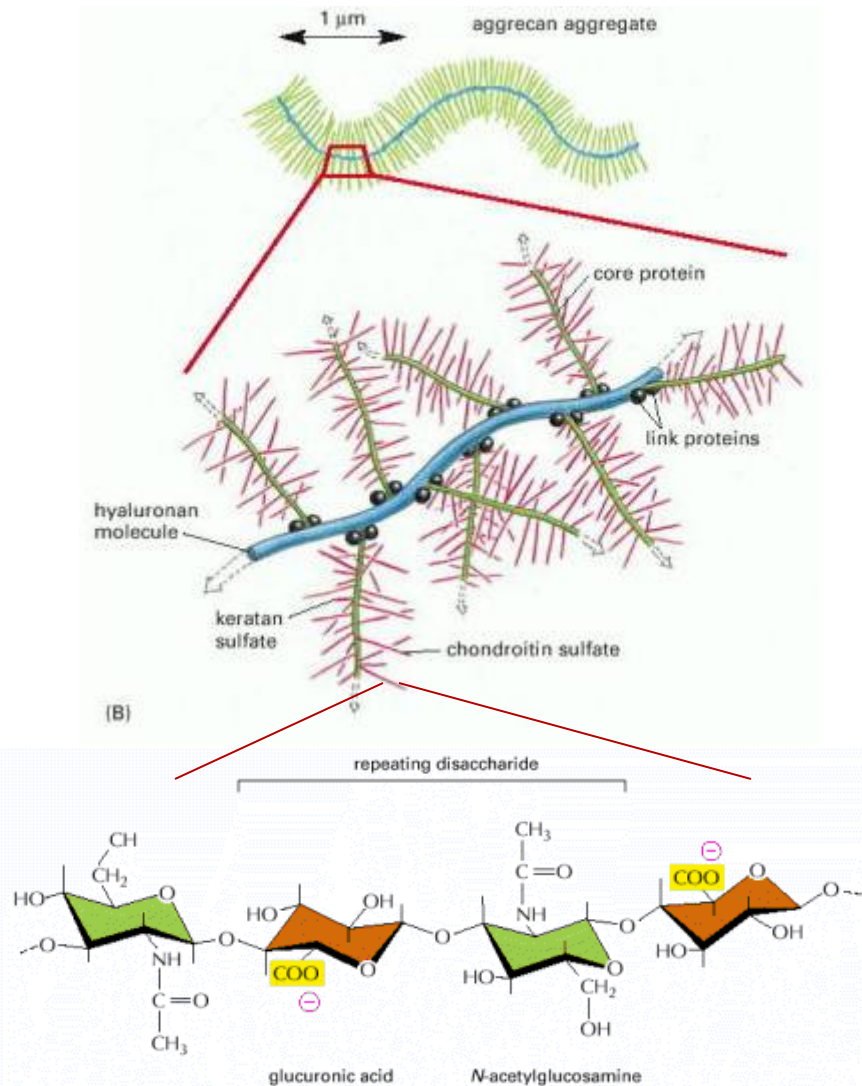
# Structure of Elastin



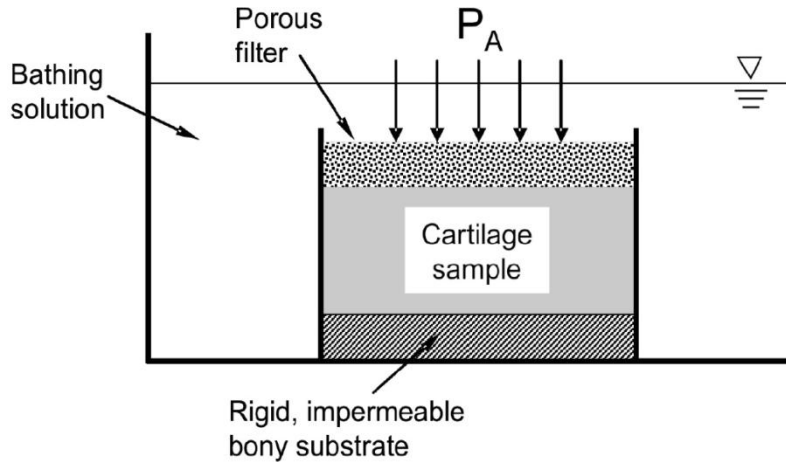
# Elastin Biomechanics



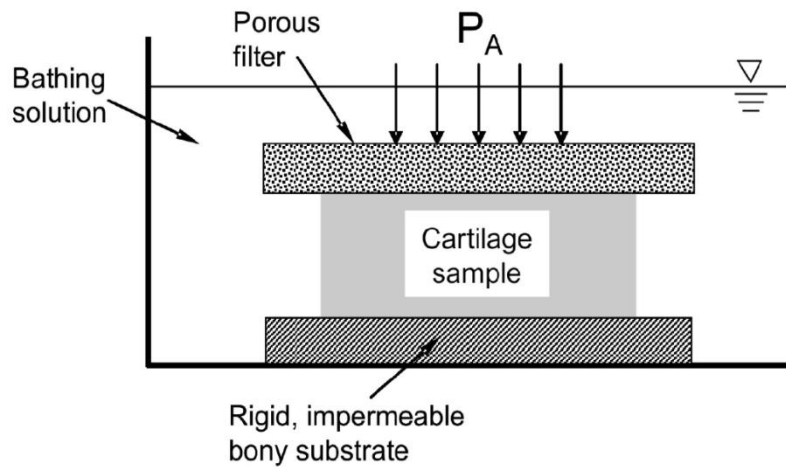
# GAGs & Proteoglycans



# GAG Biomechanics

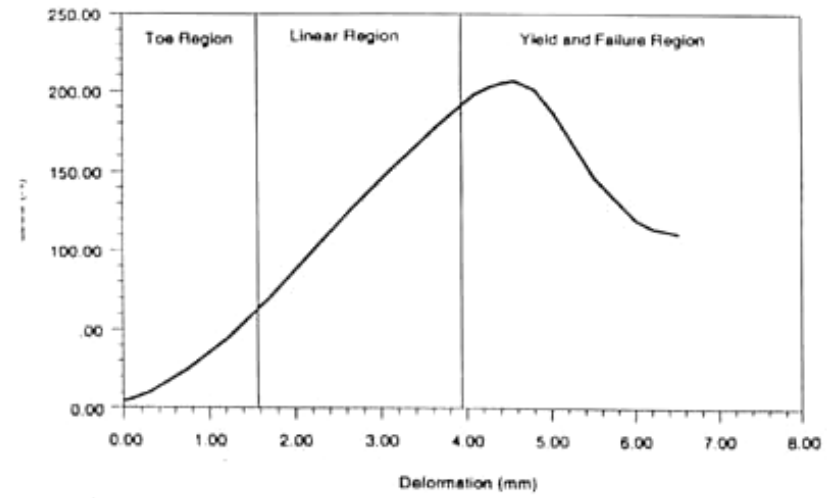
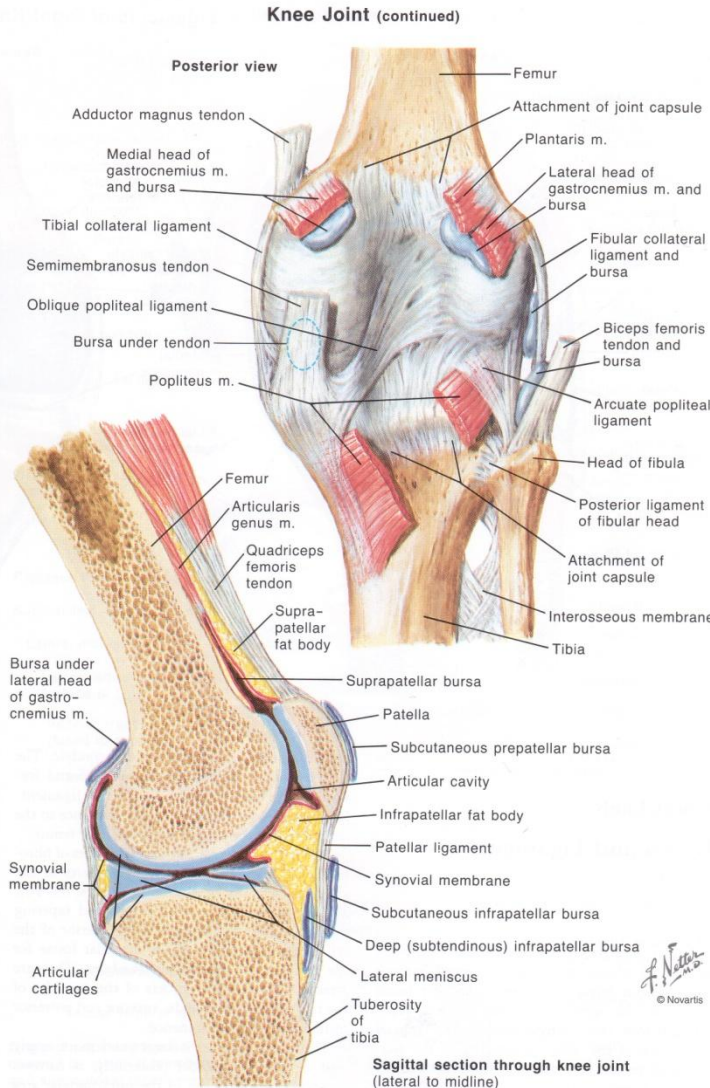


Compression testing

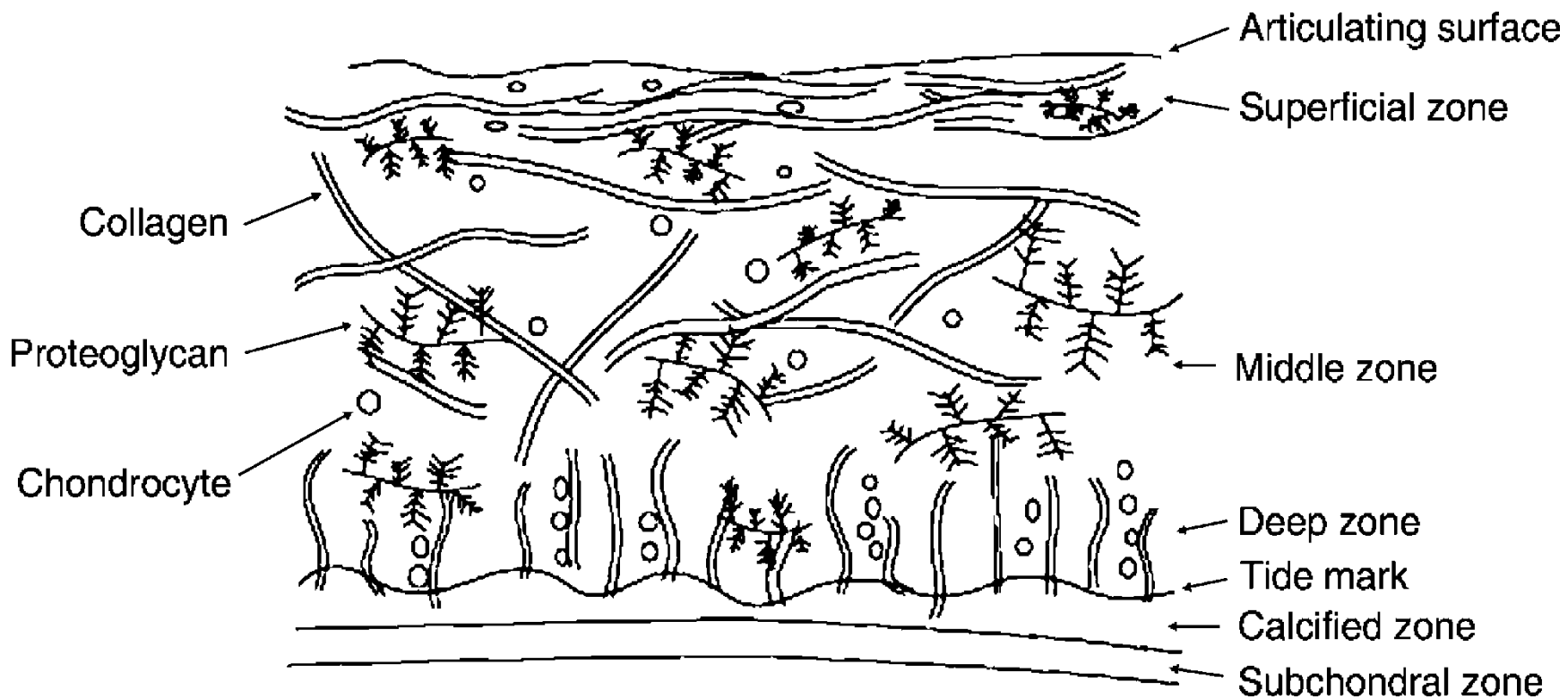




# Tendons & Ligaments



# Cartilage



Questions?