

ME 498 / ME 599

Biological Frameworks for Engineers

Class Organization

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

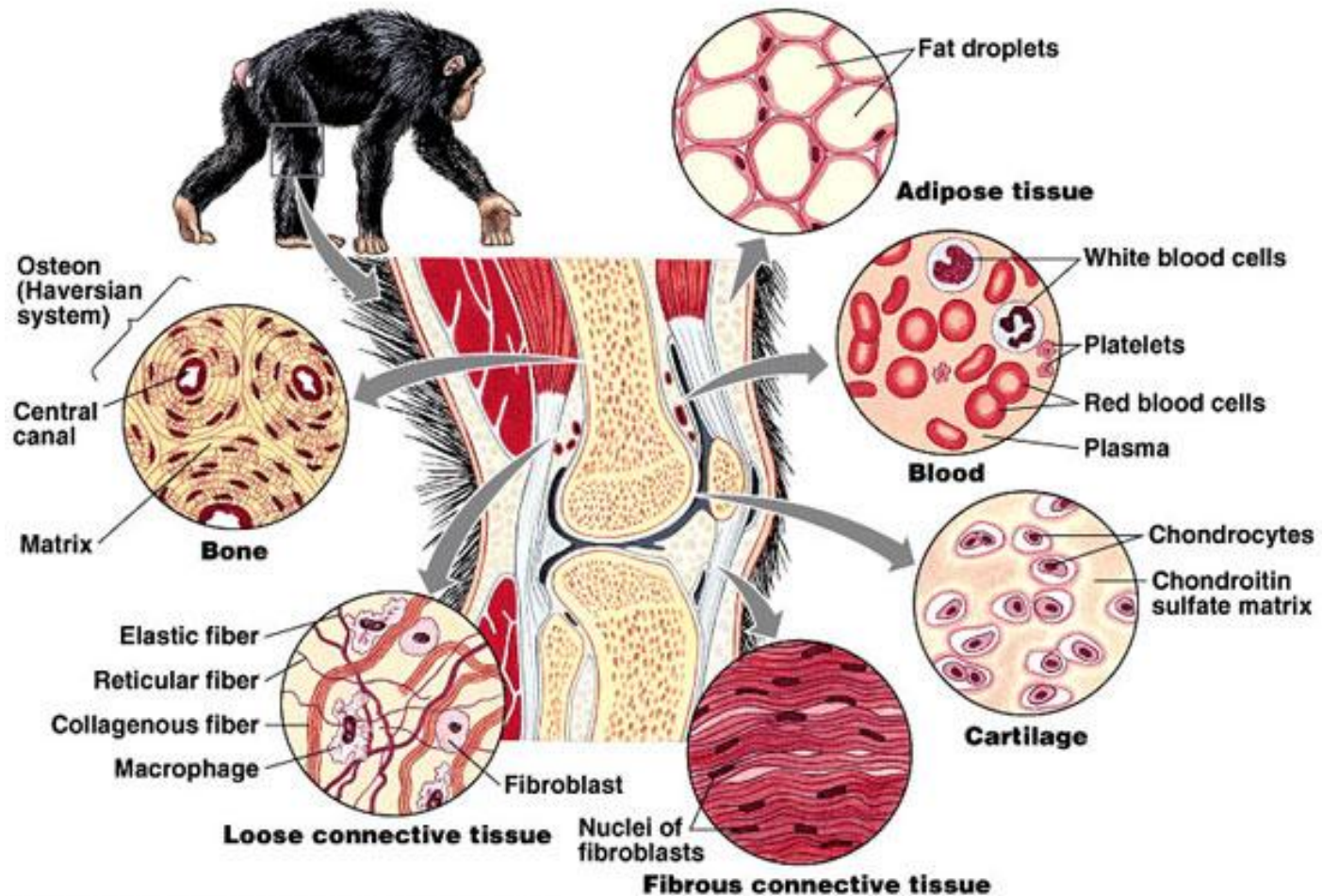
Who?	What?	When?
Alex	Actin	Nov 30 th
Adam	Dynein	Nov 30 th
Brian	F0F1-ATPase	Nov 30 th
Kevin	Kinesin	Dec 2 nd
Grier	Myosin II	Dec 2 nd
Evan	Prestin	Dec 2 nd



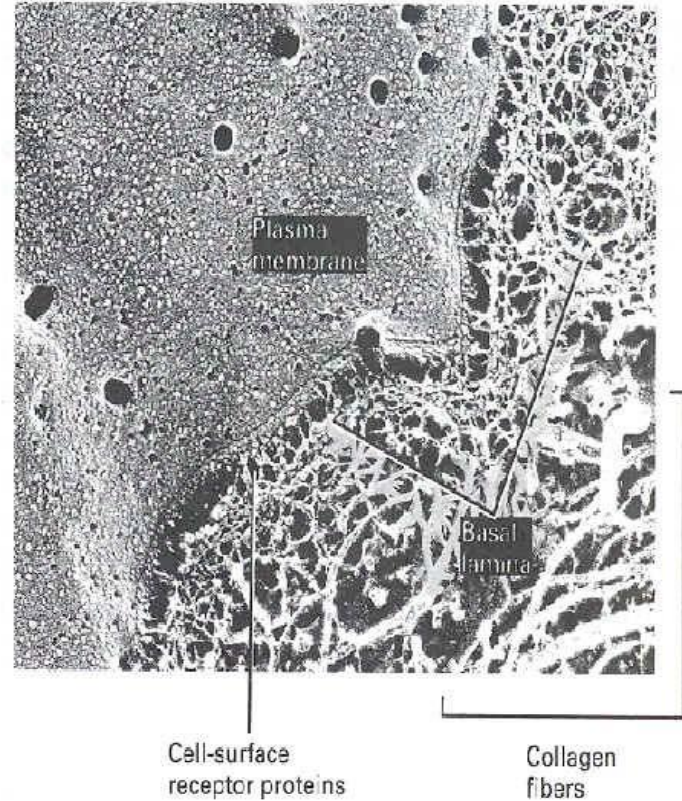
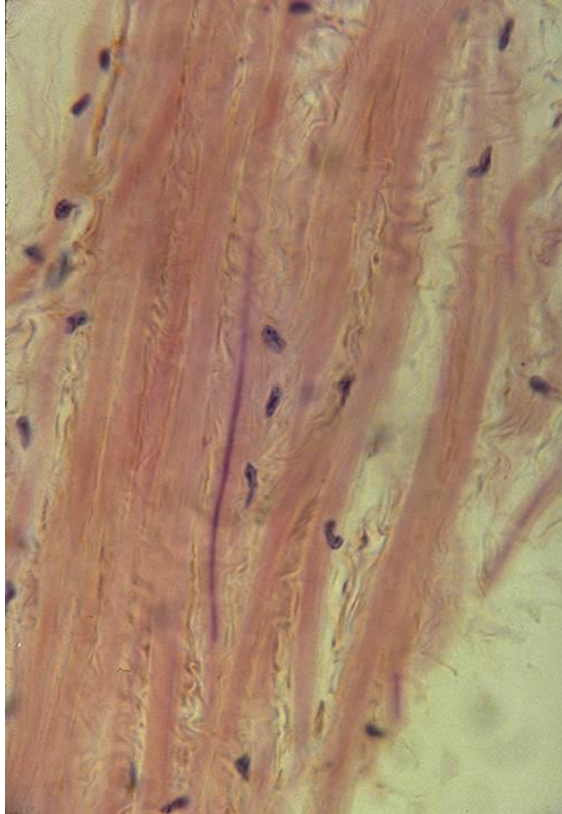
ME 498 / ME 599

Connective Tissue

Connective Tissue Types



Extracellular Matrix

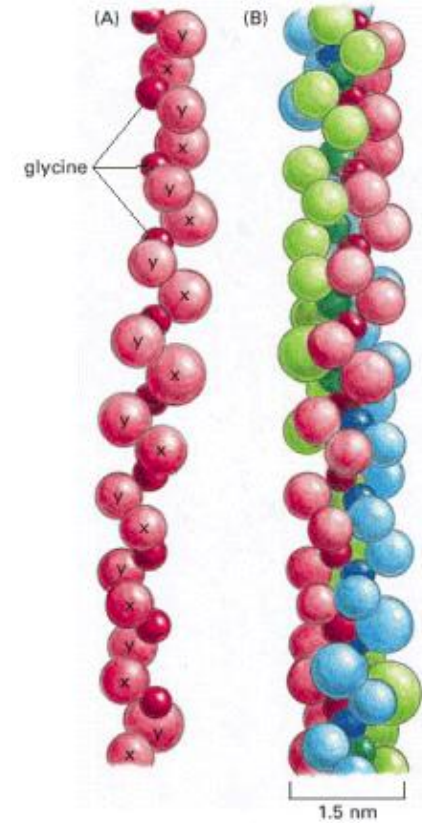
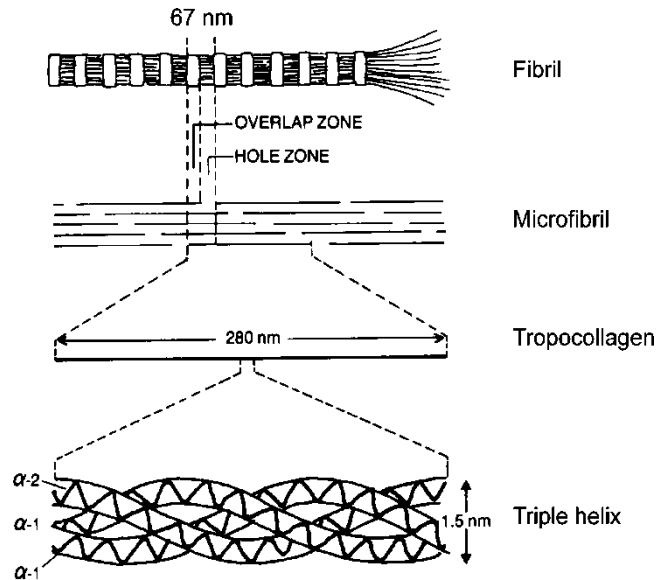
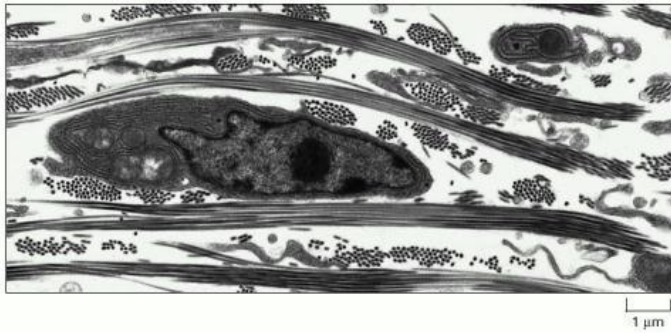


ECM Constituents

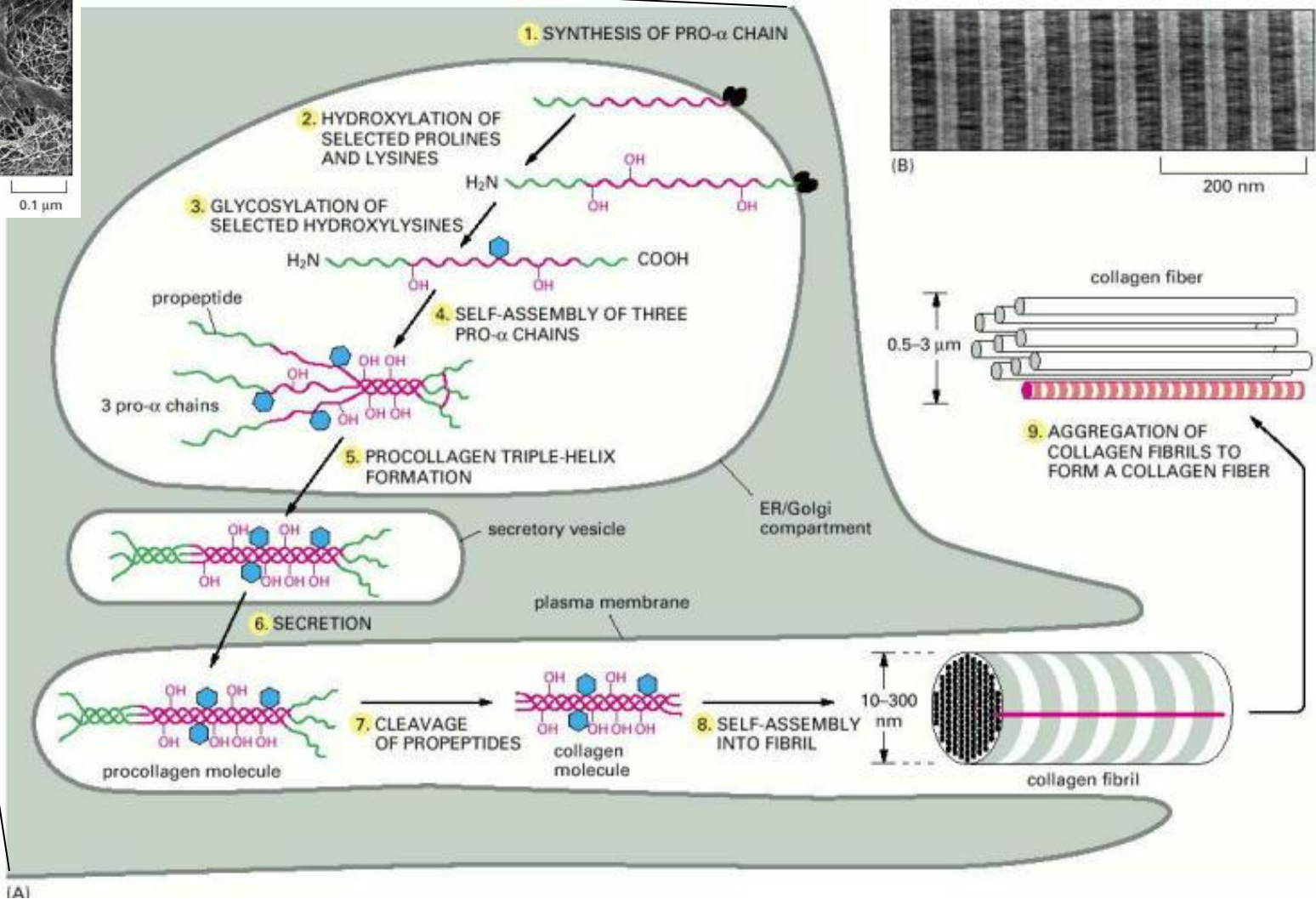
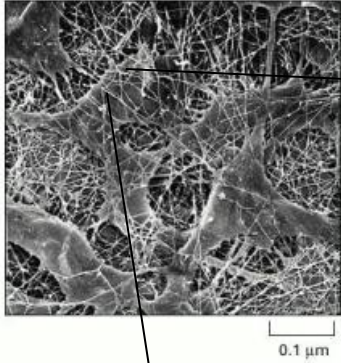
Table 9.7. Biochemical constituents of soft connective tissues. The values for ligament refer to ligaments of the extremities; elastic ligaments (e.g., in the spine) have substantially more elastin (see the description of ligaments in Section 9.9.1). Minor non-collagenous proteins are not listed and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

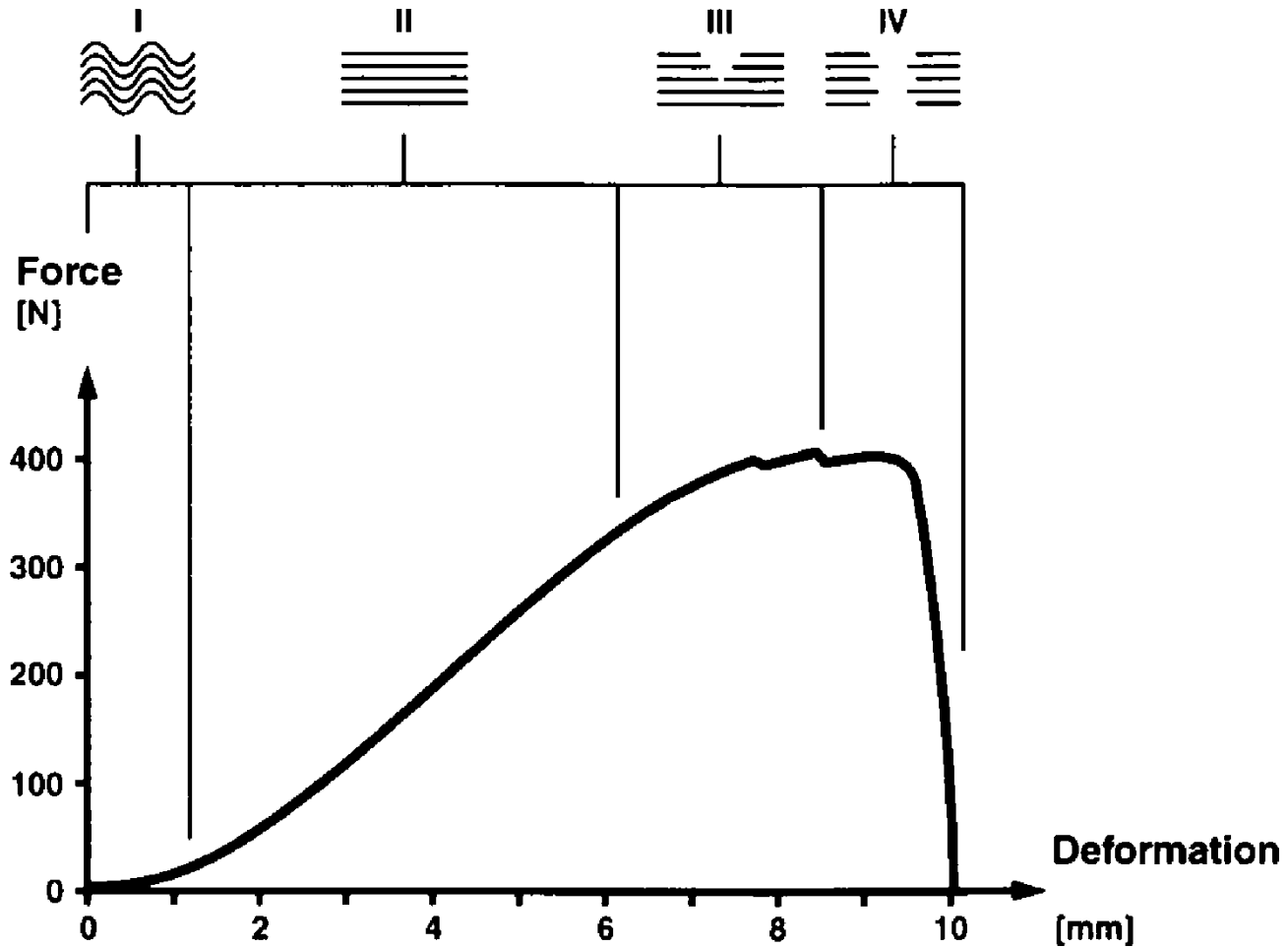
Collagen Structure



Biosynthesis of Collagen



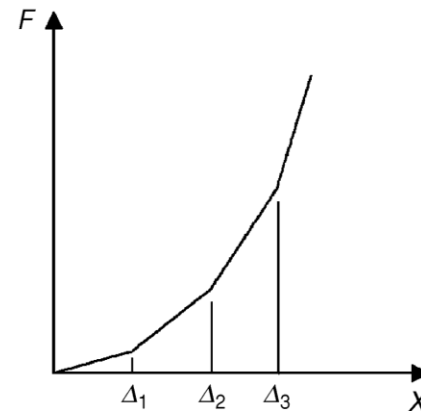
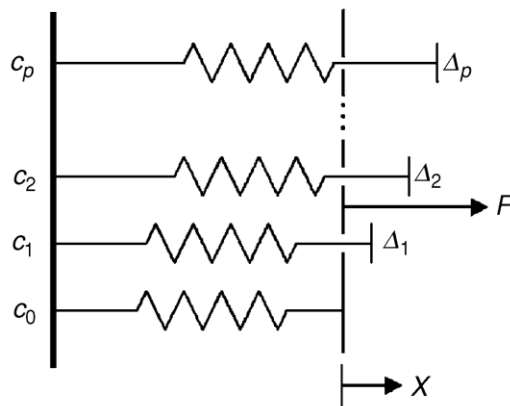
Collagen Biomechanics



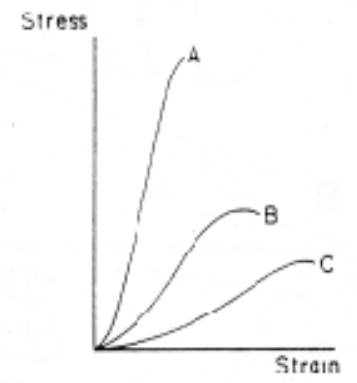
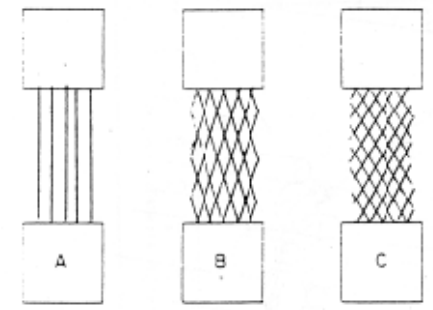
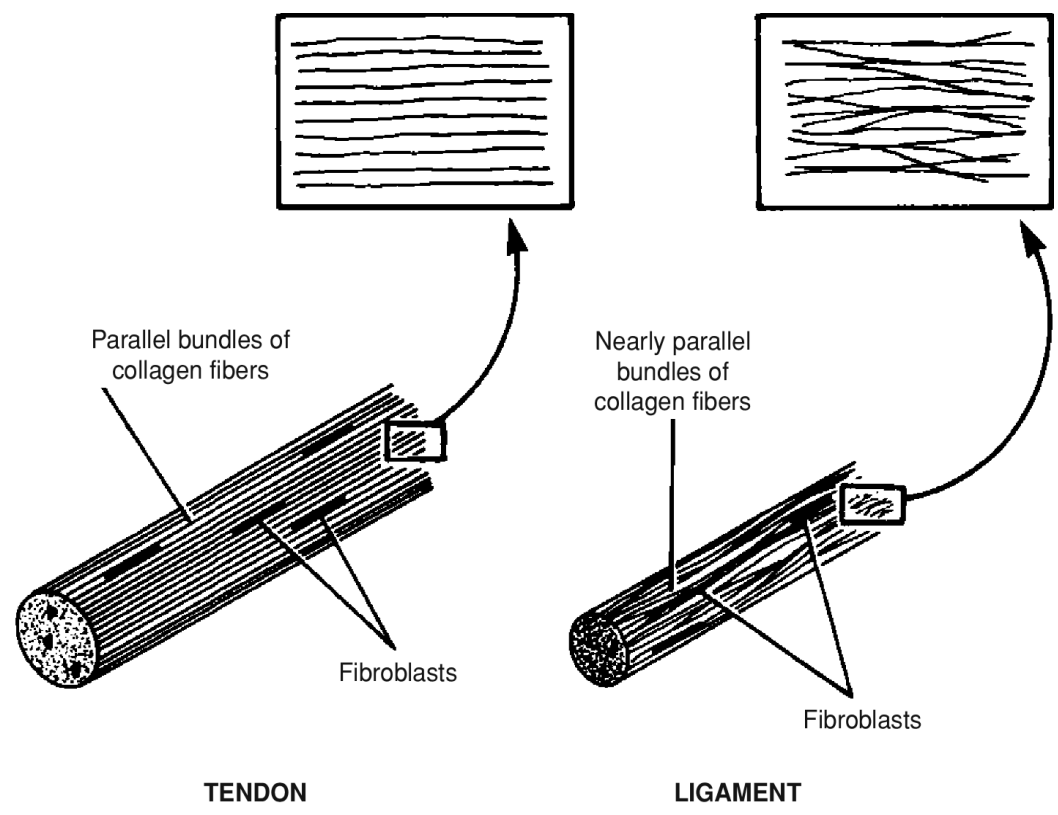
Crimp



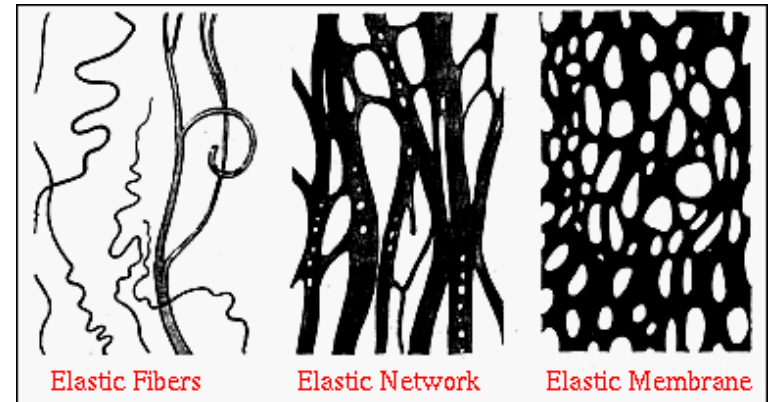
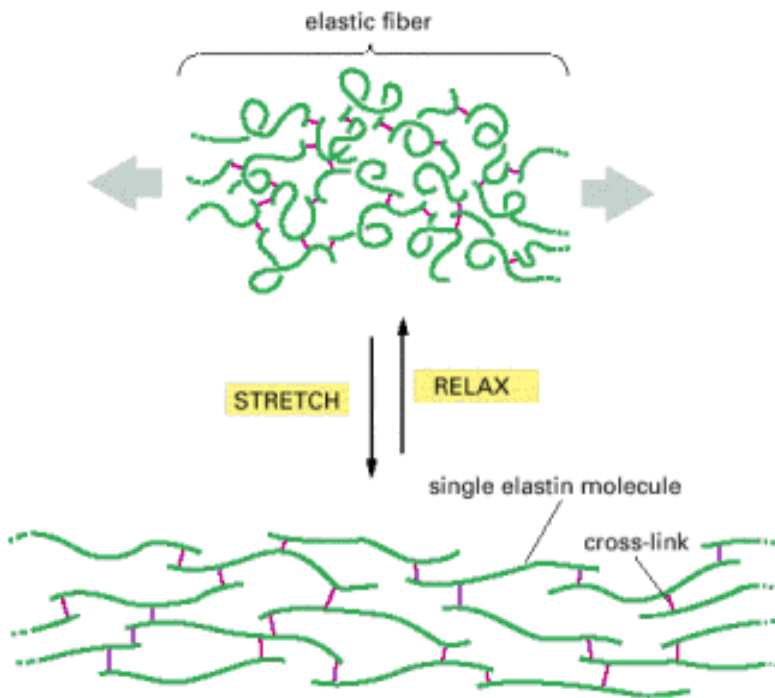
Staggered springs in parallel:



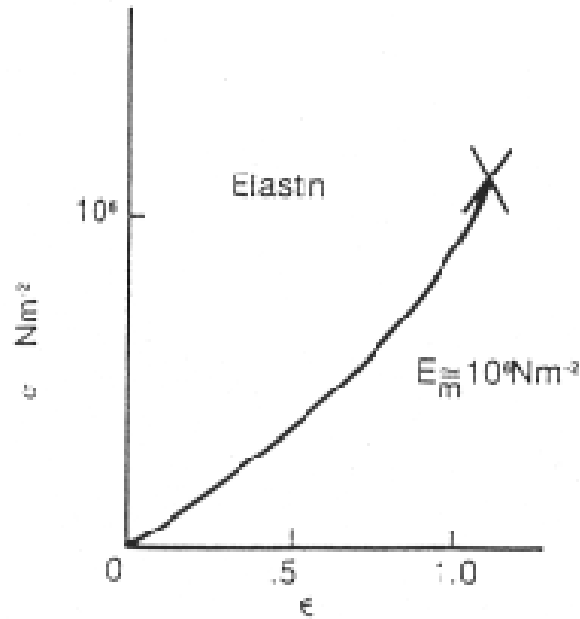
Alignment



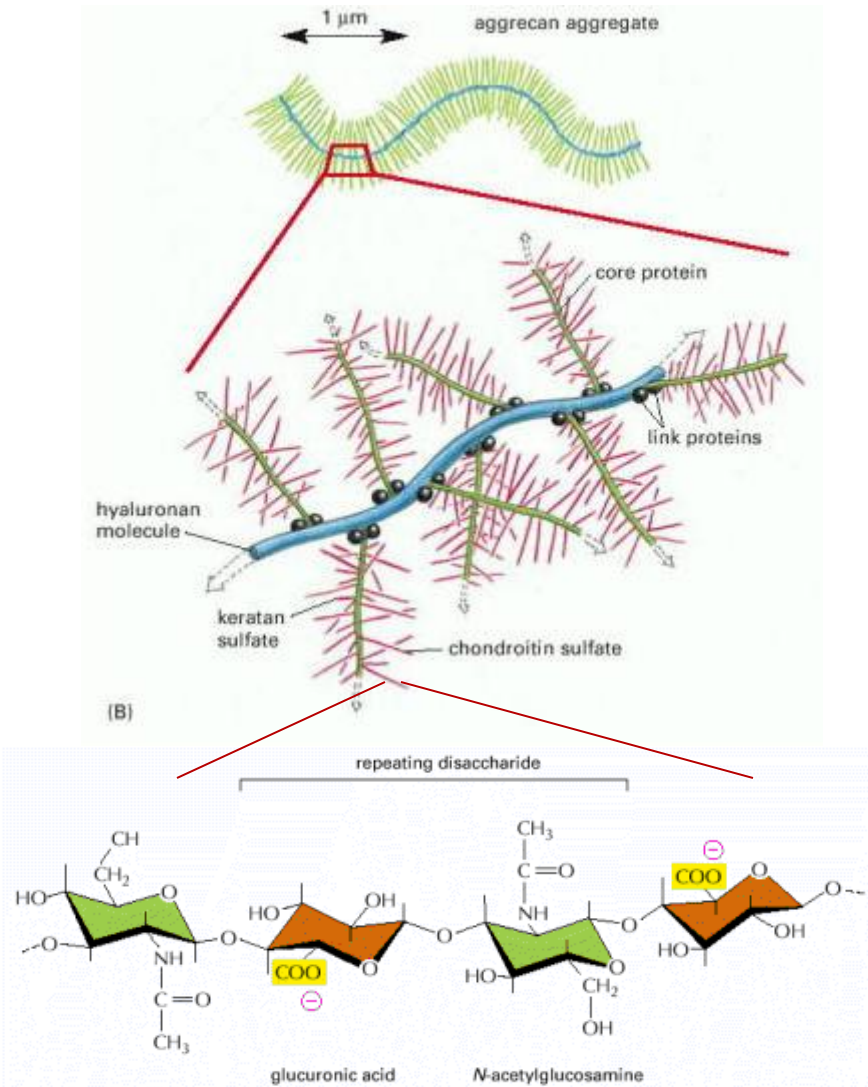
Structure of Elastin



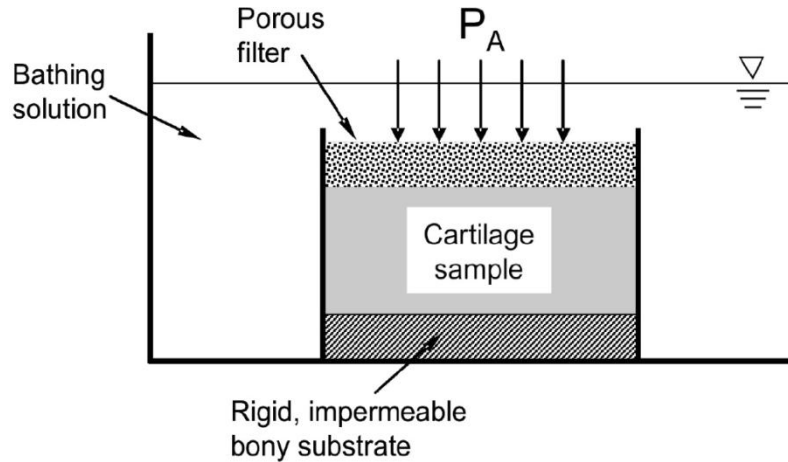
Elastin Biomechanics



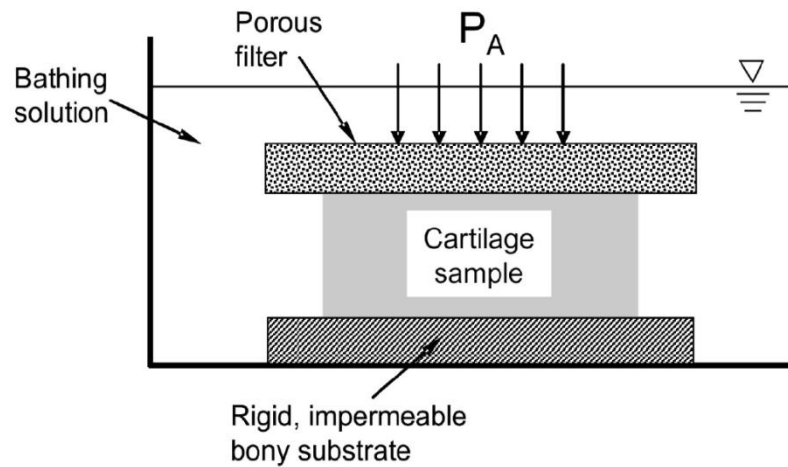
GAGs & Proteoglycans



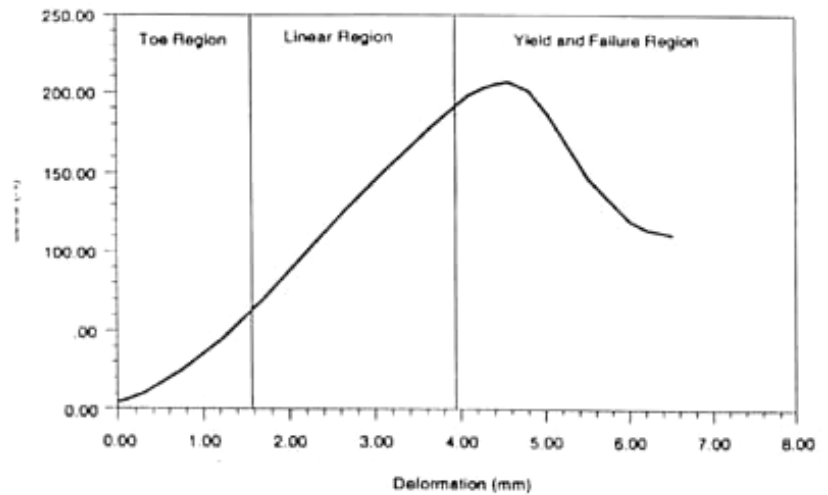
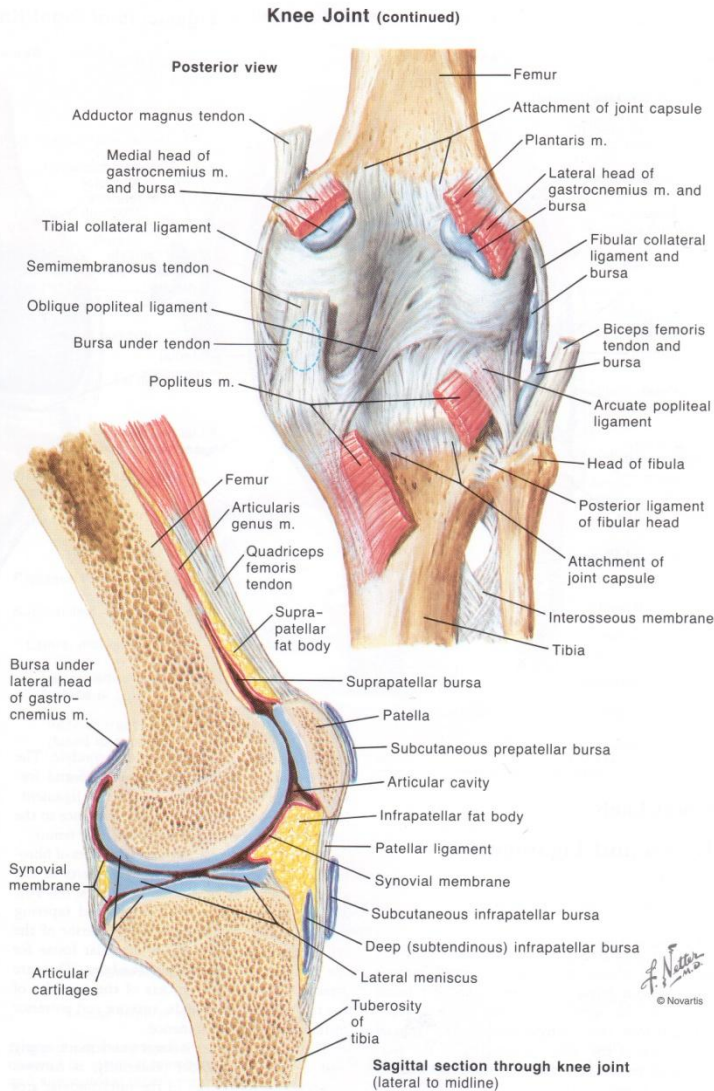
GAG Biomechanics



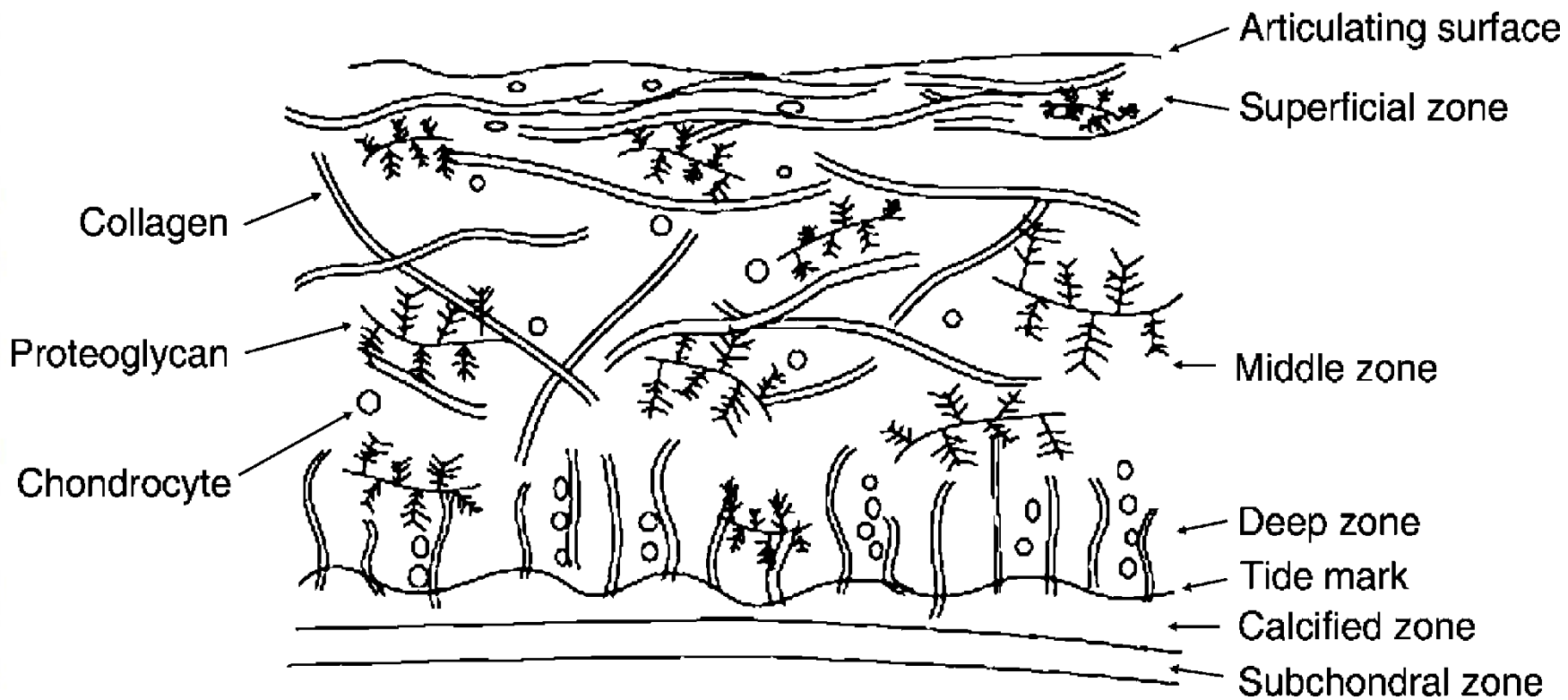
Compression testing



Tendons & Ligaments



Cartilage



Questions?