

ME 411 / ME 511

Biological Frameworks for Engineers

Class Organization

- HW5 assigned. Due Fri Nov 14
- Lab 3 – Muscle Lab
 - Next Friday (11/14)
 - MEB 127
 - 1:30, 2:30, 3:30 sign-up

Class Organization

- *Tiny Workhorse Projects*

Motor Protein	Grad Student
Helicase	Kevin & Ye
Actin-Myosin	Nathan & Kateri
Clathrin	Scott & Spencer
B. Flagella	Brian & Wai
Kinesin-5	Jarrold & Mark
Dynein	Tadbhagya & Amit
F0F1-ATPase	Tzu-Lin & Jiayang
Myosin XI	James & Kevin

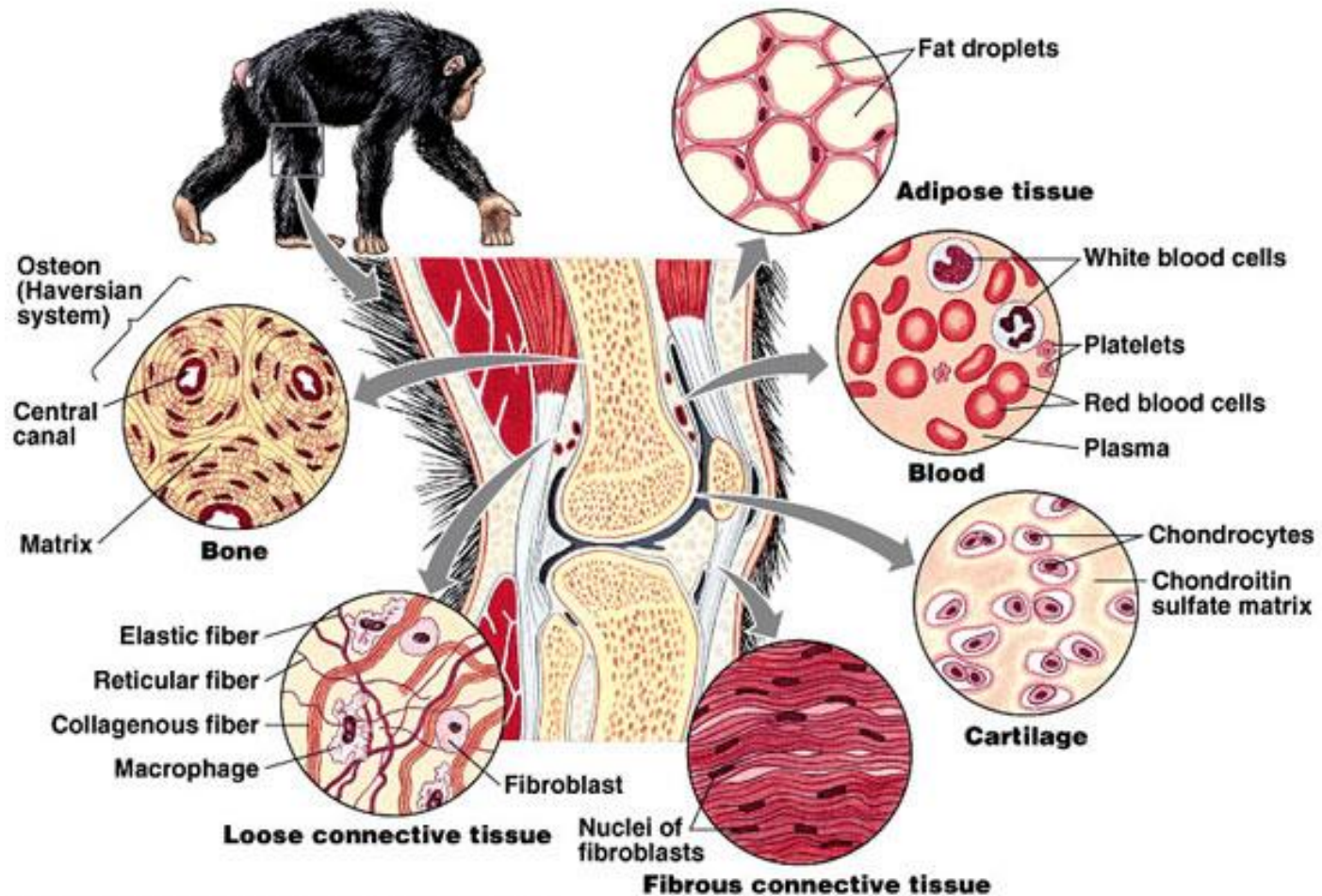


“Git along little doggies!”

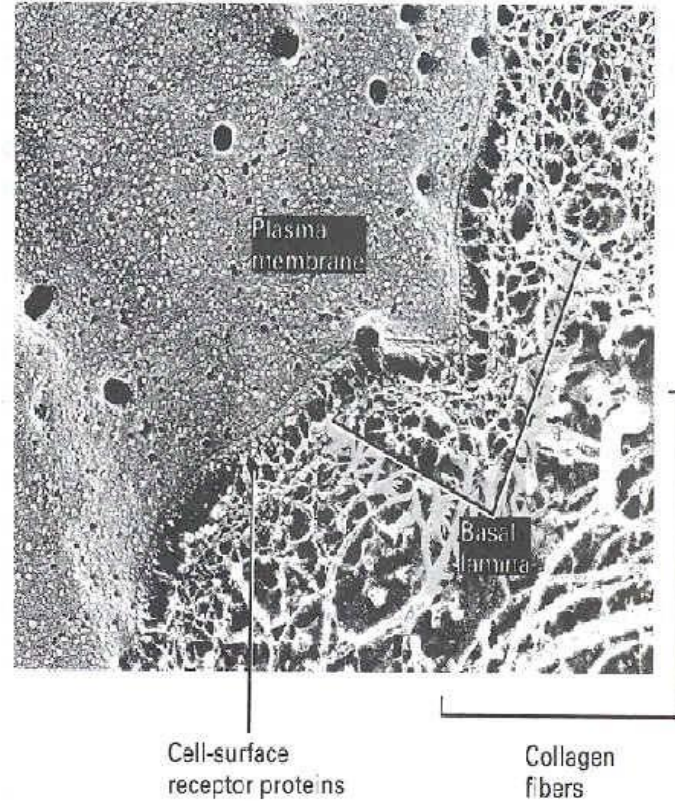
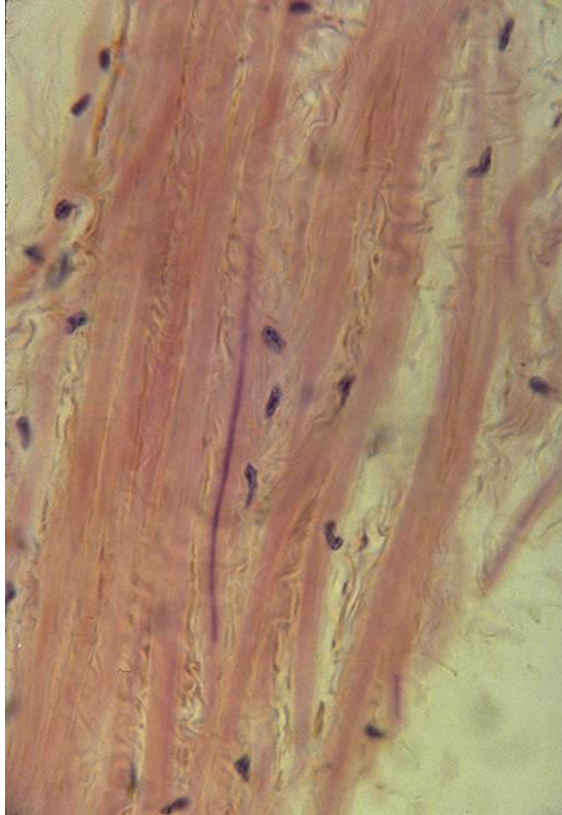
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Connective Tissue

Connective Tissue Types



Extracellular Matrix

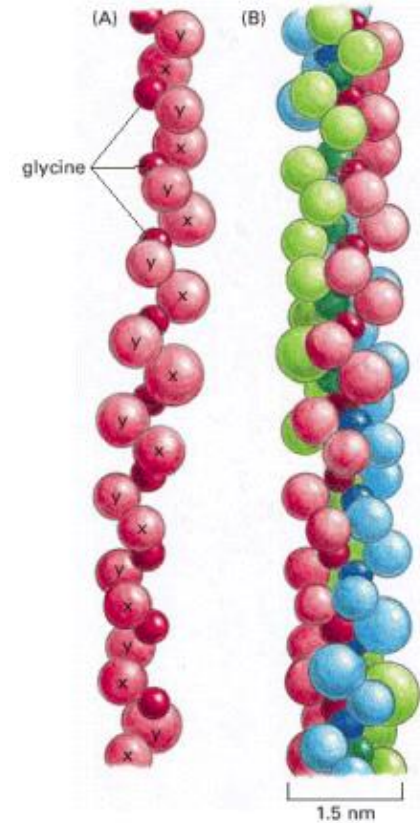
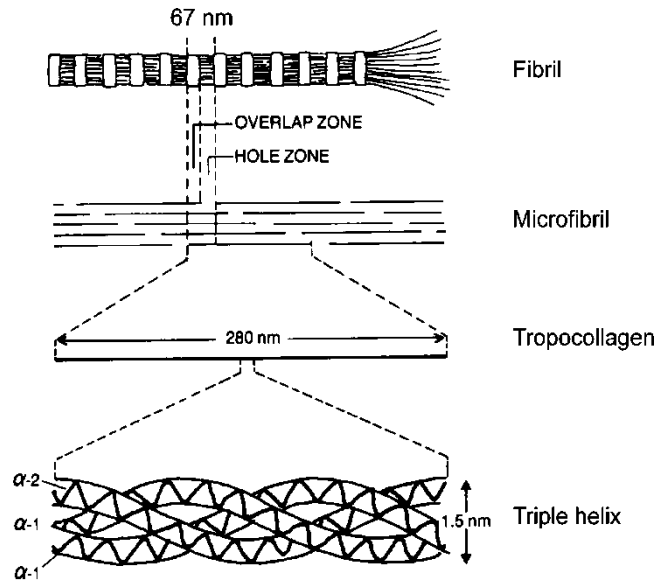
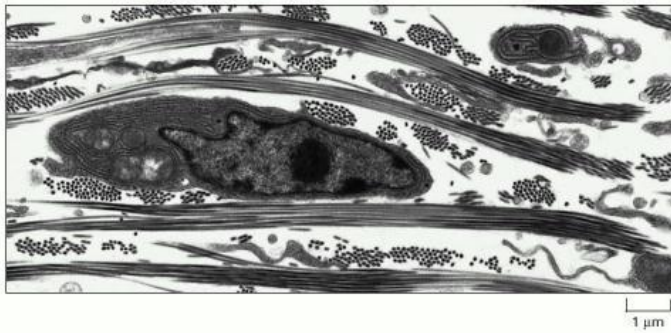


ECM Constituents

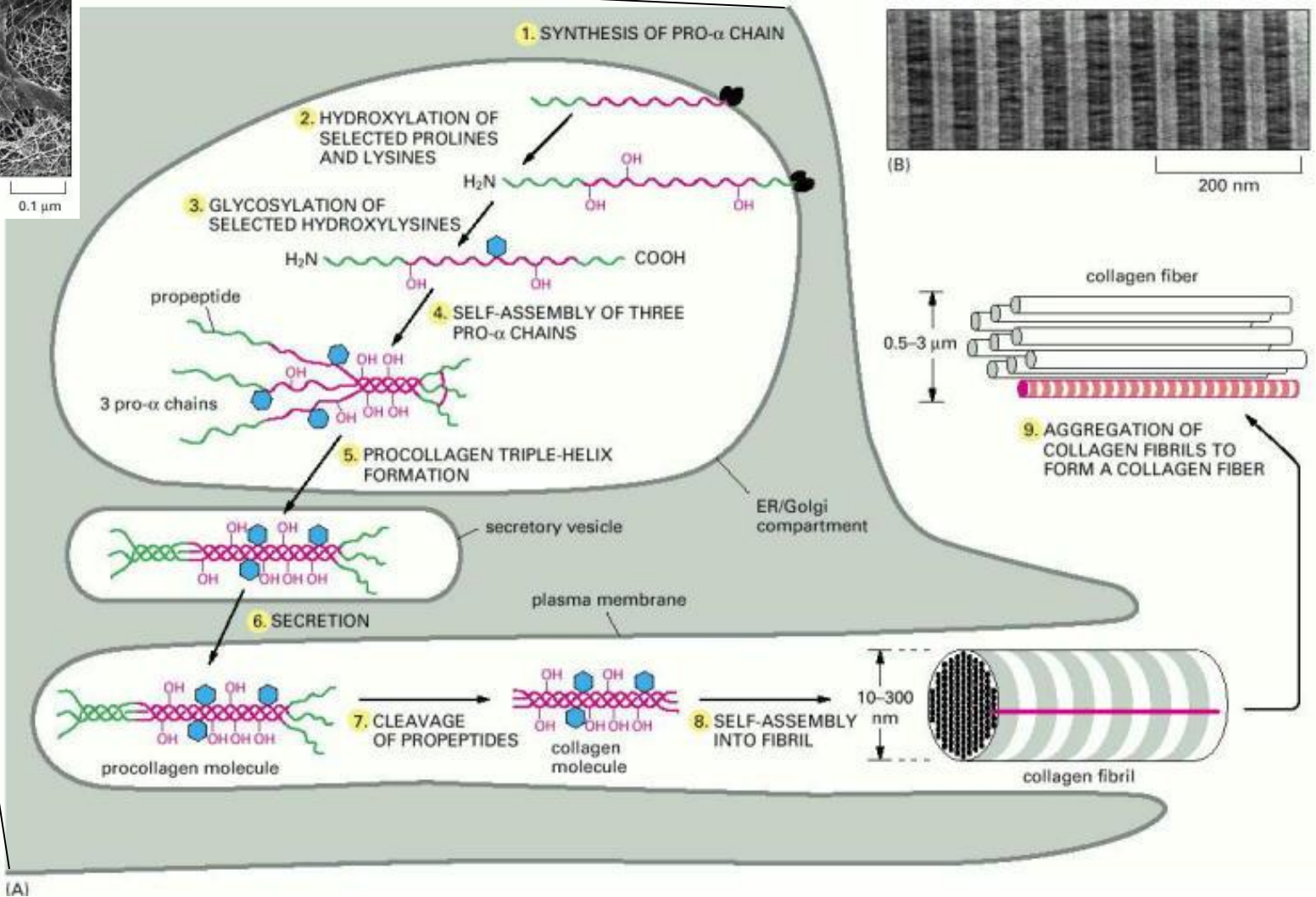
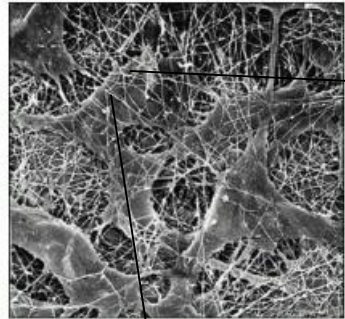
Table 9.7. Biochemical constituents of soft connective tissues. The values for ligament refer to ligaments of the extremities; elastic ligaments (e.g., in the spine) have substantially more elastin (see the description of ligaments in Section 9.9.1). Minor non-collagenous proteins are not listed and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

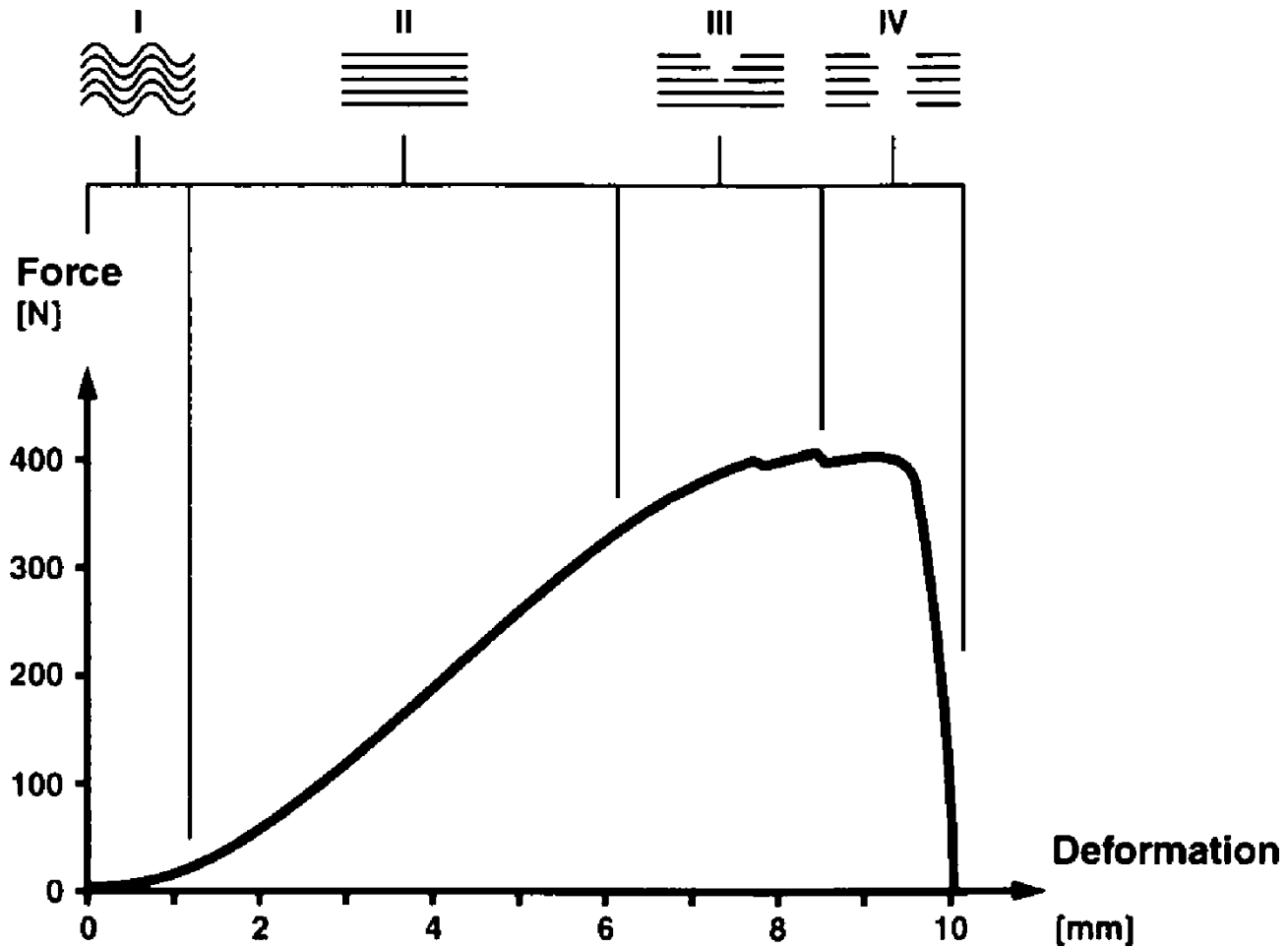
Collagen Structure



Biosynthesis of Collagen



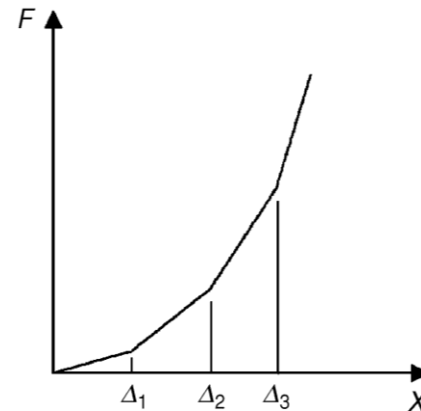
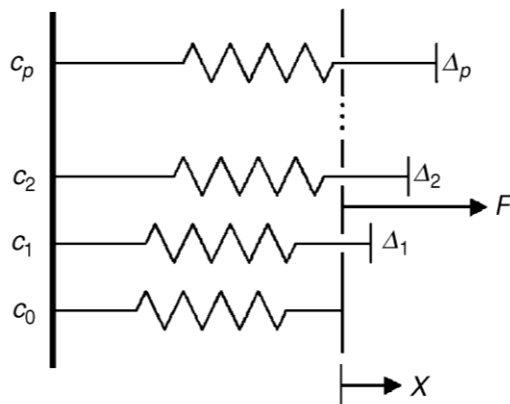
Collagen Biomechanics



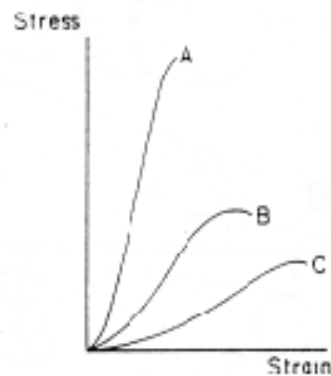
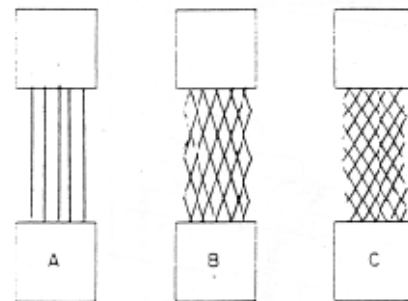
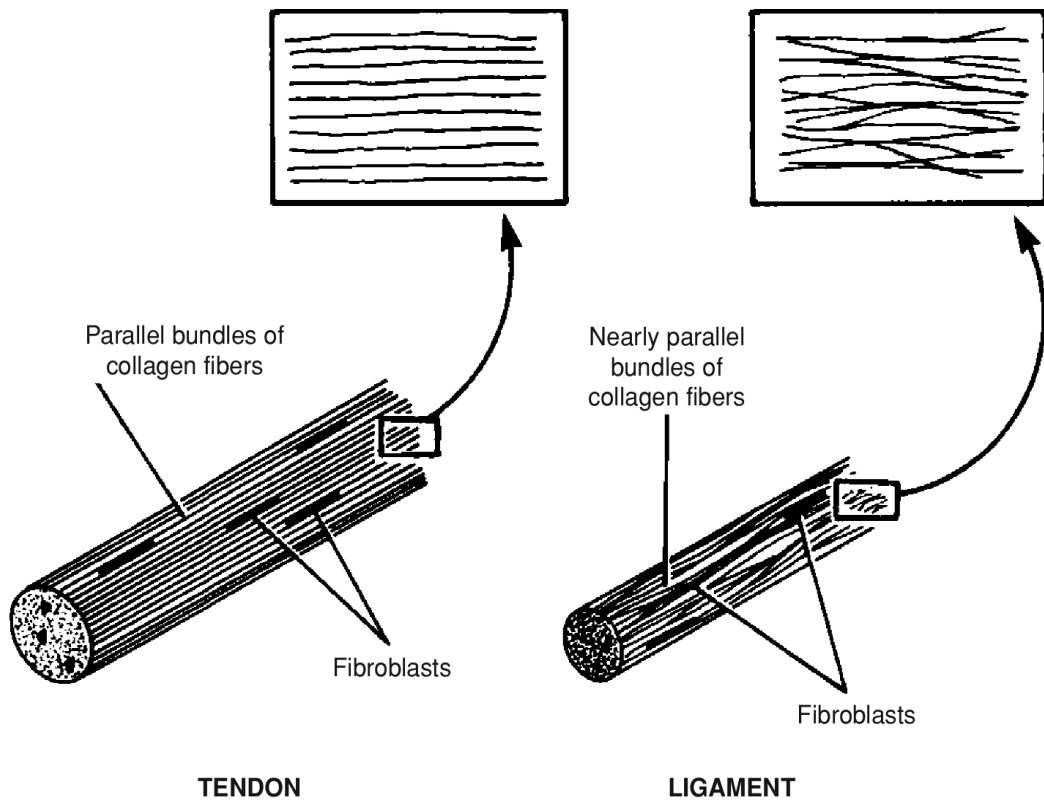
Crimp



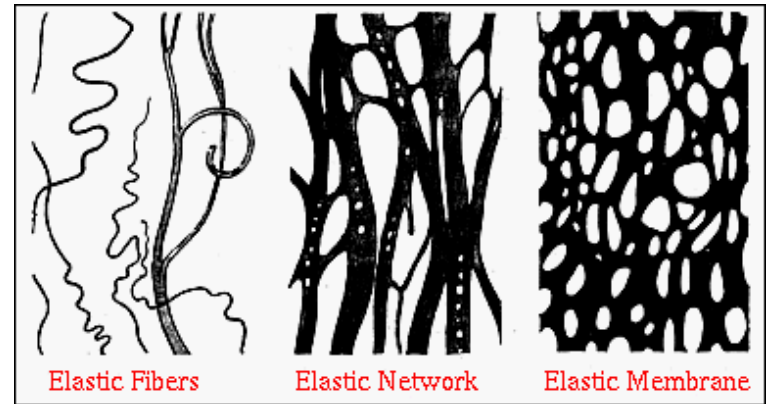
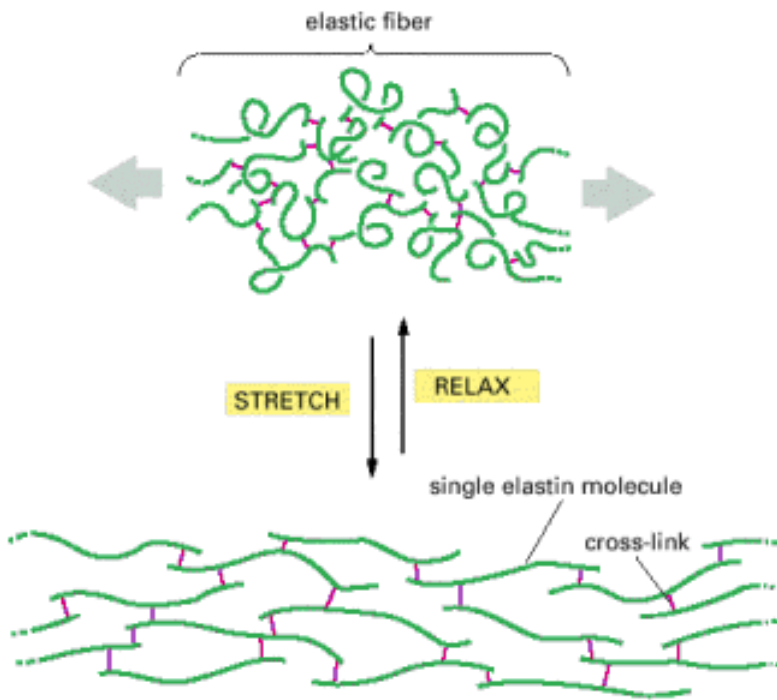
Staggered springs in parallel:



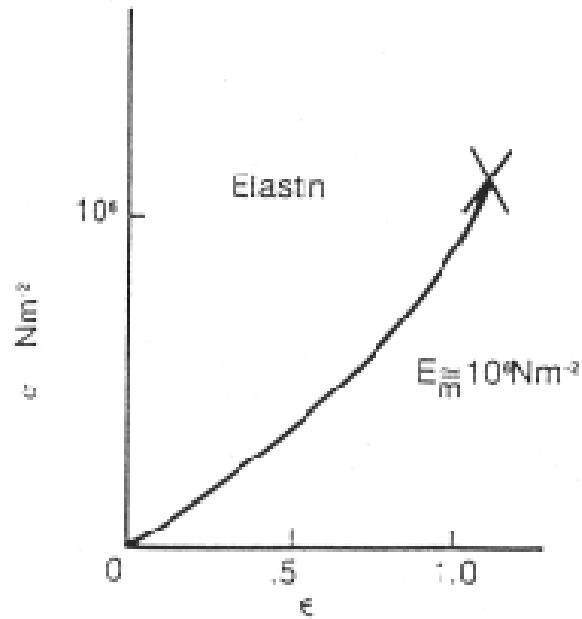
Alignment



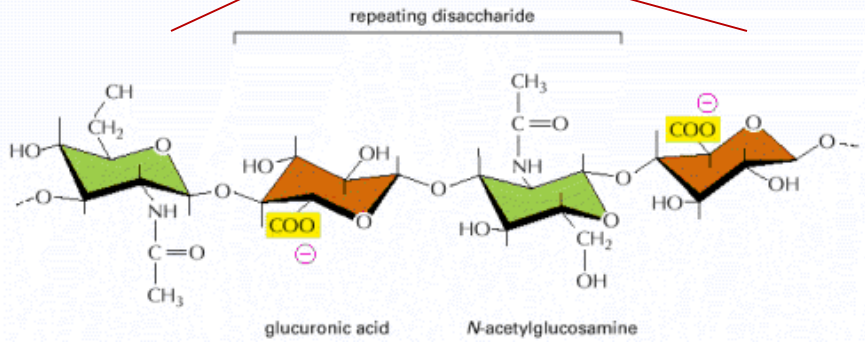
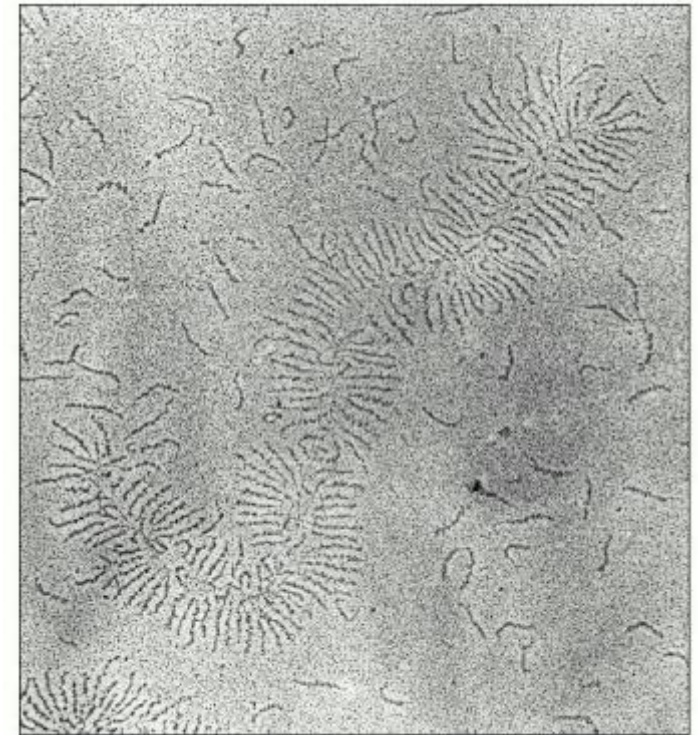
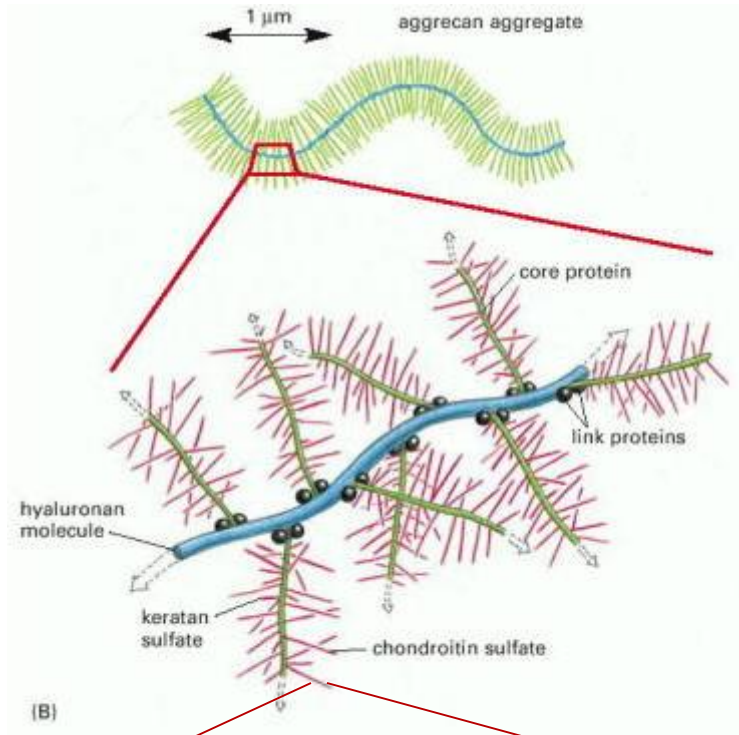
Structure of Elastin



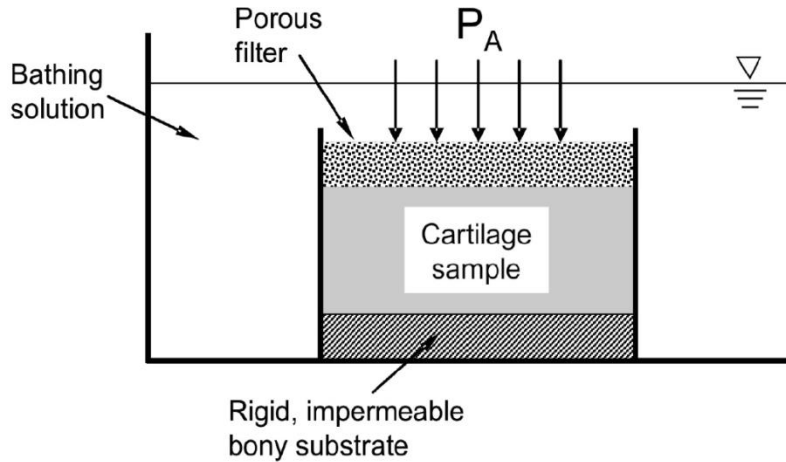
Elastin Biomechanics



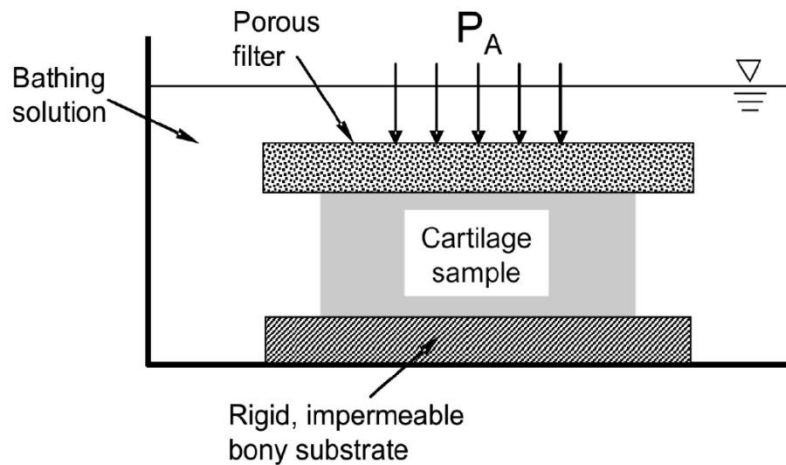
GAGs & Proteoglycans



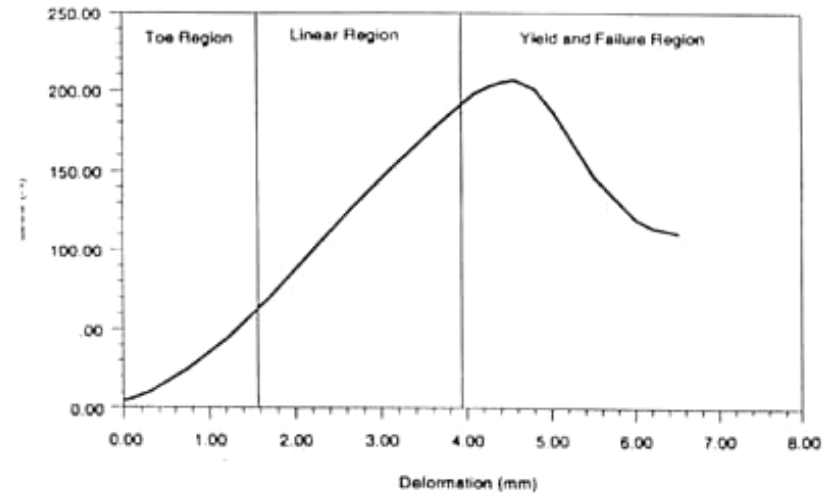
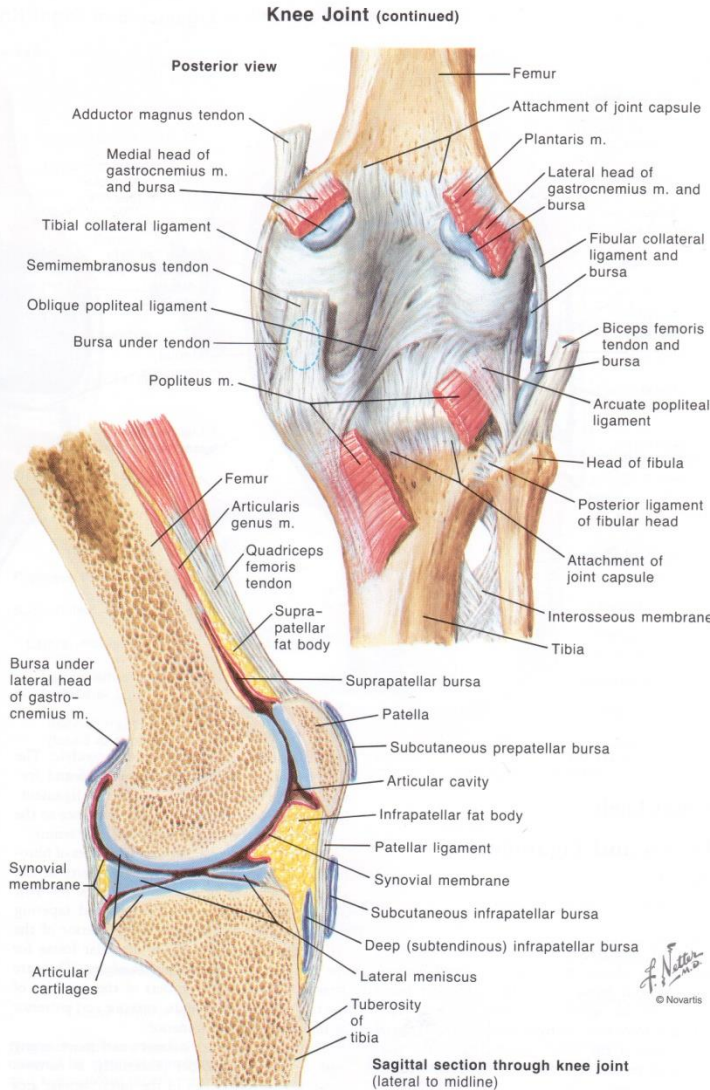
GAG Biomechanics



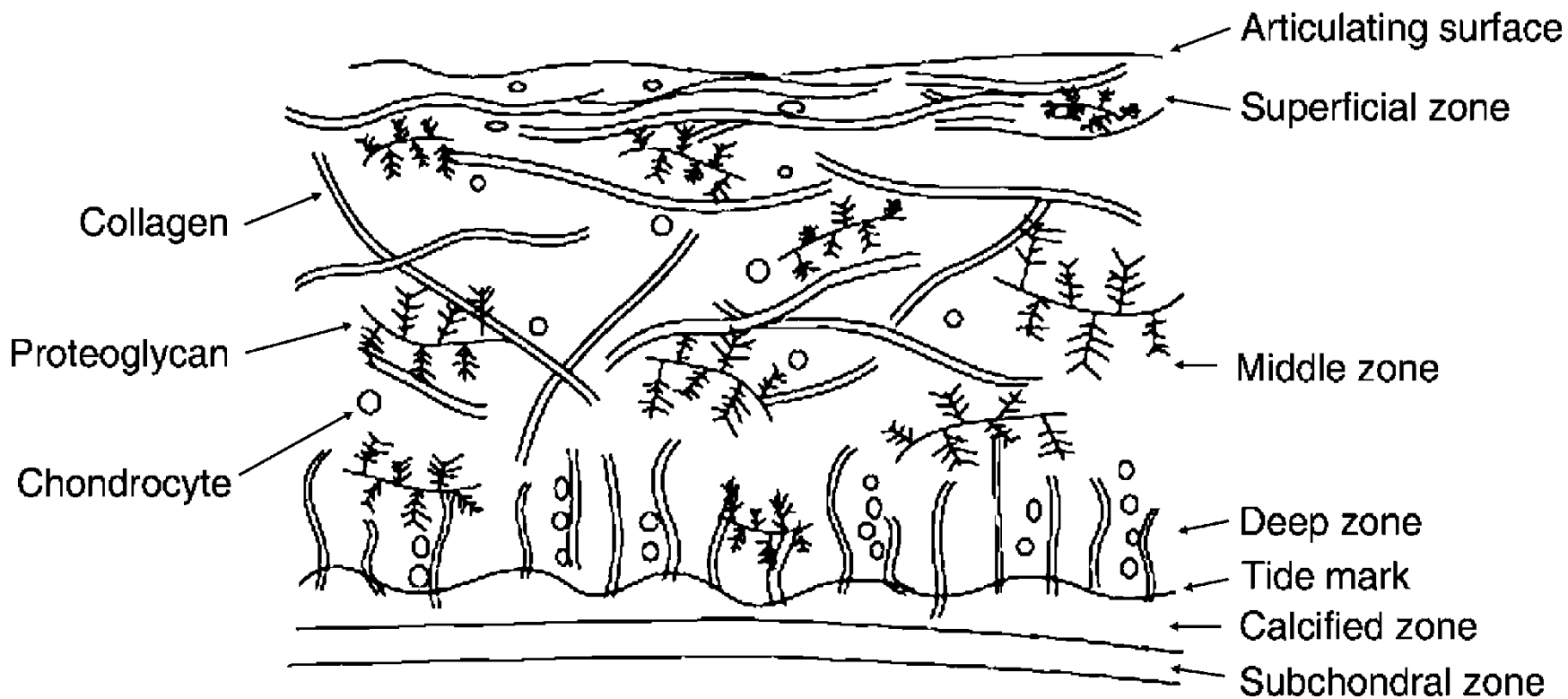
Compression testing



Tendons & Ligaments



Cartilage



Questions?