## Lecture 16 Nanomechanics of Cartilage: Definitions

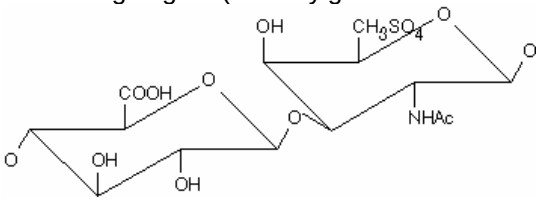
**articular cartilage** : connective avascular (contains no blood vessels) tissue covering the ends of the bones in synovial joints that allow smooth, low friction, painless motion

**proteoglycan :** A molecule that contains both protein and glycosaminoglycans, which are a type of polysaccharide. Proteoglycans are found in cartilage and other connective tissues.

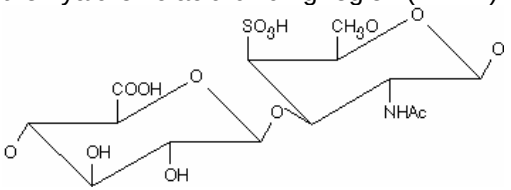
**aggrecan :** the largest aggregating proteoglycan found in cartilage tissue, has a bottle-brush configuration composed of a protein core backbone and densely spaces glycosaminoglycans

**glycosaminoglycan (GAGs) :** Polysaccharides containing repeating disaccharide units that contain either of two amino sugar compounds -- N-acetylgalactosamine or N-acetylglucosamine, and a uronic acid such as glucuronate (glucose where carbon six forms a carboxyl group). Also called mucopolysaccharide. GAGs are found in the lubricating fluid of the joints and as components of cartilage, synovial fluid, vitreous humor, bone, and heart valves.

**chondroitin sulfate :** One of several classes of sulfated glycosaminoglycans that is a major constituent in various connective tissues, especially in the ground substance of blood vessels, bone, and cartilage. Chondroitin sulfate is a sulfated glycosaminoglycan (GAG) composed of a chain of alternating sugars (N-acetylgalactosamine and glucuronic acid). It is usually found attached to proteins as part of a proteoglycan.




**hyaluronan :** Hyaluronan (HA also called hyaluronic acid or hyaluronate) is an anionic polysaccharide composed of repeating disaccharides of beta-1-4-glucuronate-beta-1-3-N-acetylglucosamine distributed widely throughout connective, epithelial, and neural tissues. The polysaccharide appears to be unique amongst glycosaminoglycans as it is synthesised, and exists in vivo, without attachment to any protein. It can be synthesized with a very large molecular weight (1,000 - 5,000 kDa). In cartilage, a globular domain at the N-terminus of aggrecan, termed G1 or the hyaluronic acid binding region (HABR). binds to HA in an interaction that is stabilized by link protein.




**link protein :** The interaction between aggrecan and HA is stabilised by link protein.

**chondrocyte :** cartilage cells responsible for the synthesis and maintenance of the extracellular matrix

**collagen:** The fibrous protein constituent of bone, cartilage, tendon, and other connective. Type II is the major fibril-forming collagen in cartilage.