Proteoglycan molecules

Proteoglycans consist of a core protein with glycosaminoglycans *(GAGs)* attached in a brush-like fashion and are 95% polysaccharide and 5% protein. **Major functions include:** lubricants, extracellular matrix, and being a molecular "sieve."

Glycoproteins are proteins that have a carbohydrate covalently attached to them. The carbohydrate portion of most glycoproteins differs from that of proteoglycans in that it is **shorter** and **branched.** They serve as enzymes, hormones, antibodies, and structural proteins. Glycoproteins are often components of cell membranes and are involved in cell-to-cell interactions.

Glycolipids *(or sphingolipids)* are found in the cell membrane with the carbohydrate portion extending into the extracellular space. They are derived from the lipid **ceramide,** and this class of compounds includes cerebrosides, globosides, and gangliosides.

Molecule	Components	Characteristic	Role
Proteoglycan	Protein + GAGs	Long & straight	Lubrication, ECM, Molecular "sieve"
Glycoprotein	Protein + Carbohydrate	Short & branched	Enzymes, hormones, antibodies, structural proteins
Glycolipids	Lipid + Carbohydrate	N/A	Cell membrane receptors