

Glycoproteins and Proteoglycans

Glycoproteins

Proteins conjugated to
saccharides lacking a
serial repeat unit

Protein >> carbohydrate

Proteoglycans

Proteins conjugated to
polysaccharides with
serial repeat units

Carbohydrate >> protein

Glycosaminoglycans
Mucopolysaccharides

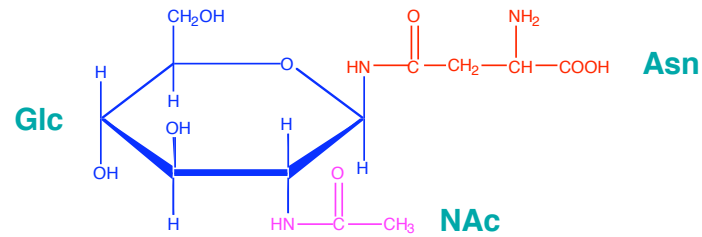
Repeat unit
HexN and HexUA

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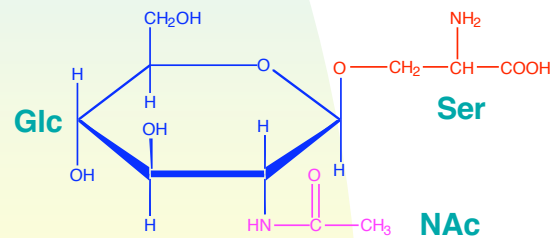
HexN: hexosamine

HexUA: hexose uronic acid

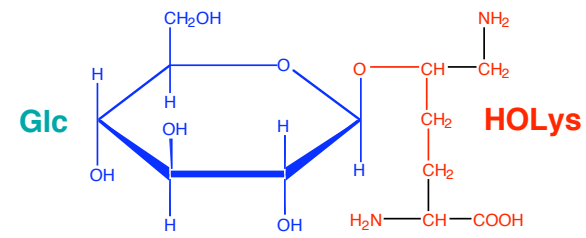
Glycopeptide bonds



Type I *N*-Glycosyl linkage to Asn



Type II *O*-Glycosyl linkage to Ser (Thr)



Type III *O*-Glycosyl linkage to 5-HOLys

Asn: asparagine

NAc: *N*-acetyl

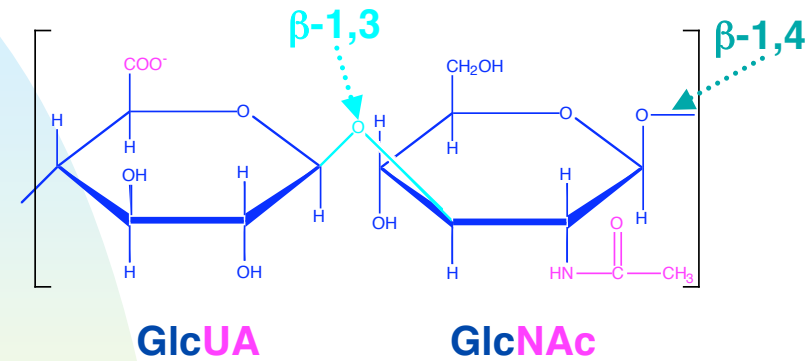
Thr: threonine

Glc: glucose

Ser: serine

HOLys: 5-hydroxylysine

Glycosaminoglycans



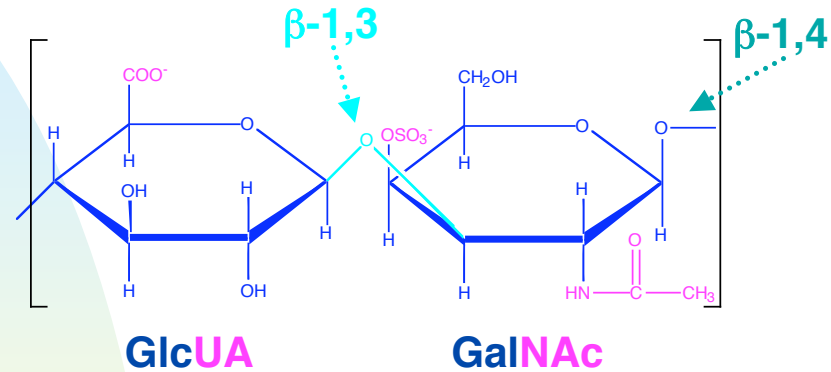
Hyaluronate

No protein link
No sulfate
 β -1,3 glycosidic linkage

GlcUA: glucuronic acid

GlcNAc: *N*-acetylglucosamine

Glycosaminoglycans

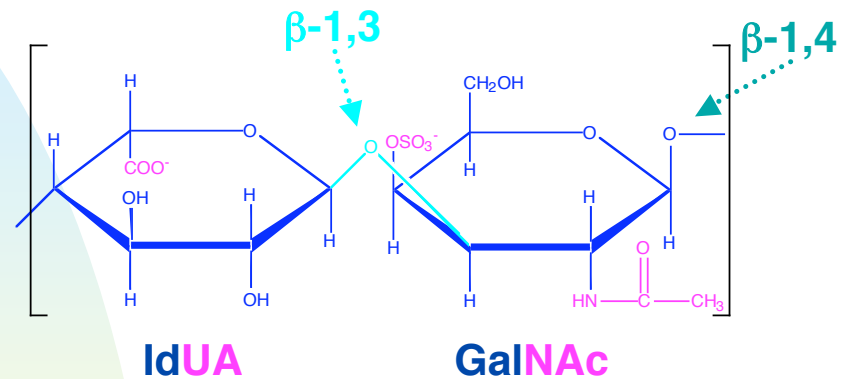


Chondroitin sulfate

GlcUA-Gal-Gal-Xyl-O-Ser link
Sulfate at 4 or 6 C of GalNAc
 β -1,3 glycosidic linkage

GlcUA: glucuronic acid **Gal:** galactose
Xyl: xylose **Ser:** serine **GalNAc:** *N*-acetylgalactosamine

Glycosaminoglycans



Dermatan sulfate

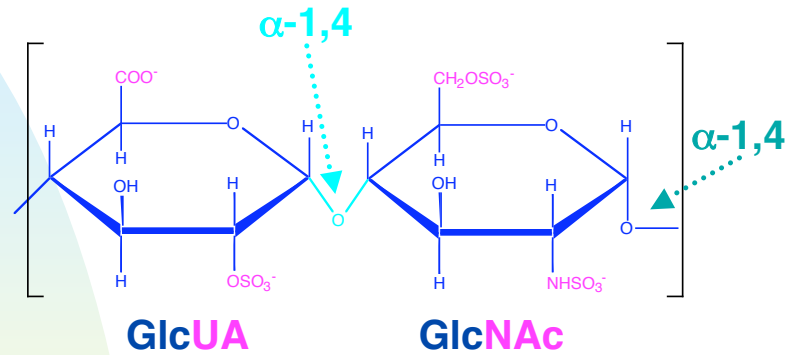
IdUA with some GlcUA
Sulfate at 4 or 6 C of GalNAc
 β -1,3 glycosidic linkage

IdUA: iduronic acid

GlcUA: glucuronic acid

GalNAc: *N*-acetylgalactosamine

Glycosaminoglycans



Heparin

Heparan sulfate

GlcN and GlcUA or IdUA
N and *O* sulfate (C2,3,6)
 α -1,4 glycosidic linkage

> NAc
 < *N* and *O* sulfate

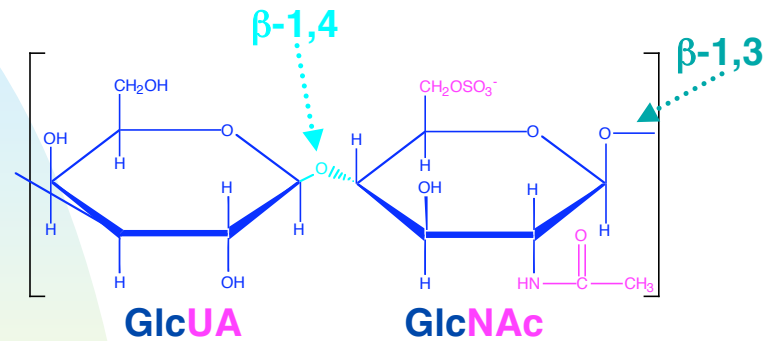
GlcN: glucosamine

GlcUA: glucuronic acid

IdUA: iduronic acid

NAc: *N*-acetyl

Glycosaminoglycans



Keratan sulfate I

GlcNAc and Gal (no UA)
Sulfate on C6 of Gal or HexN
 β -1,4 glycosidic linkage

Keratan sulfate II

GalNAc-O-Ser or Thr

GlcNAc: *N*-acetylglucosamine

Gal: galactose

UA: uronic acid

HexN: hexosamine

GalNAc: *N*-acetylgalactosamine

Ser: serine **Thr:** threonine

GlcUA: glucuronic acid