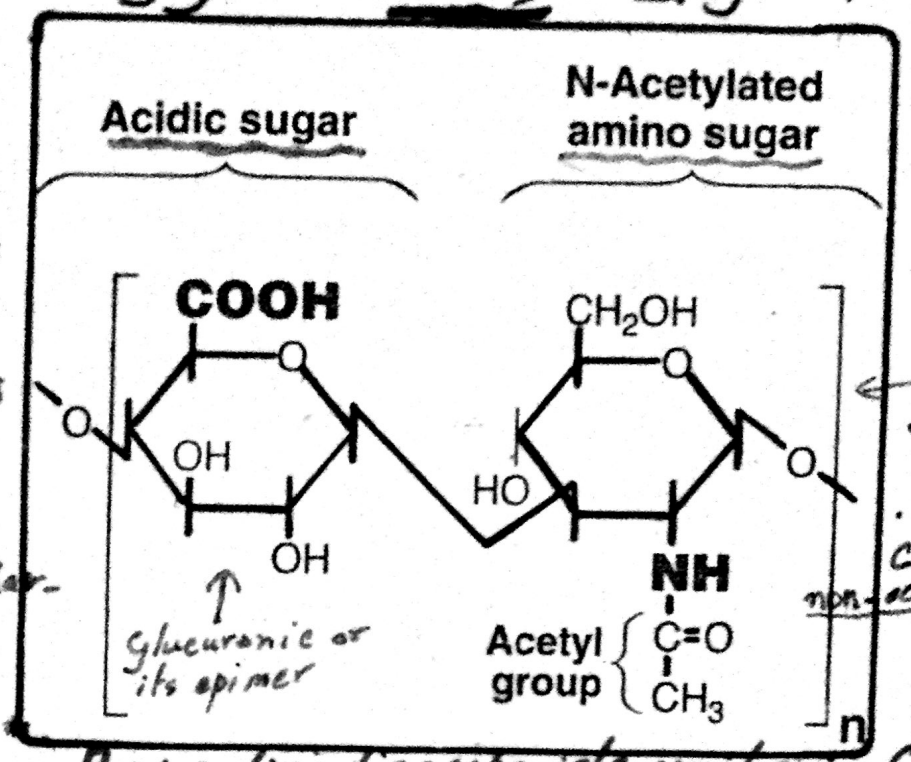
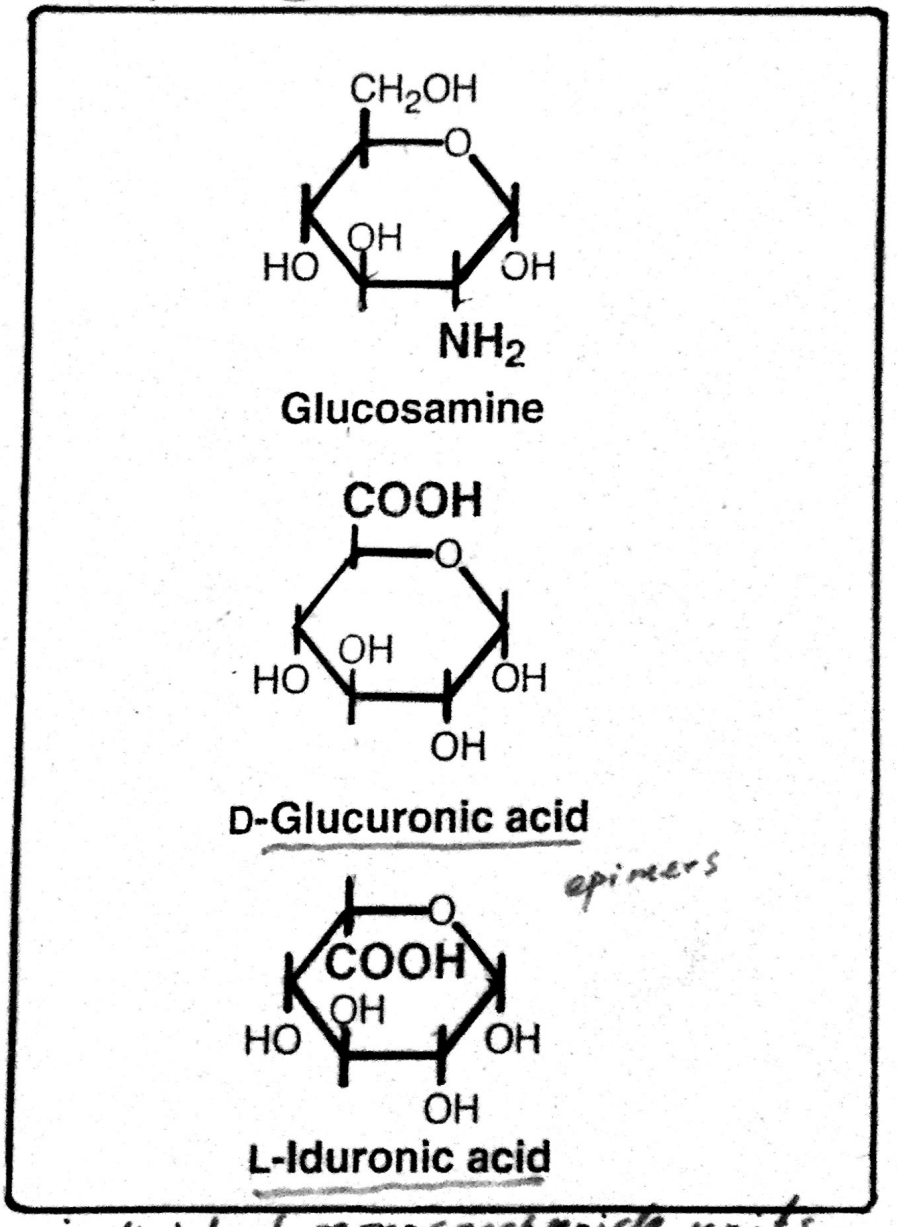
Glycosaminoglycans (GAG) & Glycoproteins

- GAG
- Proteoglycans
- Glycoproteins
- Mucopolysaccharides



Repeating disaccharide units in GAG

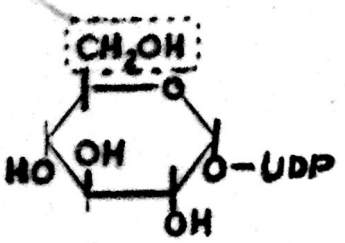


individual monosaccharide units in GAG

Glycoproteins

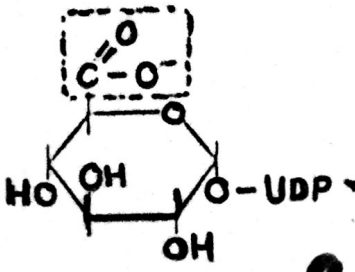
- Oligosaccharides are covalently attached
- 2 to 10 sugar residues
- No serial repeats in structure
- Are mostly branched – mainly D-hexoses also NANA, fucose in some cases
- May or may not be -ve charged
- Variable amount of carbohydrate
  4% in IgG to 80% human gastric mucin
- Membrane bound glycoproteins – Numerous functions:-
  - Cell surface recognition
  - Cell surface antigenicity
  - component of extracellular matrix
  - " of mucins in G.I. & urogenital tracts → lubricants
- All globular protein in human plasma are glycoproteins

Formation of Glucuronate



UDP-Glucose

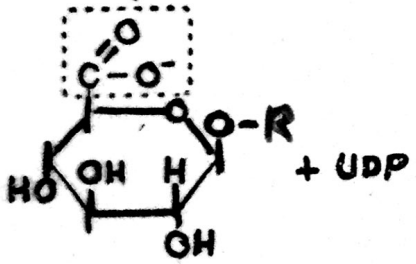
2NAD+ → 2NADH + 2H+ (UDP-glucose dehydrogenase)



UDP-Glucuronate → Glycosaminoglycans "GAG"

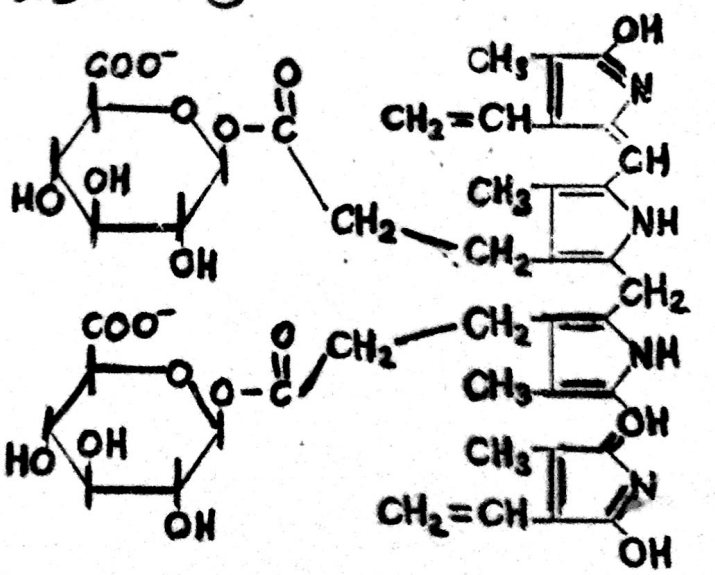
OR

UDP-glucuronate transferase (microsomal) + ROH (xenobiotics, drugs or other OH)

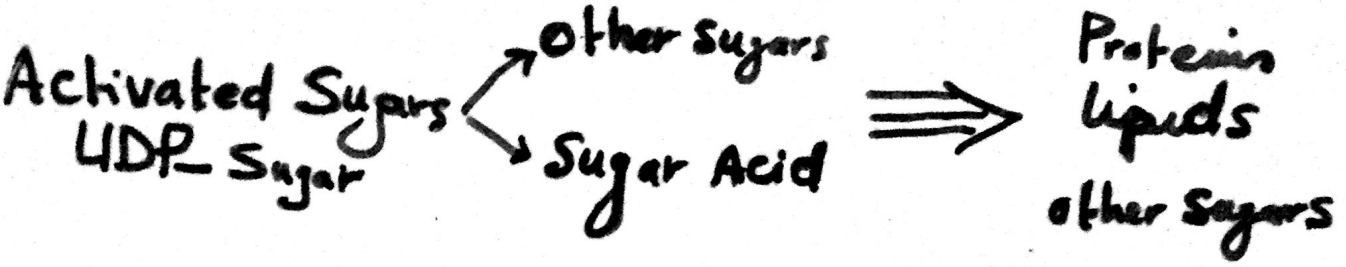


Glucuronide → Bile or urine

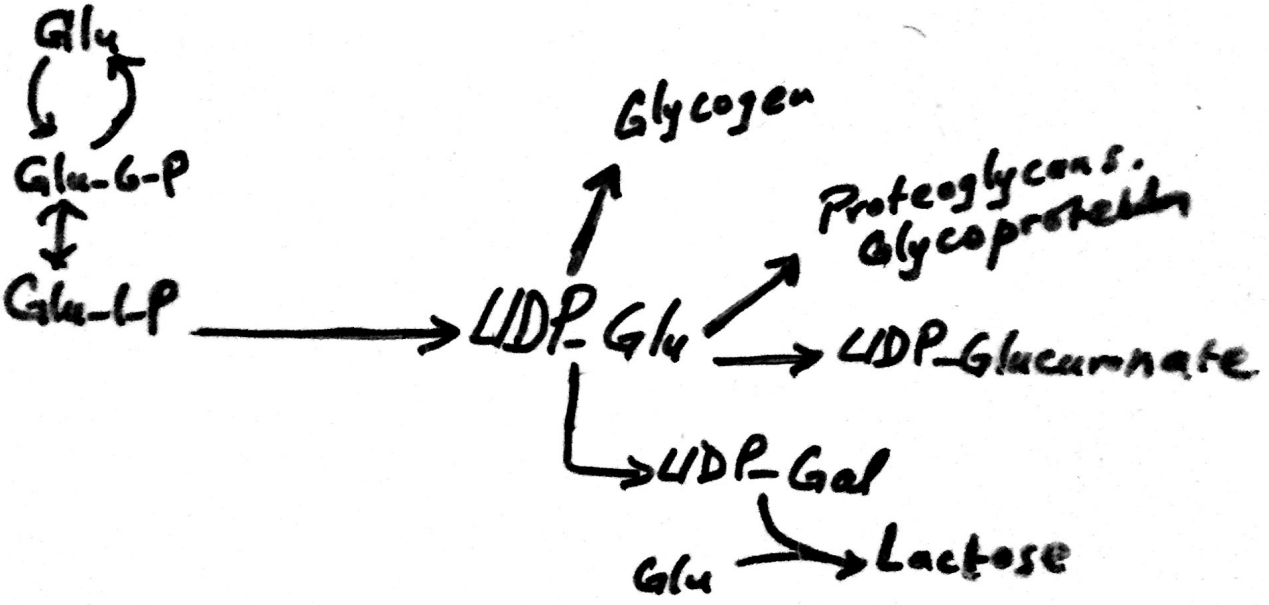
e.g. Bilirubin diglucuronide (Direct bilirubin)

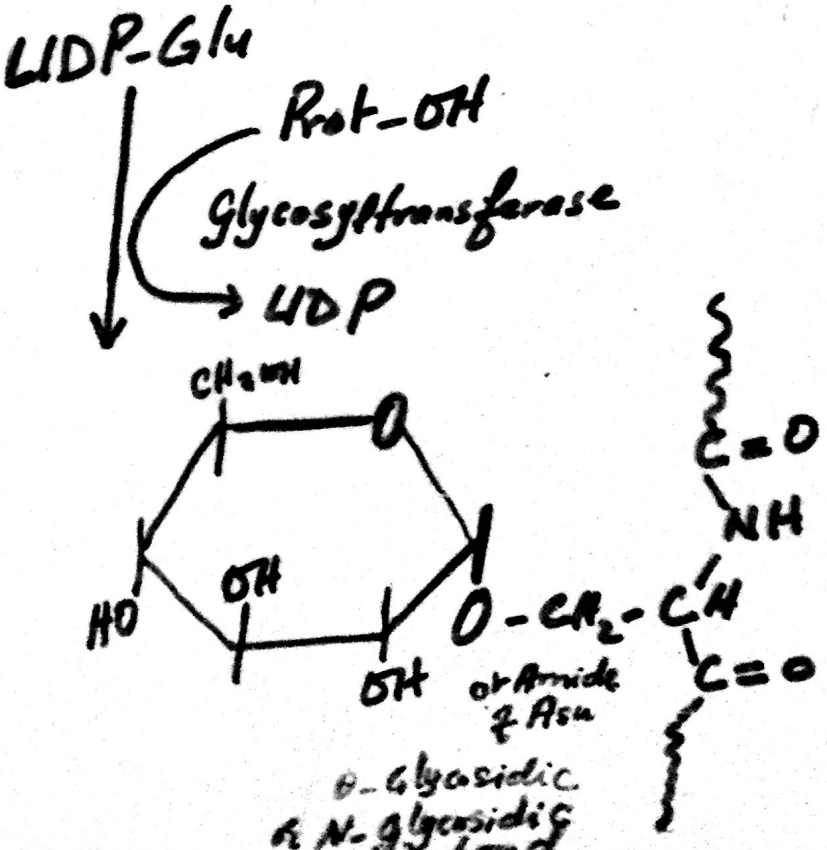


Interconversions Involving UDP-Sugars



Reactions of UDP-Glucose :-





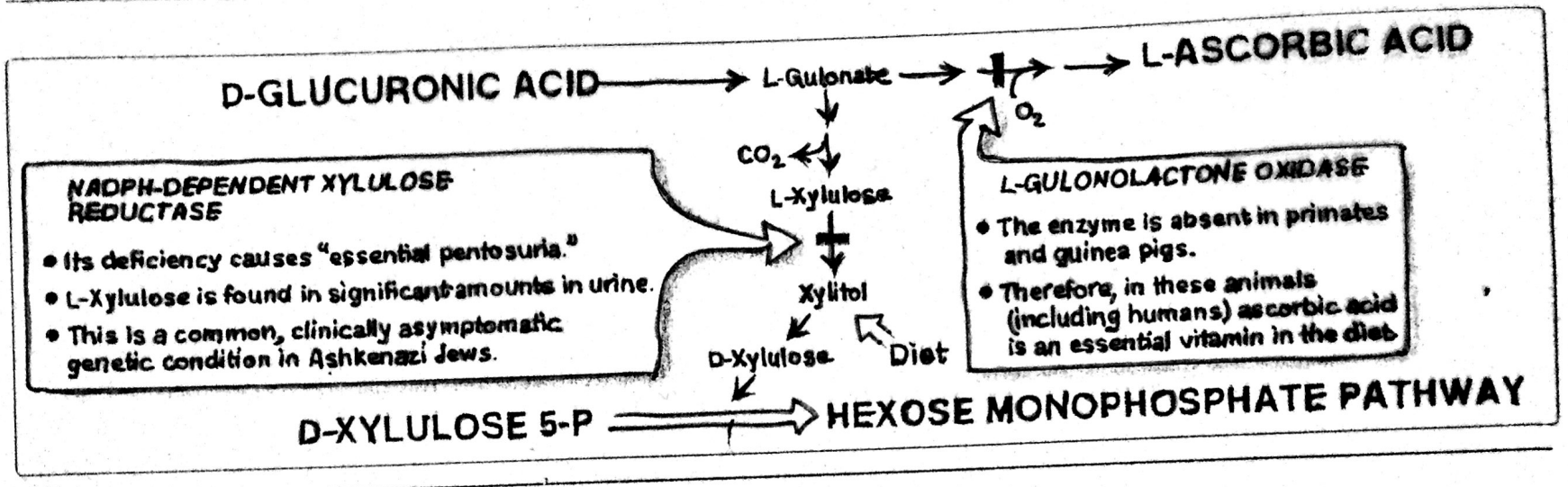
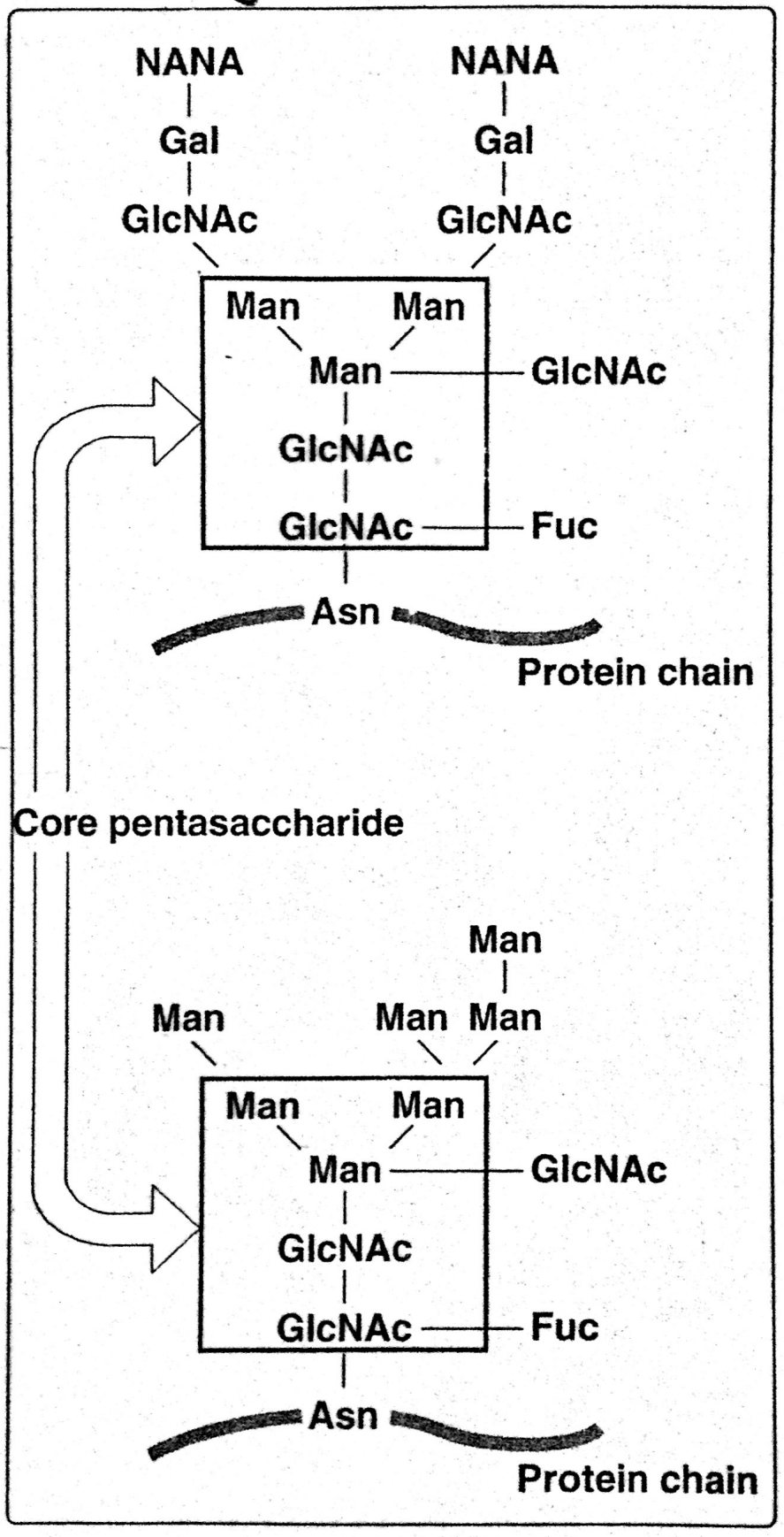


Figure 14.9
Uronic acid pathway.

Linkage between Carbohydrate and Protein

1- O-glycosidic linkage (ser or thr) / linear or branched pattern
(in Collagen - Hyl)

2- N-Linked oligosaccharide (Asn)



Complex Oligo.

High-mannose Oligo.

Mucopolysaccharidosis:

- Hereditary disorders involving any of several lysosomal acid hydrolases
  - Initially degraded to oligosaccharides then sequentially from non-reducing end.
- deficiency → ↑ GAG accumulate in tissues causing skeletal & extracellular deformities and intellectual disability
  e.g. Hunter syndrome
  Hurler =

Oligosaccharidosis

Glycoproteins are also degraded by lysosomal acid hydrolyases

deficiency of any → accumulation of partially degraded structures