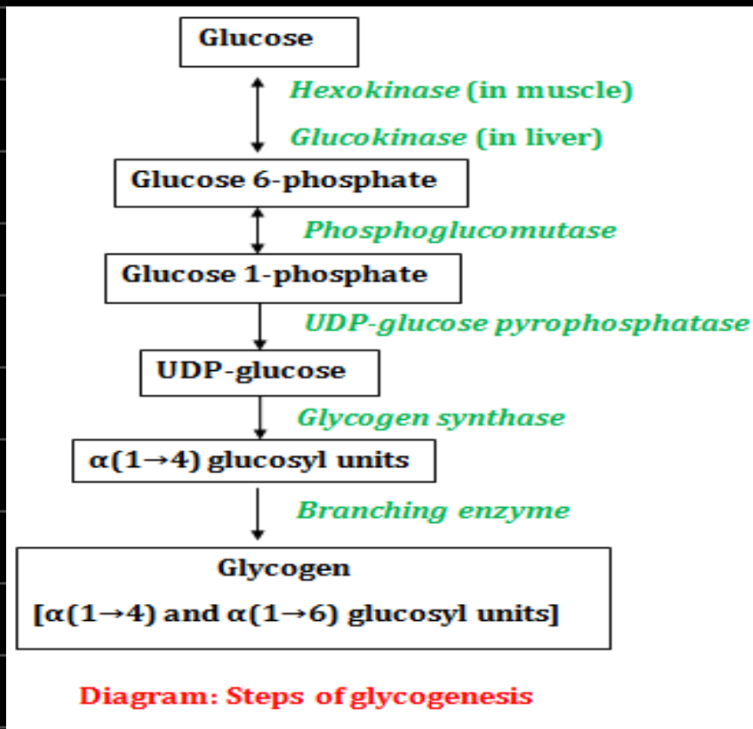


Glycogen metabolism:



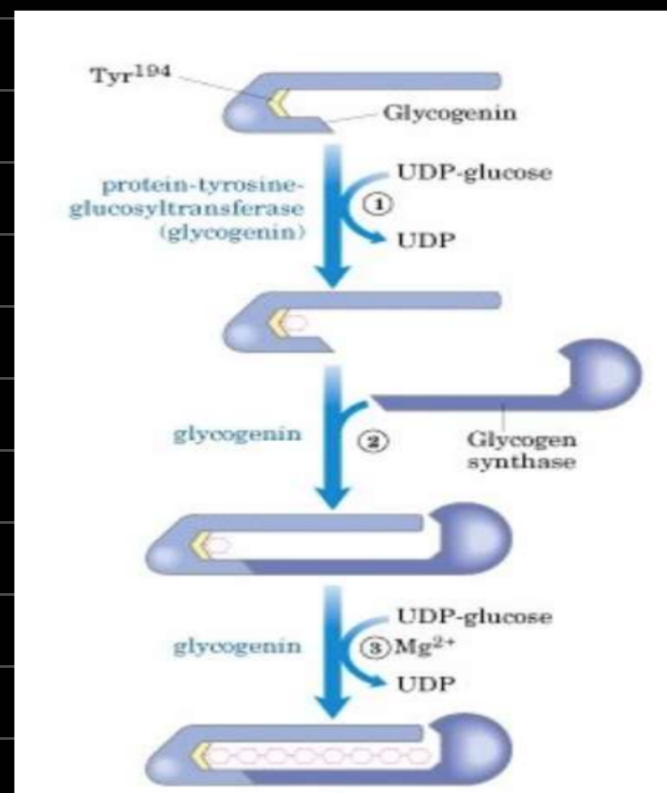
- Glycogen is mainly found in the skeletal muscle and the liver.
- Glycogen is synthesized when blood glucose level is high.

- GLUT4 is mainly found on adipose tissues, skeletal and cardiac muscles. it is insulin dependent!! so the insulin stimulate the synthesis of more GLUTs.

- GLUT 3 in neurons.

- GLUT 2 is bidirectional transporter expressed mainly in the liver and pancreatic B cells. and goes with Facilitated diffusion.

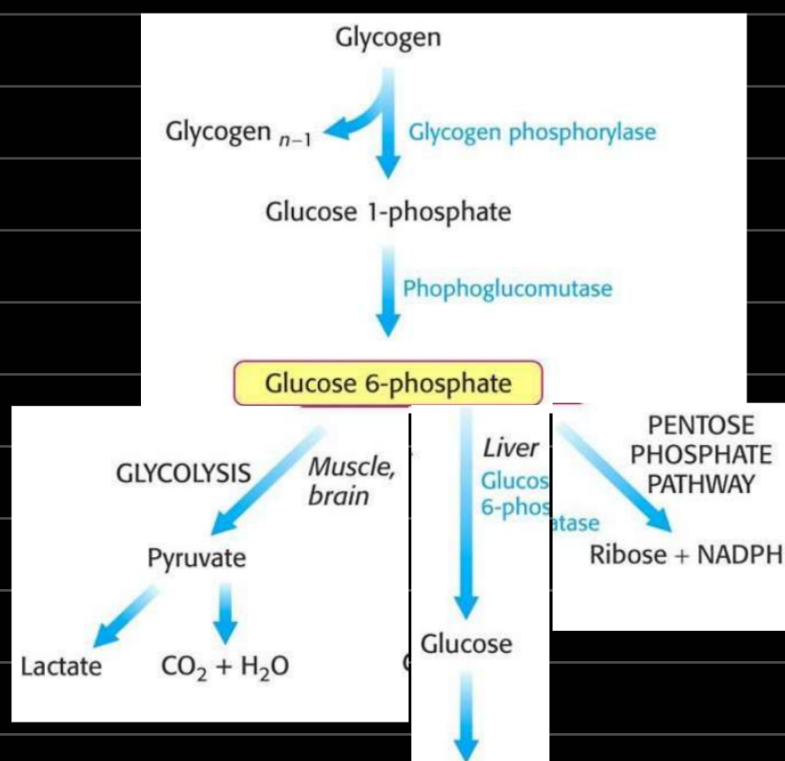
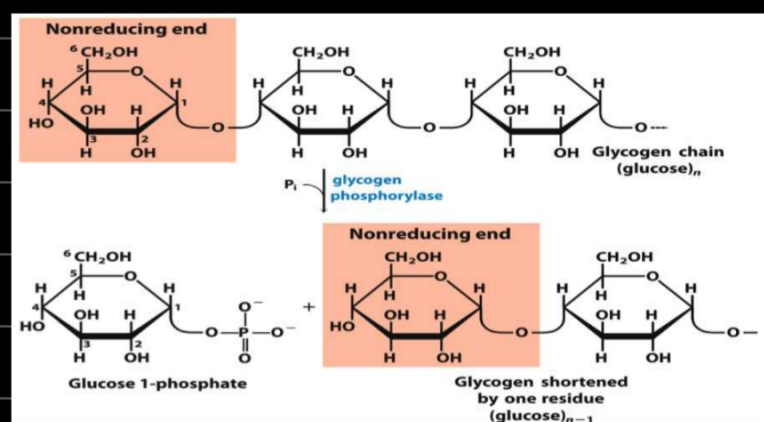
- The insulin hormone stimulate the Glycogenesis process



- **Step 1:** the first glucose is attached to tyrosine residue of a protein called glycogenin
- **Step 2:** glycogenin forms a tight complex with glycogen synthase
- **Step 3:** the chain is extended by sequential addition of up to 7 glucose residues autocatalyzed by glycogenin itself (α -1,4-glycosidic bond)
- **Step 4:** at this point, glycogen synthase dissociates and starts to extend the linear glycogen chain
- **Step 5:** the combined action of glycogen synthase and branching enzyme completes the glycogen particle
- **Step 6:** glycogen synthase dissociates from the newly synthesized glycogen molecule while the glycogenin remains covalently attached to reducing end

- Formation of branches:

the (α 1 \rightarrow 6) bonds found at the branch points of glycogen are formed by glycogen branching enzyme which catalyzes the transfer of small fragment (6-7 glucosyl residues) from the non-reducing end of a branch having at least eleven residues.



Glycolysis

- the first step is to make the phosphorylase enzyme catalyzes the phosphorolysis step " the cleavage of the bond by the addition of inorganic phosphate".

- another enzyme; Debrancher enzyme then causes:

1) Transferase activity: removes intact trisaccharide moiety (3 Glucose units) and transfer it to the end of some other branch.

2) Second " the (α 1 \rightarrow 6) glucosidase activity": the enzyme removes the last glucose unit attached to the chain by (α 1 \rightarrow 6) glycosidic bond.

- The end result of this debranching process is the release of one glucose moiety each time.

- The end products of glycogenolysis are G1P (the major product) and glucose.