

SNS COLLEGE OF ALLIED HEALTH SCIENCE
Affiliated to The Tamil Nadu Dr M.G.R Medical University, Chennai



DEPARTMENT OF CARDIOPULMONARY PERFUSION CARE

TECHNOLOGY

COURSE NAME: BIOCHEMISTRY

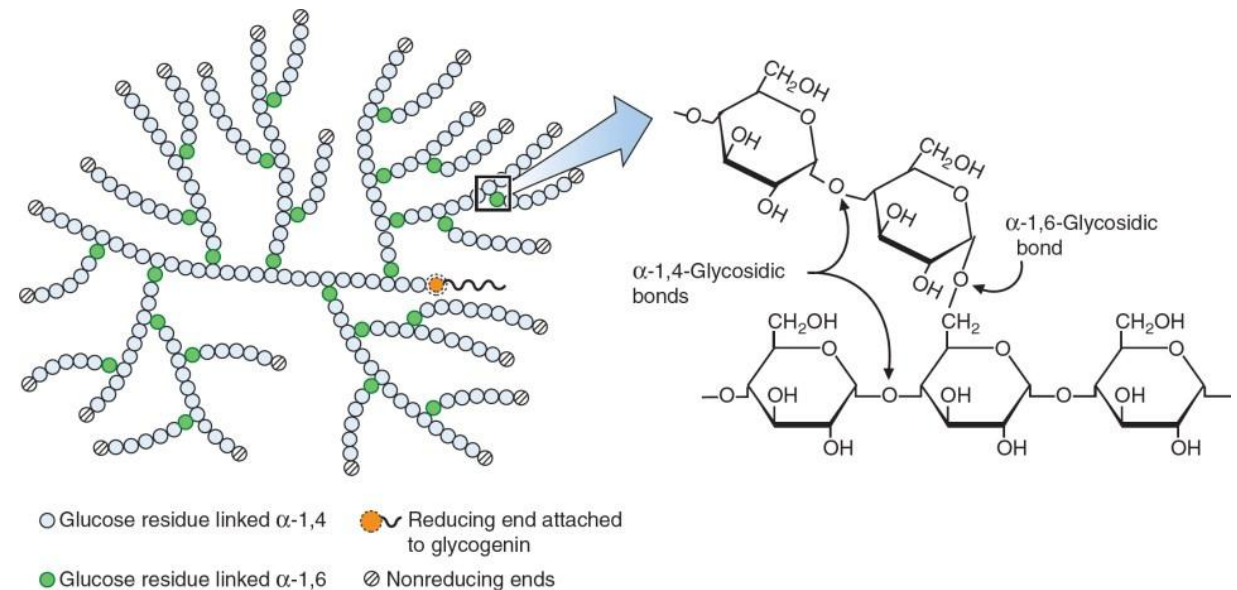
UNIT : 1

TOPIC : GLYCOGEN METABOLISM

FACULTY NAME: MITHRA V

GLYCOGEN

- **Branched polysaccharide** of glucose, serving as primary energy storage in animals and fungi.
- It is stored mainly in the liver (6-8%) and muscles (1-2%), with smaller amounts in the kidney, brain (astrocytes), and blood cells.
- It acts as a glucose reserve for maintaining blood sugar levels
- Provides **energy during exercise** or fasting.



FUNCTIONS OF GLYCOGEN

- **Liver:** Releases glucose to maintain blood sugar levels.
- **Muscles:** Provides energy for muscle activity.
- **Brain:** Stores glycogen in astrocytes, mobilized upon waking.
- **Other tissues:** Supports energy needs in kidneys, blood cells, and embryonic development.

HORMONAL REGULATING GLYCOGEN METABOLISM



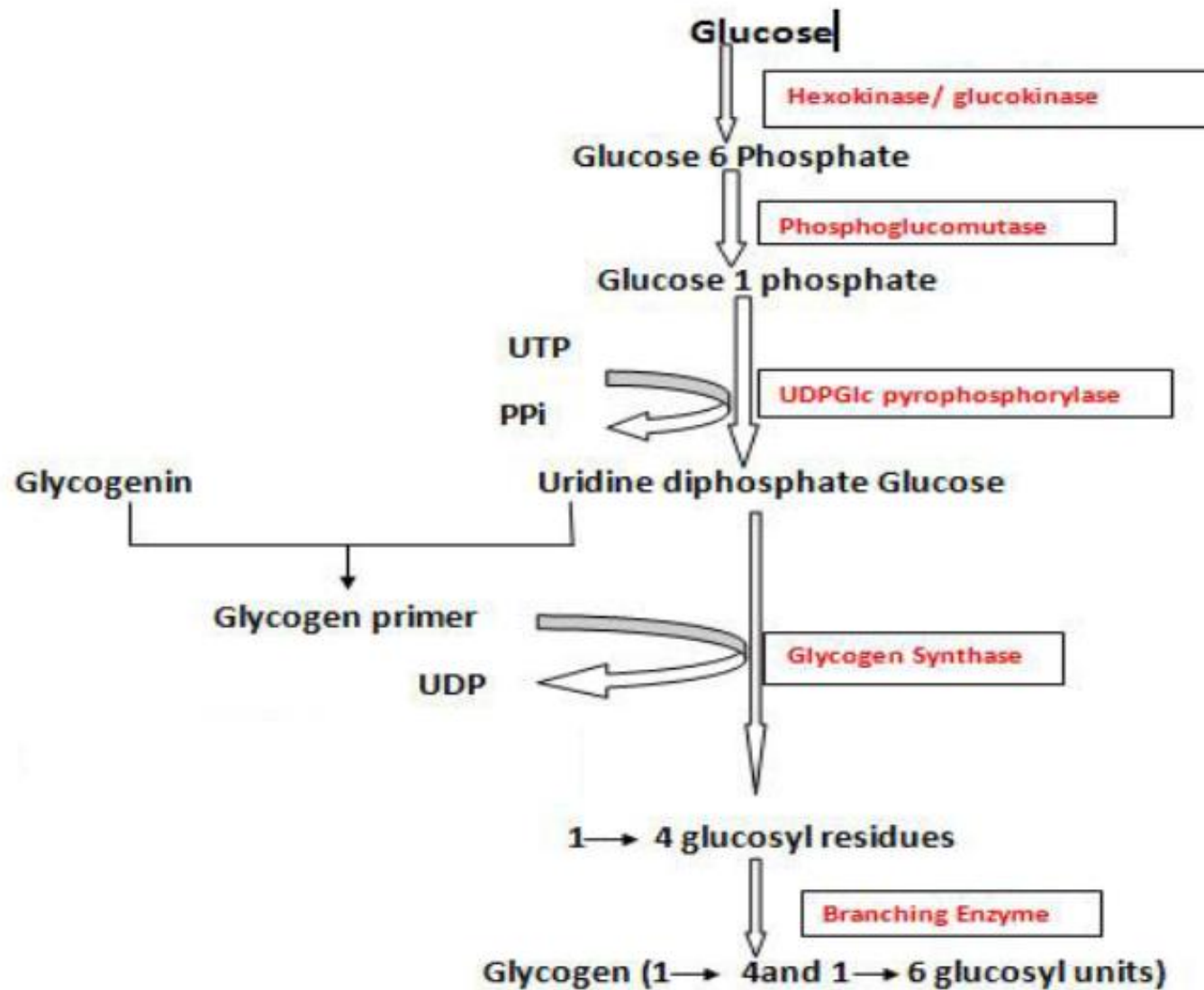
- It primarily involves **insulin and glucagon**.
- **Insulin** promotes **glycogen synthesis** (glycogenesis),
- Insulin achieves this by promoting the dephosphorylation of glycogen synthase
- While **glucagon** stimulates **glycogen breakdown** (glycogenolysis).
- Glucagon activates glycogen phosphorylase, the enzyme that breaks down glycogen.

GLYCOGENESIS (SYNTHESIS)



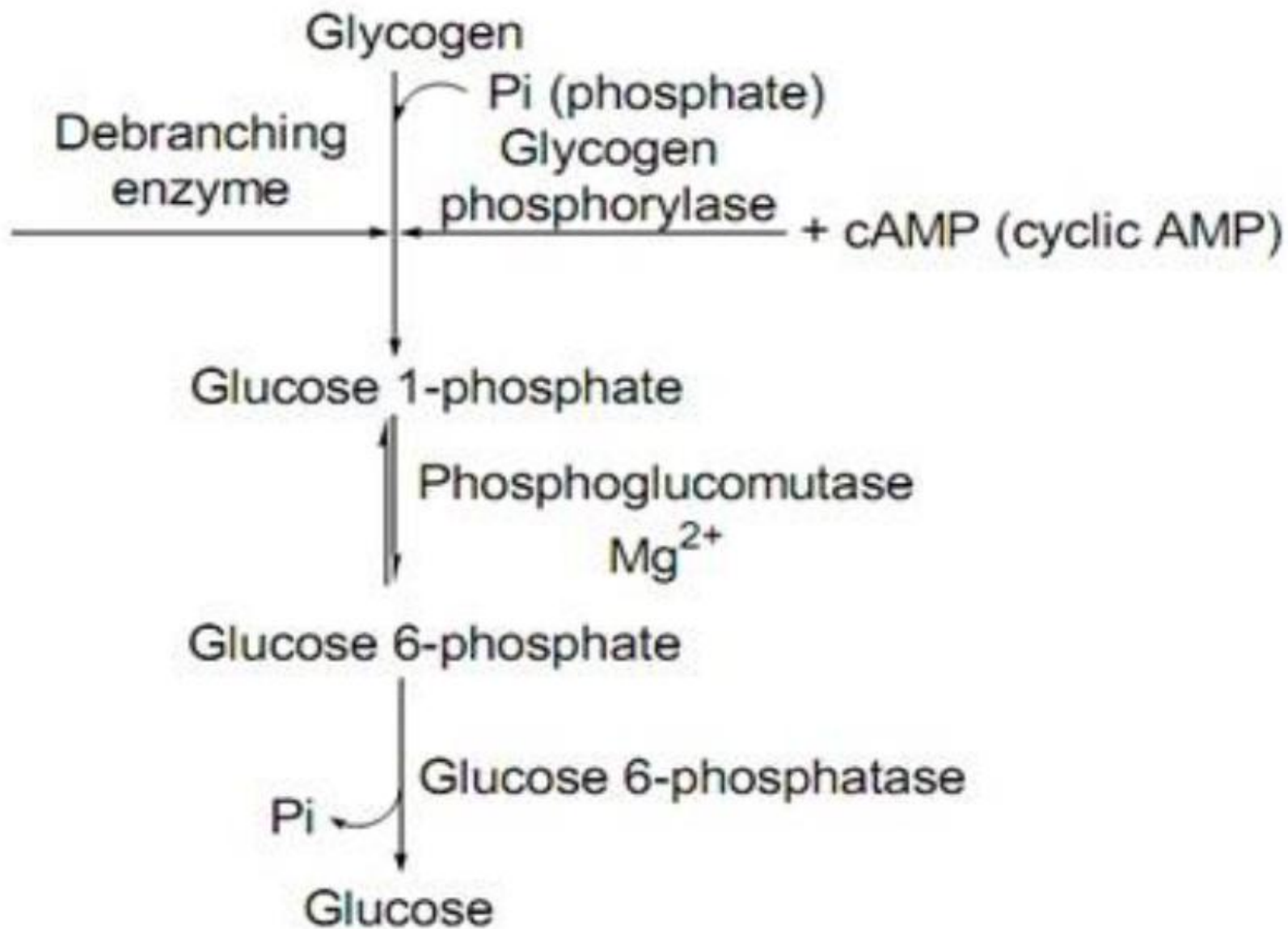
- **Converts glucose to glycogen** for storage in liver and muscles when glucose levels are high (e.g., after meals).
- **Key enzymes:**
 - i) Glucokinase/hexokinase (forms glucose-6-phosphate),
 - ii) Phosphoglucomutase (converts to glucose-1-phosphate),
 - iii) Glycogen synthase (adds glucose to glycogen chain).
 - iv) Uridine triphosphate (UTP) provides energy, forming UDP-glucose.
- Branching enzyme creates α -1,6 glycosidic bonds for glycogen branching.
- Regulation of glycogenesis - Key enzyme of Glycogenesis- **Glycogen Synthase**

Glycogenesis steps



GLYCOGENOLYSIS (BREAKDOWN)

- Breaks glycogen into glucose when levels are low (e.g., fasting or exercise).
- Key enzymes:
 - i) Glycogen phosphorylase (releases glucose-1-phosphate),
 - ii) Phosphoglucomutase (converts to glucose-6-phosphate),
 - iii) Glucose-6-phosphatase (hydrolyzes to free glucose in the liver).
- Regulation of Glycogenolysis - Key enzyme of Glycogenolysis- **Glycogen Phosphorylase**



REFERENCES



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THANK YOU