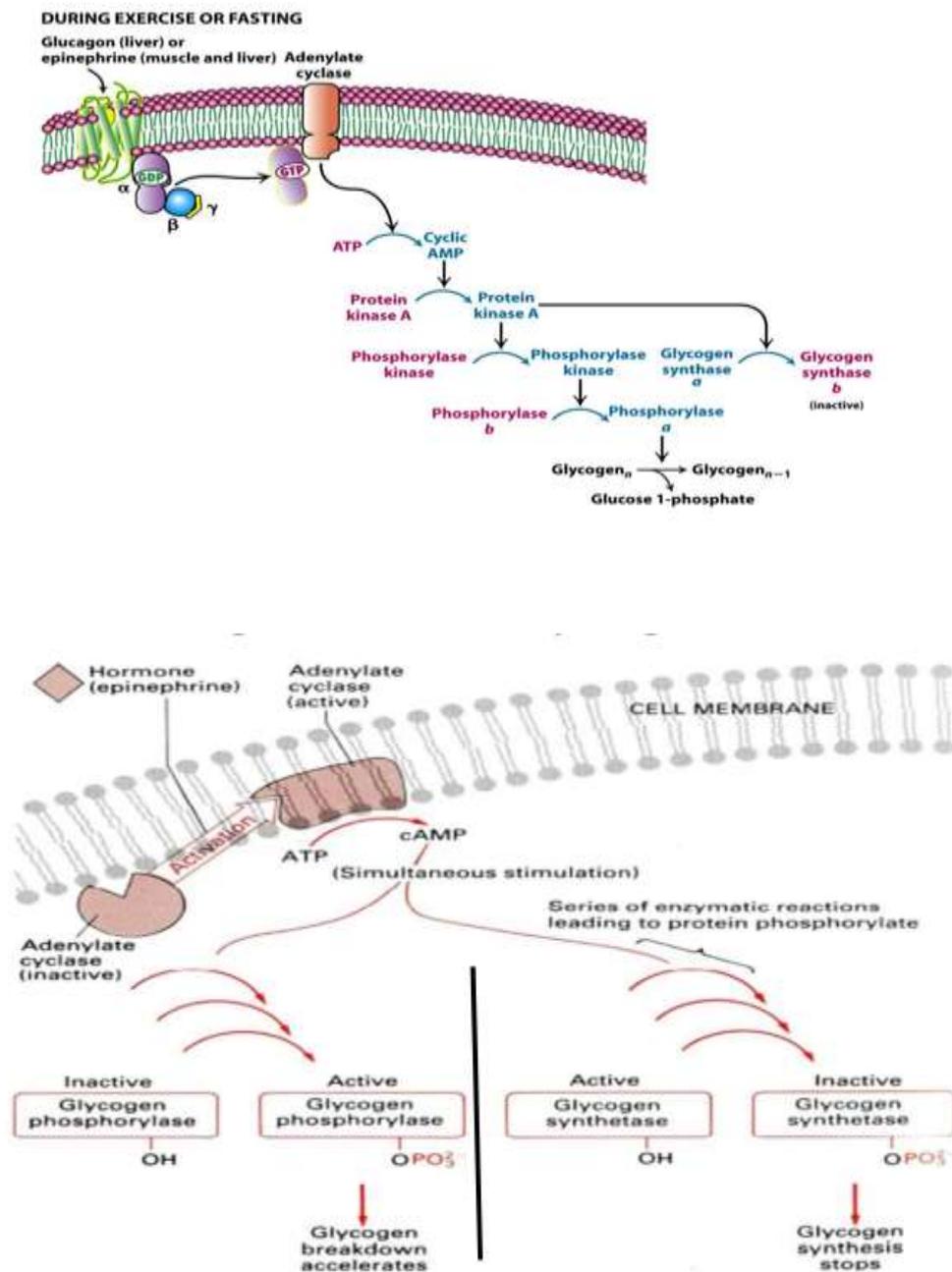


Question 1

-These images provide detailed informations on the hormonal signaling pathway that controls the breakdown of glycogen (glycogenolysis) during exercise or fasting.

Talk about the main informations acquired from these diagrams?



The image presented illustrates the **hormonal signaling mechanism** that leads to the breakdown of glycogen (glycogenolysis) during exercise or fasting.

Regulation of glycogen metabolism is realized by:

- Glucagon (in the liver) or epinephrine/adrenaline (in muscle and liver) act as hyperglycemic hormones, increasing blood glucose concentration.
- These hormones bind to a **G protein**-coupled receptor on the cell membrane, which activates **the G protein** (exchange of GDP for GTP on the alpha subunit).
- The activation of the G protein stimulates **adenylate cyclase**, which converts ATP into cyclic AMP (cAMP). cAMP acts as a **second messenger** and activates **protein kinase A (PKA)**.
- Active PKA then phosphorylates and activates **phosphorylase kinase**.
- Phosphorylase kinase in turn activates **glycogen phosphorylase** (from the inactive *b* form to the active *a* form).
- The active glycogen phosphorylase catalyzes the phosphorolysis of glycogen
- Finely, **n glycogen** turn into **glucose 1-phosphate** and a shortened glycogen (**n-1 glycogen**). Concurrently, PKA phosphorylates and inactivates **glycogen synthase**, thereby **preventing the simultaneous synthesis of glycogen (glycogenesis)**. This **reciprocal control** ensures that glycogen synthesis and degradation are coordinately regulated.

QCM

QCM1. We are studying the catabolism of hepatic glycogen. In the absence of glucose 6-phosphatase, glycogenolysis is complete.

A- Only one enzymatic activity is involved.

B- Blood glucose is released.

C- **Blood glucose is not released.**

D- **Glucose-1-P is produced.**

E- Unphosphorylated glucose is produced.

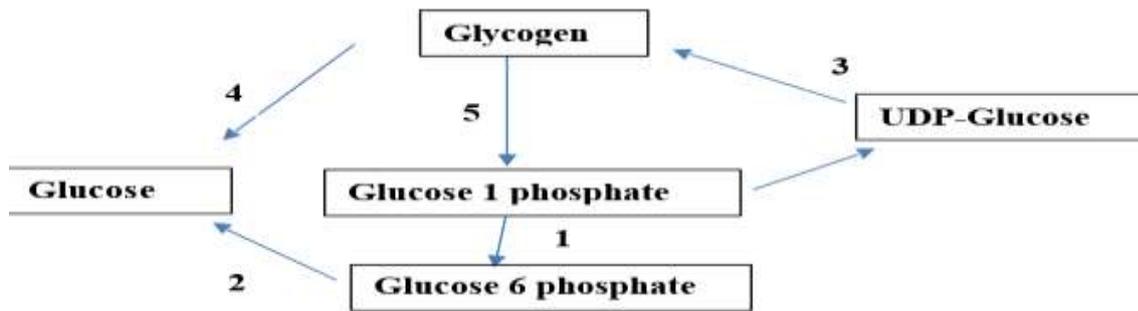
QCM2. Glycogenin

A- **Is necessary to initiate glycogen polymerization.**

B- **Binds a maximum of 8 glucose residues through the action of glycogen synthase.**

C- Reacts with UTP-glucose.

QCM3. Consider the following diagram relating to hepatic glycogen metabolism. Identify the correct labels for the enzymes involved in this metabolism.



A-1= Phosphoglucomutase

B-2=Glucose-6-phosphatase

C-3= Uridyl transferase

D-4= α -1,6 -glucosidase

E-5=Glycogen synthetase

QCM4.Regarding the regulation of glycogen metabolism

A- Phosphorylase kinase-b is inactive in its unphosphorylated form.

B- Glycogen phosphorylase-b is inactive in its unphosphorylated form.

C- Phosphoprotein phosphatase is active in its unphosphorylated form.

D- Glycogen synthetase is inactive in its phosphorylated form.

E- Phosphoprotein phosphatase is active in its phosphorylated form.

QCM5. Glucagon

A- Has a hypoglycemic effect.

B- Binds to a cytosolic receptor.

C- Decreases AMPC production.

D- Stimulates the formation of glycogen synthetase.

E- Stimulates the formation of glycogen phosphorylase.