Gluconeogenesis

Gluconeogenesis is the process of **new formation of** glucose from non-sugar substrates, e.g. amino acids, glycerol or lactate . They must be three or more carbon molecules (the PDH reaction is irreversible!). The main importance for the organism is **to maintain the level of glucose** in the norm (glucose is necessary for the brain and erythrocytes) during starvation, when glycogen reserves are already exhausted. The reactions of gluconeogenesis are mostly the same reactions of glycolysis, just in the opposite order. The irreversible reactions of glycolysis (pyruvate kinase, 6-Phosphofructo-1-kinase and glucokinase) are bypassed by another route. Gluconeogenesis takes place only **in the liver, kidneys** and **enterocytes** .

Overcoming the irreversible reactions of glycolysis

Pyruvate carboxylase and phosphoenolpyruvate carboxykinase

These two enzymes (abbreviated as PK and PEPKK) ultimately ensure the **conversion of pyruvate into phosphoenolpyruvate** . PK works in the first step – a molecule of carbon dioxide binds to pyruvate (using ATP) and **oxaloacetate** is formed (**anaplerotic reaction** – oxaloacetate is part of the citrate cycle). The whole story takes place in the matrix of mitochondria. The second step – the PEPKK reaction – decarboxylation of oxaloacetate with the simultaneous binding of phosphate. The latter comes from **GTP** . This reaction can take place both in the matrix of the mitochondria, but also in the cytosol. Oxaloacetate can be taken out of the mitochondrion using the malate aspartate shuttle, phosphoenolpyruvate has its own transporter.

Glucose-6-phosphatase

Glucose-6-phosphatase **converts Glc-6-P to glucose and phosphate** (ATP is not formed!). So it is not a reverse reaction (see the first reaction of glycolysis). Furthermore, the entire process takes place in **the endoplasmic reticulum** (separate from glycolysis, which takes place in the cytosol), and only in the liver, kidney, and enterocytes of the small intestine. Other organs in the body are therefore not able to create glucose in this way.

Pharmacology Notes

Semecarpus anacardium Semecarpus *anacardium* , originally from India, affects the effectiveness of some enzymes and thus leads to an improvement in the course of diabetes (from research on rats with induced diabetes).

Links

Related Articles

- Glycolysis
- Glycemia
- Citric cycle

References

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2. ↑ DUŠKA, František. *Biochemistry in context, part 1 - basics of energy metabolism.* 1st edition. Prague: Karolinum, 2006. ISBN 80-246-1116-3 .

External links

- Gluconeogenesis (Czech Wikipedia) (https://cs.wikipedia.org/wiki/Glukoneogeneze)
- Gluconeogenesis (English Wikipedia) (https://en.wikipedia.org/wiki/Gluconeogenesis)

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