Fructose metabolism

"Fructose metabolism" takes place mainly in the liver with the formation of intermediates:

- glycolyses – in satiety,
- gluconeogenesis - during starvation.

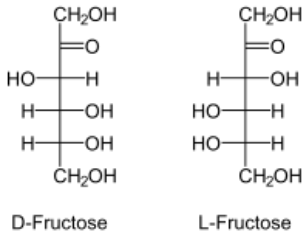
Sources of fructose

- by splitting sucrose from food (fruit, honey, table sugar) – enzyme sucrase
- as free monosaccharide in honey and glucose-fructose syrup (e.g. in lemonades)

Fructose intake is regulated by the enzyme sucrase on the luminal side of the epithelium of the small intestine and the transporter GLUT 5.

Transport proteins

- **GLUT 5** - facilitates the transport of fructose into the epithelial cells of the small intestine
- **GLUT 2'** - facilitates transfer from the epithelium of the small intestine to the bloodstream



D-Fructose and L-Fructose (Fischer diagram)

Catabolism

Fructolysis has some features in common with glycolysis:

- **Capture of a monosaccharide in the cell by its phosphorylation**

File:Metabolismus fructose.jpg
Metabolism of fructose in the body

Liver: Just as glucokinase phosphorylates glucose to form glucose-6-phosphate, fructokinase transfers phosphate from ATP to C1 fructose to form fructose-1-phosphate, which cannot leave the hepatocyte because of its charge.

Extrahepatic tissues Outside the liver (e.g. in the muscle) hexokinase catalyzes the phosphorylation of fructose at the 6th carbon (and therefore the same as with glucose). Fructose 6 phosphate is formed, which, depending on the cell's energy needs, enters either glycolysis or gluconeogenesis.

- **Cleaving a hexose into two trioses**

The enzyme ``aldolase B *(in the liver) breaks down fructose into:*

- *glyceraldehyde* (not glyceraldehyde-3-phosphate as in glycolysis)
- *dihydroxyacetone phosphate*

Both products are then converted to "glyceraldehyde-3-phosphate" - again an intermediate of glycolysis and gluconeogenesis. "Glyceraldehyde" is phosphorylated by triose kinase, dihydroxyacetone phosphate undergoes isomerization by triose isomerase.

During its catabolism, fructose "skips" the rate-limiting reaction of glycolysis catalyzed by ``phosphofructokinase *1 and is thus metabolized faster than glucose in the liver.*

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Importance of fructose for sperm

Sperm use fructose as their main source of energy. For this reason, there is a high concentration of fructose in the seminal fluid - **5-10 mmol/l'**. This fructose is produced from glucose by the seminal glands.

Glucose → sorbitol → oxidation to fructose

Links

- ws: Metabolismus fruktózy

Related Articles

- Glucose

- Carbohydrates
- Glycolysis
- Disorders of fructose metabolism
- Gluconeogenesis
- Glucose

References

- MATOUŠ, Bohuslav, et al. *Basics of medical chemistry and biochemistry.* 1. edition. Prague : Galen, 2010. 540 pp. ISBN 978-80-7262-702-8.