Disorders of galactose metabolism

Galactosemia is a congenital metabolic defect accompanied by an increased concentration of galactose in the blood serum due to a defect / deficit of one of the following enzymes:

- galactose-1-phosphate uridyltransferase (classical galactosemia),
- uridyl diphosphate galactose-4-epimerase,
- galactokinase.

Classical galactosemia

Classical galactosemia is a serious **AR inherited** disease with an incidence of 1:35 000-1: 50 000. The cause is a deficiency of galactose-1-phosphate-uridyltransferase, which metabolizes galactose-1-phosphate to UDP-galactose. Toxic galactose-1-phosphate accumulates in the liver, kidneys, brain, intestine, and lens, and is alternatively metabolized to galacticol.

Symptoms begin between days 4-9 **after milk intake**. The patient most often refuses food, vomiting and diarrhea occur. At the same time, liver insufficiency with jaundice, hemorrhagic diathesis, hepatomegaly, lethargy or convulsions develops. Some patients develop a cerebral pseudotumor. The symptoms resemble acute septic disease with **liver** and **kidney failure**. Untreated patients develop cerebral edema and often bilateral cataracts. A newborn with a low birth weight will only get the disorder after switching to a regular dairy diet. Classical galactosemia can be demonstrated by increased concentrations of galacticol in urine and galactose-1-phosphate in erythrocytes. With a family history, the disorder can be detected by prenatal examination of the amniotic villi or by measuring galacticol in the amniotic fluid. However, each of these tests must be confirmed at the enzymatic and molecular levels.

If suspicion is expressed, immediate **discontinuation of the dairy diet is necessary.** Furthermore, upon confirmation of the diagnosis, the patient is immediately indicated for a lifelong galactose-free diet. The most common disorder is a speech disorder, in girls hypergonadotropic hypogonadism develops. Galactose crosses the placenta and the child may be exposed to galactose intrauterine. Therefore, mothers who have familiar carriers of this diagnosis in the family are advised to follow a lactose-free diet.

Galactokinase deficiency

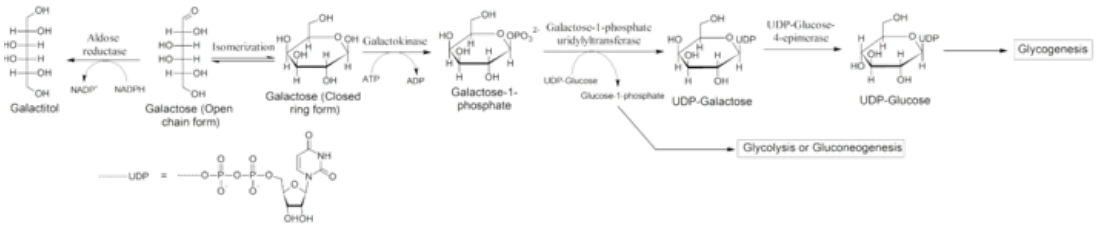
Galactokinase deficiency is a rare **AR inherited disease** with an incidence of 1: 200,000. It is due to a lack of galactokinase, which catalyzes the conversion of galactose to galactose-1-phosphate. The ingested galactose cannot be metabolized in the normal way, so it is metabolized by the aldose-reductase pathway to the galacticol side. This phenomenon occurs mainly in tissues where there is a lot of this enzyme. An example is an ocular lens, where galacticol accumulates and causes osmotic edema, and thus cataracts.

The disease is often found in the Roma minority and manifests itself in bilateral cataracts, pseudotumor cerebri, and galactosuria, which is an unmetabolized galactose that has not even turned into galacticol. The disease is treatable with a lactose-restricted diet, after which cataracts often disappear

Uridyl diphosphate galactose-4-epimerase deficiency

Uridyl diphosphate galactose-4-epimerase deficiency is a **rare AR inherited disease**, indicated by uridyldiphosphate galactose-4-epimerase deficiency. In a mild form, it is a partial benign deficiency of the enzyme. In severe form, the disease resembles classic galactosemia. Thus, the person vomits, and does not thrive, we find hepatopathy in newborns, but if the problem is not recognized, psychomotor retardation can occur.

Normal galactose metabolism



Galactose metabolic pathway

Literature

1. HŘEBÍČEK, M. *Dědičné poruchy metabolismu sacharidů a poruchy glykosylace* [online]. [cit. 2010-10-25]. <https://ubeo.lf1.cuni.cz/cesky.htm>.