Organic aciduria

Organic acidurias are a group of several dozen diseases with a common characteristic: **the excretion of carboxylic acids in the urine**. Organic acids accumulate in the body when the metabolism is disturbed, especially amino acids, then fatty acids and carbohydrates, rarely other substances.

Heredity:

- AR

Pathogenesis:

- disorder of the cytosolic, mitochondrial or peroxisomal metabolic pathway (enzyme deficiency, cofactor deficiency)
- substrate accumulation prior to failure

Symptoms:

- they are different according to the type of aciduria, often non-specific
- a strange smell is highly suspicious
- often metabolic acidosis
- often hyperammonemia

Forms:

1. Acute neonatal
   - severe disorder of intermediary metabolism
   - manifests itself in the first days or weeks of life
2. Intermittent
   - partial deficiency of an enzyme that is sufficient for intermediate metabolism under normal conditions
   - the provoking stimulus is increased catabolism (e.g. surgery), increased protein intake, prolonged starvation
   - they are manifested by attacks of acute encephalopathy, acidosis, hypoglycemia
3. Chronically ongoing
   - less common, progressive, difficult to influence
   - CNS disorders

The organic acidurias investigated as part of the nationwide newborn screening in the Czech Republic include:

- glutaric aciduria type I (GA I)
- isovaleric aciduria (IVA)
- leucinosis (MSUD)
- The last one is propionic acidemia , which is not in the screen

Methylmalonic acidemia

- It belongs to the group of organic acidurias
- It is a disorder of the Methylmalonyl-Coa mutase enzyme
- inheritance is AR
- its non-hereditary form is caused by an excess of vitamin B12, which is a cofactor of the said enzyme

Clinical picture

- a short symptom-free period after birth
- then vomiting
- lethargy
- progressive impairment of consciousness
- brain edema
- liver and kidney failure
- children die under the guise of sepsis, bleeding, or shock
- in the acute stage - ketoacidosis and laboratory signs of liver and kidney failure
- glycine, valine, methionine and methylmalonic acid are higher in blood and urine

Diagnosis

- examination of organic AMK in urine and blood
- the exact type of defect will be determined by enzymatic examination of cultured fibroblasts

Therapy

- if suspected, protein intake should be stopped and muscle catabolism-glucose infusion must be avoided

- with early treatment the prognosis can be good
- in critically ill patients, we must use elimination methods for treatment: hemodialysis, hemodiafiltration, peritoneal dialysis and exchange transfusion (descending efficiency).
- a lifelong diet with a restriction of the amino acids isoleucine, valine, methionine and threonine with the addition of essential AMK and carnitine in food supplements is necessary.[1]

Links

Related articles

- Newborn screening

References

- HYÁNEK, Josef, et al. *Dědičné metabolické poruchy.* 1.. edition. Praha : Avicenum, 1990. pp. 342. ISBN 80-201-0064-4.

1. BENEŠ, Jiří. *Studijní materiály* [online]. ©2007. [cit. 2010-04]. <http://www.jirben.wz.cz/>. HRODEK, Otto – VAVŘINEC, Jan, et al. *Pediatrie.* 1. edition. Praha : Galén, 2002. ISBN 80-7262-178-5.

Hereditary Metabolic Disorders (HMDs)	
In general	DMP of complex molecules • DMP of small molecules • Newborn screening • Screening for hereditary diseases • Examination methods for DMP
DMP amino acids	Alkaptonuria
Organic aciduria	–
DMP of the urea cycle	Alkaptonuria • Ornithine transcarbamylase deficiency • Prolidase deficiency • Phenylketonuria • Glutaric aciduria • Hyperphenylalaninemia • Hyperornithineemia • Isovaleric aciduria • Leucinosis • Nonketotic hyperglycinemia • Cystinosis • Tyrosinemia
DMP of propionate, biotin and cobalamin	Biotinidase deficiency • Methylmalonic acidemia • Propionic acidemia
DMP of purines and pyrimidines	Hepatic porphyria • Cutaneous porphyria • Mitochondrial neurogastrointestinal encephalomyopathy
DMP sugars	Glycogenoses • Fructoaldolase deficiency • Fructose-1,6-bisphofatase deficiency • Essential fructosuria • Galactokinase deficiency • Galactose-1-phosphate uridyltransferase deficiency
Mitochondrial DMP	Phosphoenolcarboxykinase deficiency • LCHAD deficiency • MCAD deficiency • Pyruvate dehydrogenase deficiency • Pyruvate carboxylase deficiency • SCAD deficiency • Chronic progressive external ophthalmoplegia • Leber's hereditary optic neuropathy • Leigh syndrome • Maternal diabetes and deafness • Kearns -Sayre syndrome • VLCAD deficiency
DMP of peroxisomes	Neonatal adenodystrophy • Refsum disease • Rhizomelic chondrodystrophia punctata • X-linked adrenoleukodystrophy • Zellweger syndrome
DMP of lysosomes	Fabry disease • Gaucher disease • Krabbe disease • Danon disease • Mucolipidosis II • Metachromatic leukodystrophy • Mucopolysaccharidosis III • Niemann-Pick disease • Cystinosis • Tay-Sachs disease
Portal: Pathobiochemistry	