Biotinidase Deficiency

What is Biotinidase Deficiency?

Biotinidase deficiency is a form of multiple carboxylase deficiency in which the fundamental defect is an inability to cleave biocytin for biotin recycling. Biotin is a water-soluble vitamin of the B complex that acts as a coenzyme in each of 4 carboxylases in humans (pyruvate carboxylase, propionyl-coenzyme A carboxylase, ß-methylcrotonyl CoA caorboxylase and acetyl-CoA carboxylase).[2]

CLINICAL MANIFESTATIONS

Biotinidase deficiency presents with a median age of 3 months or as late as 10 years of age, symptoms include dermatologic affectation appearing as patchy desquamation and neurological manifestations such as seizures in 70% of patients and ataxia that can interfere with walking. Some patients may also have optic atrophy and hearing loss.[2] Individuals with partial biotinidase deficiency can present with skin manifestations and no neurologic symptoms.[2,3]

PATHOPHYSIOLOGY

Biotinidase deficiency results in an inability to recycle endogenous biotin which means the brain is unable to recycle biotin adequately leading to decreased pyruvate carboxylase activity in the brain and accumulation of lactate which in turn causes the neurologic symptoms.[2]

Inheritance: autosomal recessive[3]

CONFIRMATORY TESTING

Confirmatory studies are performed by determining biotinidase activity in serum; and by urine organic acid analysis.[2]

Overview of Disease Management

Patients are treated with biotin (5-10mg/day).[2,3]

Prognosis

Once therapy is instituted, cutaneous symptoms resolve quickly as do seizures and ataxia, however other symptoms such as hearing loss and optic atrophy are less reversible.[2]

Preliminary / Initial Management During Metabolic Crisis

Metabolic crises may be caused by illness, prolonged fasting or stressful situations such as surgery and severe infection. The goal of treatment is to reverse the catabolic state, correct the acidosis and prevent essential amino acid deficiency.

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WHAT TO DO IF UNWELL

- Nothing per orem
- Ensure patient's airway is secure
- Insert IV access. Collect samples for serum ammonia and blood gas. May request for investigations (i.e. CBC, etc.) as needed.
- May give fluid boluses if patient requires.
- Start D10% 0.3NaCl at full maintenance. Assess patient clinically, if there is need to increase fluid, may do so up to 1.2 or 1.5x the maintenance.
- Monitor input and output strictly (q6 hours).

**Inform metabolic doctor on call for further guidance regarding on-going management*

[1] *Nyhan WL, Barshop BA and Ozand P. Chapter 6: Mul ple carboxylase deficiency/bio nidase deficiency. Atlas of Metabolic Diseases 2nd ed. Great Britain: Oxford University Press, 2005 pp 42-48.*

[2] *Schulze A, Matern D, Hoffmann GF. Chapter 2: Newborn screening in Sarafoglou K, Hoffman GF and Roth KS (eds). Pediatric Endocrinology and Inborn Errors of Metabolism. New York:McGraw Hill, 2009 pp 17-32.*

[3] *Nyhan WL, Barshop BA and Ozand P. Chapter 6: Mul ple carboxylase deficiency/bio nidase deficiency. Atlas of Metabolic Diseases 2nd ed. Great Britain:Oxford University Press, 2005 pp 42-48.*