
Biotinidase Deficiency

What is Biotinidase Deficiency?

Biotinidase is an enzyme that is essential for the recycling of the vitamin biotin. Biotin, in turn, is important as an enzyme cofactor. Free biotin is needed to activate carboxylase enzymes by binding at a specific site. Carboxylases are important in the production of certain fats and carbohydrates and for the breakdown of proteins. This process is blocked if an individual has biotinidase deficiency.

What is its incidence?

Biotinidase deficiency affects about 1 in every 60,000 babies born in Ontario.

What causes the disease?

Mutations in the gene for biotinidase, called BTB, produces deficient or defective enzyme.

What are the clinical features of the disease?

Untreated children with biotinidase deficiency will often have developmental delays, hypotonia, seizures, skin rash, and hair loss. They may also present with ataxia, lethargy, hearing loss, eye problems, and breathing problems. Affected children can also have altered biochemistry (e.g. hyperammonemia, acidosis, and organic aciduria), which may be life threatening. Symptoms usually appear between 3-6 months of age but the age of onset can be variable. Severity of the condition can vary, even within the same family.

Some individuals have a milder form of the condition. Untreated children are usually healthy but can become symptomatic under conditions of stress, such as an illness or poor diet. Some children with partial biotinidase deficiency may need treatment.

How is the diagnosis confirmed?

The diagnosis of biotinidase deficiency can be confirmed by testing a blood sample to determine the biotinidase enzyme activity level. Genetic testing to look for mutations in the BTB gene may also assist in

confirming the diagnosis. Diagnostic testing is arranged by specialists at your regional treatment centre.

What is the treatment of the disease?

Dietary supplementation with large doses of biotin can prevent symptoms of biotinidase deficiency. This treatment is usually life-long. Specialists at your regional treatment centre coordinate treatment.

What is the outcome of treatment?

For symptomatic children, supplementation can reverse some symptoms, such as the biochemical imbalance(s), hair loss, seizures, low muscle tone, and skin rash. Although treatment can halt the progression of developmental delay, hearing loss, and visual impairments, it cannot reverse damage that has already occurred. Babies who receive treatment **before** any symptoms appear usually will not develop signs of biotinidase deficiency.

Can a family have more than one affected child?

Biotinidase deficiency is inherited as an autosomal recessive disease. Parents of a child with biotinidase deficiency are assumed to be carriers for the disease and have a 1 in 4 (25%) chance, in each pregnancy, of having another child with this condition. Prenatal testing for biotinidase deficiency can be done as early as 15-16 weeks of pregnancy. Genetic counselling to discuss the benefits of prenatal testing options in more detail is recommended.

Unaffected siblings of a child with biotinidase deficiency have a 2/3 chance of being carriers. Carriers are healthy and do not have symptoms of biotinidase deficiency.

Resources

<http://www.cmcckids.org/research/biotinidase/>
<http://www.geneclinics.org>