Published on *My46* (https://www.my46.org) 01/20/2022

My46 Trait Profile

Glutaric acidemia type 1

Glutaric acidemia type 1 is a metabolic disorder characterized by the body's inability to fully break down certain amino acids called lysine, hydroxylysine, and tryptophan. It is caused by mutations in the GCDH gene that makes the glutaryl-CoA dehydrogenase enzyme.

Characteristics of Glutaric acidemia type 1

Individuals with GA1 cannot properly breakdown certain amino acids called lysine, hydroxylysine, and tryptophan. Amino acids are the building blocks of proteins. These three amino acids cannot be broken down because the enzyme, glutaryl-CoA dehydrogenase enzyme, is not working properly. Without treatment, this leads to the build-up of a harmful substance, glutaric acid. The build-up of glutaric acid can severely damage the brain and cause other serious health problems, such as poor feeding, delayed growth, low muscle tone, developmental delays, and problems with balance, movement, and coordination.

Diagnosis/Testing

Most infants with GA1 are diagnosed within the first few days or weeks of life through newborn screening (NBS). NBS tests a spot of blood from the baby's heel to see if the GCDH enzyme is working properly. NBS test results are confirmed with additional blood and urine chemical tests, as well as with genetic testing of the GCDH gene. This gene makes the glutaryl-CoA dehydrogenase enzyme that is responsible for breaking down or processing lysine, hdroxylysine, and tryptophan. Most individuals with GA1 have changes or mutations in the GCDH gene. If a pregnancy is known to be at risk for GA1, amniocentesis can be used for prenatal diagnosis.

Management/Surveillance

Children with GA1 are managed by a team of specialists which often include. Since the amino acids lysine, hydroxylysine, and tryptophan are found in most foods we eat, including breast milk and infant formula, it is very important that individuals with GA1 follow a special low protein diet. This diet includes a medical formula designed to provide all amino acids except for lysine and tryptophan to ensure good nutrition. Specific medications and vitamin supplements (e.g., riboflavin and L-carnitine) are also often prescribed. It is recommended that an emergency treatment plan is made to ensure that during times of illness, a child with GA1 will be assessed for signs and symptoms of a metabolic crisis (e.g., poor feeding, vomiting, lethargy, excessive sleepiness, irritability) and treated appropriately.

Mode of inheritance

GA1 is inherited in an autosomal recessive pattern. This means that an individual has to inherit two GCDH mutations (i.e., one from each parent) to be affected with GA1. If both parents are carriers of a GCDH mutation, they have a 1 in 4 (25%) chance with each pregnancy of having a child with GA1. Babies born in the United States are screened for GA1 by newborn screening.

Risk to family members

Parents of a child with GA1 are carriers of GA1. If a sibling of a child with GA1 is unaffected, he/she has a 2 in 3 (66%) chance of being a carrier of GA1.

Special considerations

None

Resources

Genetics Home Reference: Glutaric acidemia type I
http://ghr.nlm.nih.gov/condition/glutaric-acidemia-type-i
Medical Home Portal: Glutaric acidemia type 1
http://www.medicalhomeportal.org/newborn/glutaric-acidemia-type-1
Organic Acidemia Association
http://www.oaanews.org/
International Organization of Glutaric Acidemia
http://helpioga.org/

References

Hedlund, GL. et al. (2006)."Glutaric Acidemia Type 1." American Journal of Medical Genetics 142C(2): 86-94.
Kolker, S. et al. (2011)."Diagnosis and management of glutaric aciduria type 1 – revised recommendations." Journal of Inherited Metabolic Disease. 34(3): 677-694.
Seashore MR. (Updated 22 December 2009). The Organic Acidemias: An Overview. In: GeneReviews at GeneTests Medical Genetics Information Resource (database online). Copyright, University of Washington, Seattle. 1997-2013. Available at http://www.ncbi.nlm.nih.gov/books/NBK1134/. Accessed [10/31/2013].

Created: 10/2013 **Created by:** Jessica Hartley, MS, CGC
Updated: mm/yyyy **Edited by:** Seema Jamal, MSc, LCGC