Glycogen Storage Disease Type VI

Subjects: Genetics & Heredity
Contributor: Camila Xu

Glycogen storage disease type VI (also known as GSDVI or Hers disease) is an inherited disorder caused by an inability to break down a complex sugar called glycogen in liver cells. A lack of glycogen breakdown interferes with the normal function of the liver.

Keywords: genetic conditions

1. Introduction

The signs and symptoms of GSDVI typically begin in infancy to early childhood. The first sign is usually an enlarged liver (hepatomegaly). During prolonged periods without food (fasting), affected individuals may have low blood sugar (hypoglycemia) or elevated levels of ketones in the blood (ketosis). Ketones are molecules produced during the breakdown of fats, which occurs when stored sugars are unavailable. Children with GSDVI tend to grow slower than their peers, but they often achieve normal height as adults. Some affected children also have mild delays in the development of motor skills, such as sitting, standing, or walking.

The signs and symptoms of GSDVI tend to improve with age; most adults with this condition do not have any related health problems.

2. Frequency

The exact prevalence of GSDVI is unknown. At least 11 cases have been reported in the medical literature, although this condition is likely to be underdiagnosed because it can be difficult to detect in children with mild symptoms or adults with no symptoms. GSDVI is more common in the Old Older Mennonite population, with an estimated incidence of 1 in 1,000 individuals.

3. Causes

Mutations in the *PYGL* gene cause GSDVI. The *PYGL* gene provides instructions for making an enzyme called liver glycogen phosphorylase. This enzyme is found only in liver cells, where it breaks down glycogen into a type of sugar called glucose-1-phosphate. Additional steps convert glucose-1-phosphate into glucose, a simple sugar that is the main energy source for most cells in the body.

PYGL gene mutations prevent liver glycogen phosphorylase from breaking down glycogen effectively. Because liver cells cannot break down glycogen into glucose, individuals with GSDVI can have hypoglycemia and may use fats for energy, resulting in ketosis. Glycogen accumulates within liver cells, causing these cells to become enlarged and dysfunctional.

3.1. The gene associated with Glycogen storage disease type VI

- PYGL

4. Inheritance

This condition is inherited in an autosomal recessive pattern, which means both copies of the gene in each cell have mutations. The parents of an individual with an autosomal recessive condition each carry one copy of the mutated gene, but they typically do not show signs and symptoms of the condition.

5. Other Names for This Condition

- GSD type VI

- GSD VI
- GSD6
- hepatic glycogen phosphorylase deficiency
- Hers disease
- liver phosphorylase deficiency syndrome

References

1. Beauchamp NJ, Taybert J, Champion MP, Layet V, Heinz-Erian P, Dalton A, TannerMS, Pronicka E, Sharrard MJ. High f requency of missense mutations in glycogenstorage disease type VI. J Inherit Metab Dis. 2007 Oct;30(5):722-34.
2. Burwinkel B, Bakker HD, Herschkovitz E, Moses SW, Shin YS, Kilimann MW.Mutations in the liver glycogen phosphoryl ase gene (PYGL) underlying glycogenosistype VI. Am J Hum Genet. 1998 Apr;62(4):785-91.
3. Chang S, Rosenberg MJ, Morton H, Francomano CA, Biesecker LG. Identificationof a mutation in liver glycogen phosp horylase in glycogen storage disease typeVI. Hum Mol Genet. 1998 May;7(5):865-70.
4. Labrador E, Weinstein DA. Glycogen Storage Disease Type VI. 2009 Apr 23[updated 2019 Nov 27]. In: Adam MP, Ardin ger HH, Pagon RA, Wallace SE, Bean LJH, Stephens K, Amemiya A, editors. GeneReviews® [Internet]. Seattle (WA): Universityof Washington, Seattle; 1993-2020. Available fromhttp://www.ncbi.nlm.nih.gov/books/NBK5941/