Glycogen storage disease type VI

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.

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.

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.

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.

Inheritance Pattern

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.

Other Names for This Condition

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

Diagnosis & Management

Genetic Testing Information

- What is genetic testing?
  /primer/testing/genetictesting
- Genetic Testing Registry: Glycogen storage disease, type VI

Research Studies from ClinicalTrials.gov

- ClinicalTrials.gov
  https://clinicaltrials.gov/ct2/results?cond=%22glycogen+storage+disease+type+VI%22

Other Diagnosis and Management Resources

- GeneReview: Glycogen Storage Disease Type VI
  https://www.ncbi.nlm.nih.gov/books/NBK5941
- MedlinePlus Medical Tests: Ketones in Blood
  https://medlineplus.gov/lab-tests/ketones-in-blood/

Additional Information & Resources

Health Information from MedlinePlus

- Encyclopedia: Hepatomegaly
  https://medlineplus.gov/ency/article/003275.htm
- Health Topic: Carbohydrate Metabolism Disorders
  https://medlineplus.gov/carbohydratemetabolismdisorders.html
- Health Topic: Hypoglycemia
  https://medlineplus.gov/hypoglycemia.html
• Health Topic: Liver Diseases
  https://medlineplus.gov/liverdiseases.html

• Medical Tests: Ketones in Blood
  https://medlineplus.gov/lab-tests/ketones-in-blood/

Genetic and Rare Diseases Information Center
• Glycogen storage disease type 6
  https://rarediseases.info.nih.gov/diseases/6529/glycogen-storage-disease-type-6

Educational Resources
• Cincinnati Children’s Hospital: Glycogen Storage Disease
  https://www.cincinnatichildrens.org/health/g/gsd

• Merck Manual Consumer Version: Overview of Hereditary Metabolic Disorders

• Orphanet: Glycogen storage disease due to liver glycogen phosphorylase deficiency
  https://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=EN&Expert=369

Patient Support and Advocacy Resources
• Association for Glycogen Storage Disease
  https://www.agsdus.org/type-vi.php

• Metabolic Support UK
  https://www.metabolicsupportuk.org/

• National Organization for Rare Disorders (NORD)
  https://rarediseases.org/rare-diseases/hers-disease/

• The Association for Glycogen Storage Disease (UK)

• The Association for Glycogen Storage Disease (US)
  https://www.agsdus.org/type-vi.php

• University of Kansas Medical Center Resource List
  http://www.kumc.edu/gec/support/glycogen.html

Clinical Information from GeneReviews
• Glycogen Storage Disease Type VI
  https://www.ncbi.nlm.nih.gov/books/NBK5941
Scientific Articles on PubMed

• PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28glycogen+storage+disease+type+VI%5BALL%5D%29+OR+%28GSD+VI%5BALL%5D%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+3600+days%22%5Bdp%5D

Catalog of Genes and Diseases from OMIM

• GLYCOGEN STORAGE DISEASE VI
  http://omim.org/entry/232700

Sources for This Summary

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/17705025

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/9529348
  Free article on PubMed Central: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1377030/

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/9536091

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/20301760

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