Gaucher disease

Gaucher disease is an inherited disorder that affects many of the body's organs and tissues. The signs and symptoms of this condition vary widely among affected individuals. Researchers have described several types of Gaucher disease based on their characteristic features.

Type 1 Gaucher disease is the most common form of this condition. Type 1 is also called non-neuronopathic Gaucher disease because the brain and spinal cord (the central nervous system) are usually not affected. The features of this condition range from mild to severe and may appear anytime from childhood to adulthood. Major signs and symptoms include enlargement of the liver and spleen (hepatosplenomegaly), a low number of red blood cells (anemia), easy bruising caused by a decrease in blood platelets (thrombocytopenia), lung disease, and bone abnormalities such as bone pain, fractures, and arthritis.

Types 2 and 3 Gaucher disease are known as neuronopathic forms of the disorder because they are characterized by problems that affect the central nervous system. In addition to the signs and symptoms described above, these conditions can cause abnormal eye movements, seizures, and brain damage. Type 2 Gaucher disease usually causes life-threatening medical problems beginning in infancy. Type 3 Gaucher disease also affects the nervous system, but it tends to worsen more slowly than type 2.

The most severe type of Gaucher disease is called the perinatal lethal form. This condition causes severe or life-threatening complications starting before birth or in infancy. Features of the perinatal lethal form can include extensive swelling caused by fluid accumulation before birth (hydrops fetalis); dry, scaly skin (ichthyosis) or other skin abnormalities; hepatosplenomegaly; distinctive facial features; and serious neurological problems. As its name indicates, most infants with the perinatal lethal form of Gaucher disease survive for only a few days after birth.

Another form of Gaucher disease is known as the cardiovascular type because it primarily affects the heart, causing the heart valves to harden (calcify). People with the cardiovascular form of Gaucher disease may also have eye abnormalities, bone disease, and mild enlargement of the spleen (splenomegaly).

Frequency

Gaucher disease occurs in 1 in 50,000 to 100,000 people in the general population. Type 1 is the most common form of the disorder; it occurs more frequently in people of Ashkenazi (eastern and central European) Jewish heritage than in those with other backgrounds. This form of the condition affects 1 in 500 to 1,000 people of Ashkenazi Jewish heritage. The other forms of Gaucher disease are uncommon and do not occur more frequently in people of Ashkenazi Jewish descent.
Causes
Mutations in the \textit{GBA} gene cause Gaucher disease. The \textit{GBA} gene provides instructions for making an enzyme called beta-glucocerebrosidase. This enzyme breaks down a fatty substance called glucocerebroside into a sugar (glucose) and a simpler fat molecule (ceramide). Mutations in the \textit{GBA} gene greatly reduce or eliminate the activity of beta-glucocerebrosidase. Without enough of this enzyme, glucocerebroside and related substances can build up to toxic levels within cells. Tissues and organs are damaged by the abnormal accumulation and storage of these substances, causing the characteristic features of Gaucher disease.

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
- cerebroside lipidosis syndrome
- Gaucher splenomegaly
- Gaucher syndrome
- Gaucher’s disease
- Gauchers disease
- GD
- glucocerebrosidase deficiency
- glucocerebrosidosis
- glucosyl cerebroside lipidosis
- glucosylceramidase deficiency
- glucosylceramide beta-glucosidase deficiency
- glucosylceramide lipidosis
- kerasin histiocytosis
- kerasin lipoidosis
- kerasin thesaurismosis
- lipoid histiocytosis (kerasin type)
Diagnosis & Management

Genetic Testing Information

• What is genetic testing?

Genetic Testing Registry: Acute neuronopathic Gaucher's disease

• Genetic Testing Registry: Gaucher disease

• Genetic Testing Registry: Gaucher disease type 3A

• Genetic Testing Registry: Gaucher disease type 3B

• Genetic Testing Registry: Gaucher disease type 3C

• Genetic Testing Registry: Gaucher's disease, type 1

• Genetic Testing Registry: Subacute neuronopathic Gaucher's disease

Research Studies from ClinicalTrials.gov

• ClinicalTrials.gov
https://clinicaltrials.gov/ct2/results?cond=%22gaucher+disease%22

Other Diagnosis and Management Resources

• Baby’s First Test
https://www.babysfirsttest.org/newborn-screening/conditions/gaucher

• GeneReview: Gaucher Disease
https://www.ncbi.nlm.nih.gov/books/NBK1269

• MedlinePlus Encyclopedia: Gaucher Disease
https://medlineplus.gov/ency/article/000564.htm

• National Organization for Rare Disorders (NORD) Physician Guide
https://rarediseases.org/physician-guide/gaucher-disease/
Additional Information & Resources

Health Information from MedlinePlus

- Encyclopedia: Gaucher Disease
  https://medlineplus.gov/ency/article/000564.htm
- Health Topic: Gaucher Disease
  https://medlineplus.gov/gaucherdisease.html

Genetic and Rare Diseases Information Center

- Gaucher disease
  https://rarediseases.info.nih.gov/diseases/8233/gaucher-disease
- Gaucher disease type 1
  https://rarediseases.info.nih.gov/diseases/2441/gaucher-disease-type-1

Additional NIH Resources

- National Human Genome Research Institute
  https://www.genome.gov/Genetic-Disorders/Gaucher-Disease
- National Institute of Neurological Disorders and Stroke: Gaucher's Disease Information Sheet
  https://www.ninds.nih.gov/Disorders/All-Disorders/Gaucher-Disease-Information-Page
- National Institute of Neurological Disorders and Stroke: Lipid Storage Diseases Fact Sheet
  https://www.ninds.nih.gov/Disorders/All-Disorders/Lipid-storage-diseases-Information-Page
- Researching Disease: Dr. Roscoe Brady and Gaucher Disease
  https://history.nih.gov/exhibits/gaucher/

Educational Resources

- JAMA Patient Page: Gaucher disease
  https://jamanetwork.com/journals/jama/fullarticle/208870
- MalaCards: gaucher disease, type i
  https://www.malacards.org/card/gaucher_disease_type_i
- MalaCards: gaucher disease, type ii
  https://www.malacards.org/card/gaucher_disease_type_ii
- MalaCards: gaucher disease, type iii
  https://www.malacards.org/card/gaucher_disease_type_iii
- Mount Sinai School of Medicine
  https://icahn.mssm.edu/research/gaucher/what-is
• Orphanet: Gaucher disease
  https://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=EN&Expert=355
• Orphanet: Gaucher disease-ophthalmoplegia-cardiovascular calcification syndrome
  https://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=EN&Expert=2072

Patient Support and Advocacy Resources
• Canadian MPS Society
  http://www.mpssociety.ca/
• National Gaucher Foundation
  https://www.gaucherdisease.org/
• National Organization for Rare Disorders (NORD)
  https://rarediseases.org/rare-diseases/gaucher-disease/
• National Tay Sachs and Allied Diseases Association
  https://www.ntsad.org/

Clinical Information from GeneReviews
• Gaucher Disease
  https://www.ncbi.nlm.nih.gov/books/NBK1269

Scientific Articles on PubMed
• PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28Gaucher+Disease%5BMAJR%5D%29+AND+%28Gaucher+disease%5BTI%5D%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+720+days%22%5Bdp%5D

Catalog of Genes and Diseases from OMIM
• GAUCHER DISEASE, TYPE I
  http://omim.org/entry/230800
• GAUCHER DISEASE, TYPE II
  http://omim.org/entry/230900
• GAUCHER DISEASE, TYPE III
  http://omim.org/entry/231000
• GAUCHER DISEASE, TYPE IIIC
  http://omim.org/entry/231005

Medical Genetics Database from MedGen
• Gaucher disease
Sources for This Summary

  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/16720474
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/8544197 
  Free article on PubMed Central: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1051678/
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/16396828
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/11359469
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/14677061
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/16485335
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/23622393
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/20301446
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/23510062
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/23114583 
  Free article on PubMed Central: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4141347/

Reprinted from Genetics Home Reference: