



**Sarah**

**Mother of a child  
with Gaucher**

**Working toward  
a healthy future**

**Helping her son achieve  
his own dreams, too**

**Straight Talk**

**For Patients and Families**

# **Inheritance of Gaucher Disease**

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Monday - Friday 8:00 am - 6:00 pm EST

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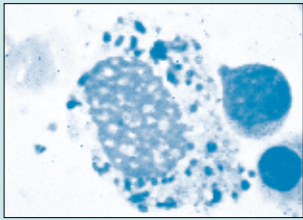
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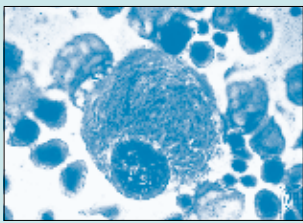
Glucocerebrosidase is an enzyme that helps break down glucocerebroside, a type of fat or lipid found in certain parts of your body that is the result of the breakdown of worn-out red and white blood cells. Without this important enzyme, special cells called macrophages, responsible for picking up and recycling glucocerebroside, fill up with the undigested fat. These cells are referred to as Gaucher cells.

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### Your bones and organs are at risk even when you're not in pain



Normal Cell



Gaucher Cell

Gaucher cells, bloated with undigested fat, accumulate primarily in the liver, spleen and bone marrow, and sometimes in the lungs. When this happens, the affected organs, especially the spleen and liver, can become enlarged and distended so that they protrude from the abdomen. This condition is called organomegaly (literally, big organs), or hepatosplenomegaly (big liver and spleen).

## Gaucher patients can't produce enough of an important enzyme



Organomegaly was first described by the French physician Philippe Gaucher in 1882 as the most obvious symptom of the disease that bears his name.

Despite Philippe Gaucher's observations, the greater risk for patients may not come from their organs, but from their bones. Gaucher cells may displace a significant volume of healthy bone marrow, often contributing to anemia and uncontrolled bleeding (due to low platelet counts).



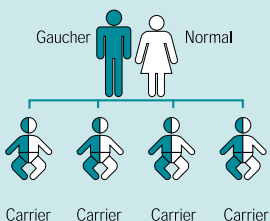
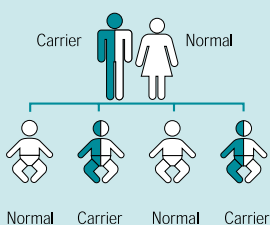
Philippe Gaucher

The real danger, however, may occur in the bones of the legs, hips, shoulders and spine. There, the bone marrow displacement can lead to delayed growth, weakness, pain, erosion and eventually may result in the collapse of the bone itself. Many Gaucher patients seek help for chronic bone or joint pain, and it is not uncommon for those affected by the disease to experience broken hips or collapsed vertebrae without ever displaying symptoms of organomegaly.

## Gaucher patients inherit a faulty gene from both parents

Glucocerebrosidase is one of many enzymes produced by the human body.

Enzymes are produced in the appropriate cells according to a pattern recorded in a person's DNA, or hereditary material. The DNA segment with the pattern which holds the information that makes a body grow and organs function is called a gene. A person carries a pair of genes, with each parent contributing one gene. It is possible for the pattern in a particular gene to become changed, or mutated, get passed down from generation to generation. This change in the pattern of a gene is known as a mutation.



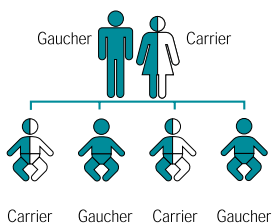
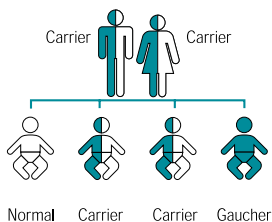
Gaucher disease is called an autosomal recessive disorder. Autosomal reflects that the defect is not gender specific. Recessive tells us that only patients who inherit the mutated gene from both parents are affected.

## Some people are Gaucher disease carriers



People with only one defective gene produce less glucocerebrosidase, but have enough glucocerebrosidase so that they do not have any symptoms of the disease.

These people are known as carriers because they carry only one changed copy of the gene. Research shows that about one in 400 people in the general population is a glucocerebrosidase mutation carrier. Among certain ethnic groups, the carrier rate is as high as one in 10. With each pregnancy, carriers have a 50% chance of passing along the one changed gene.



## You get Gaucher disease by inheriting two Gaucher genes

People with two defective genes cannot produce enough glucocerebrosidase and therefore may develop Gaucher disease symptoms. When both parents are carriers, there is a 25% chance with each pregnancy that the child will be affected by Gaucher disease. This pattern of inheritance, which holds true for any autosomal recessive disorder, is shown in the four diagrams on these pages.



## **A diagnosis for Gaucher disease is important for your entire family**

A diagnosis of Gaucher disease in any person indicates an increased probability that the person's siblings, aunts, uncles and first cousins are carriers or actually have the disease. Genetic counseling for families with Gaucher disease is important to help address associated complex social and reproductive questions.

## A blood test can tell who has the disease and who is a carrier



When Gaucher disease is suspected, the diagnosis can be confirmed by a test that measures the activity of the enzyme glucocerebrosidase in the blood. The test requires a blood sample and a few days to produce a result. Carrier status can be determined by analyzing a person's DNA, which also can be extracted from a blood sample. Prenatal diagnosis is available through amniocentesis and chorionic villus sampling.



*In the back of this booklet, you will find a Family Tree. Fill it out and return it to your genetic counselor, nurse or doctor. This will help your medical team develop a full picture of your family and how Gaucher disease may be passed through the generations.*



## Who should be tested

Gaucher disease testing should be considered for anyone with symptoms, such as delayed growth in children, general weakness, enlarged spleen or liver, anemia, bone pain, and spontaneous fractures in a child or adult. Additionally, family members of an individual with diagnosed Gaucher disease should be tested.

Knowledge of a history of Gaucher disease in the family is an important diagnostic tool for the physician. It is not uncommon for physicians first encountering the symptoms to either fail to diagnose Gaucher disease or to misdiagnose it as another disorder.

Family genetic testing is important for persons at risk of being carriers who are planning to marry or start a family. Knowledge of carrier status can affect reproductive choices and drive decisions about additional family testing and counseling.



## What the diagnostic tests show



What you learn from your test will be determined by what technology is used. The enzyme activity test measures whether or not you have enough glucocerebrosidase enzyme to break down glucocerebroside. This test has been shown to accurately detect the disease, but does not indicate anything about a person's genetic status. DNA analysis will show which Gaucher mutations are present. Neither test can predict the severity of symptoms.

### **No diagnosed patient is alone**

Treatment is available for this disorder, and decisions concerning treatment options should be discussed with your physician.

If you are diagnosed with Gaucher disease, you can get more information from a Gaucher disease specialist in your area or by contacting the Gaucher resources on the following page.



## Talk to people who have been there

Nosebleeds, broken bones, swollen bellies, weakness, pain, and questions about testing—around the world there are thousands of patients, parents, friends and physicians who know Gaucher disease firsthand and offer a sensitive and credible resource for those dealing with the disease. The list below is offered as a starting point. Please use it to seek out additional resources in your area.

### **National Gaucher Foundation (NGF)**

[www.gaucherdisease.org](http://www.gaucherdisease.org)

Email: [ngf@gaucherdisease.org](mailto:ngf@gaucherdisease.org)

### **Genzyme Care Coordination**

Genzyme Corporation

500 Kendall St.

Cambridge, MA 02142

800-745-4447, press #3

#### Your Local Comprehensive Gaucher Center

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Tel:

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Contact:

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This type of family history is particularly important in the case of an autosomal recessive disorder such as Gaucher disease where generations of people within a family may carry a single copy of the defective gene and never know it. As a result, the diagnosis of Gaucher disease in one person (or the identification of an ancestor with significant Gaucher symptoms) may be the first indication that siblings, aunts, uncles and cousins may be Gaucher disease carriers.

If you suspect that you or someone close to you either has Gaucher disease or is a carrier, talk to your doctor, or refer to the resources listed in this booklet.

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## A family story

This chart is designed to help you gather and organize relevant information about your family members and their status as potential carriers of Gaucher disease. Together with a knowledge of inheritance patterns outlined in the Straight Talk booklet, it will help you to better understand how Gaucher disease occurs and how it is passed along.

