

Diagnostic Methods for Gaucher Disease

How to Cite This Article: Salehpour Sh. Diagnostic Methods for Gaucher Disease. Iran J Child Neurol. 2015 Autumn;9:4(Suppl.1): 14-15.

Shadab SALEHPOUR MD^{1,2}

Gaucher's disease or Gaucher is a sphingolipid in which glucocerebroside (glucosylceramide) accumulates in cells and certain organs. The disorder is characterized by bruising, fatigue, anemia, low blood platelet count and enlargement of the liver and spleen, and is caused by deficiency of the enzyme glucocerebrosidase.

Most patients with Gaucher disease have radiologic evidence of skeletal involvement, including an Erlenmeyer flask deformity of the distal femur, which is an early skeletal change. Clinically apparent bony involvement, which occurs in more than 20% of patients with Gaucher disease, can present as bone pain or pathologic fractures. In patients with symptomatic bone disease, lytic lesions can develop in the long bones, ribs, and pelvis, and osteosclerosis or osteopenia may be evident at an early age. Bone crises with severe pain and swelling can occur in individuals with type 1 Gaucher disease and are frequently mistaken for synovitis or osteomyelitis until other symptoms become apparent.

Occasional patients with type 1 Gaucher disease develop pulmonary involvement, parkinsonism, or portal hypertension. Patients with milder presentations of Gaucher disease are diagnosed later in life during evaluations for hematologic or skeletal problems or are found to have splenomegaly during routine examinations. Some patients are overtly asymptomatic, and a diagnosis is made incidentally after evaluation for other medical problems. Because some of the signs and symptoms associated with Gaucher disease are similar to those of other more common disorders, it may take months or even years for people with Gaucher disease to get an accurate diagnosis. For example, joint pain may be attributed to arthritis, or bone pain in the upper legs may be attributed to 'growing pains.' Low red blood cell or platelet count may at first be diagnosed as a blood disorder or lead to a work up for leukemia or lymphoma. Also, since the initial signs and symptoms may seem rather harmless, patients and physicians may not suspect a progressive disease for a long time.

Accurate and definitive diagnosis of Gaucher disease can be made with a simple blood test (or assay) that measures glucocerebrosidase enzyme activity. The blood sample can be taken in the physician's office, but may need to be sent to a specialized medical center for analysis. In healthy individuals, the test shows white blood cells that contain normal enzyme activity; in individuals with Gaucher disease, enzyme activity is much lower.

Alternatively, the physician may obtain a skin sample, as certain skin cells called fibroblasts can be used to measure glucocerebrosidase activity levels.

A bone marrow biopsy is often taken when a physician suspects a blood cancer, such as leukemia. This bone marrow sample may be used to check for Gaucher

1. Genomic Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran

2. Department of Pediatric Endocrinology and Metabolism, Loghman Hakim Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Corresponding Author:
Salehpour Sh.

Loghman Hakim Hospital, Tehran, Iran
Email: shadab.salehpour@gmail.com

cells. The cells are then viewed under a microscope. However, the definitive testing method for Gaucher disease continues to be a simple blood test (or enzyme assay) that measures enzyme activity.

Blood tests that can show a variety of abnormalities such as low red blood cell or low platelet counts, signs of chronic inflammation, or of some liver dysfunction. X-rays, magnetic resonance imaging (MRI), or computerized tomography (CT or "CAT" scans), may show abnormalities in bone. MRI or CT scan measures the liver and spleen sizes. X-rays and/or electrocardiogram (ECG) or other tests to assess whether the lungs and/or heart are involved may be helpful. Special tests to evaluate possible effects on the brain or peripheral nerves are also available.

Gaucher disease testing should be considered for anyone with Gaucher symptoms, especially delayed growth, general weakness, enlarged spleen or liver, anemia, bone pain, or spontaneous (pathologic) fractures. Also, close family members of an individual with Gaucher disease must be tested to determine if they are carriers. So evaluation of the complex signs and symptoms can be helpful for early diagnosis. On the other hand, several tests are available for confirmation of the diagnosis of Gaucher disease. In the past, invasive bone-marrow tests were most common. Due to the overlap in presentation between Gaucher and hematological malignancies, bone marrow histology is still frequently done in Gaucher patients. Today, measurement of β -glucocerebrosidase activity can be used to measure glucocerebrosidase activity in cells obtained from the patient, providing a definitive diagnosis of Gaucher disease: enzyme activity of 30% or less than normal definitively indicates Gaucher disease. Enzyme activity can be measured either in leukocytes, which are fairly easily obtained from peripheral blood, or in skin fibroblasts, e.g., grown from skin biopsies.

DNA testing can be used to aid diagnosis or screen for carrier status. In individuals of Eastern European ancestry, four specific gene mutations occur in 89% to 96% of Gaucher disease patients. This method is considered less sensitive than enzyme analysis when used as a diagnostic tool in the general population.

DNA testing, however, provides the most reliable means of identifying carriers. Testing is recommended for all first-degree relatives of a confirmed Gaucher disease patient. Besides the diagnostic and carrier testing, other evaluations are recommended to gauge disease progression and tailor therapy. These include skeletal imaging, hematological assays, and visceral evaluations.

Keywords: Gaucher disease; Gaucher cell; β -glucocerebrosidase

References

1. Salehpour Sh. Clinical Manifestations of Type 1 Gaucher Disease. *Iran J Child Neurol Autumn 2012; 6:4 (suppl. 1):13-14.*
2. Nagral A. Gaucher Disease. *J Clin Exp Hepatol. 2014 Mar; 4(1): 37-50.*