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What is Tay-Sachs Disease?
Tay-Sachs disease (TSD) is an inherited disease that is characterized by progressive degeneration of the central nervous system and death, occurring typically in early childhood. The symptoms of TSD are due to a defect in the production of an enzyme called beta-hexosaminidase A, which is responsible for breaking down a fatty substance in the body called GM2 ganglioside. Without this enzyme, GM2 accumulates primarily in the brain and nerve cells, causing severe damage. TSD is also known as hexosaminidase A deficiency.[1]

What are the symptoms of Tay-Sachs Disease and what treatment is available?
Tay-Sachs disease is a progressive condition that typically presents in infancy between three and six months of age and results in early childhood death.[1] Although less common, juvenile and adult forms of TSD occur and are associated with later onset, slower disease progression, and variable neurological findings.[2]

Symptoms of infantile TSD may include[1,2]:

- Progressive muscle weakness
- Loss of motor skills (rolling, sitting, crawling)
- Exaggerated startle response to loud noise
- Reduced attentiveness
- Spasticity (tight muscles)
- Cherry-red spot seen on eye examination
- Vision and hearing loss
- Seizures
- Severe mental retardation

Symptoms of adult-onset TSD may include[2]:

- Loss of muscle mass
- Muscle weakness
- Loss of motor skills (walking)
- Speech problems
- Dementia
- Mental illness

There is no cure for Tay-Sachs disease. Treatment includes supportive care for symptoms.[2]

How is Tay-Sachs Disease inherited?
Tay-Sachs disease is an autosomal recessive disease caused by mutations in the *HEXA* gene.[1] An individual who inherits one copy of a *HEXA* gene mutation is a "carrier" and is not expected to have related health problems. An individual who inherits two mutations in this gene, one from each parent, is expected to be affected with TSD.

If both members of a couple are carriers, the risk for an affected child is 25% in each pregnancy; therefore, it is especially important that the reproductive partner of a carrier be offered testing.

Who is at risk for Tay-Sachs Disease?
TSD can occur in individuals of any race or ethnicity; however, it is most common in individuals of Ashkenazi Jewish and French-Canadian ancestry.

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Carrier Frequency in Select Ethnic Groups

Ethnicity	Carrier Rate
Ashkenazi Jewish	1/27[3]
French Canadian	1/73[4]
General	1/300[5]

Having a relative who is a carrier or who is affected can also increase an individual's risk of being a carrier. Consultation with a genetics health professional may be helpful in determining carrier risk and appropriate testing.

What does a positive test result mean?
If a gene mutation is identified, an individual should speak to a physician or genetics health professional about the implications of the result and appropriate testing for the reproductive partner and at-risk family members.

What does a negative test result mean?
A negative result reduces, but does not eliminate, the possibility that an individual carries a gene mutation. The likelihood of being a carrier is also influenced by family history, medical symptoms, and other relevant test results.

Where can I get more information?

- National Tay-Sachs and Allied Diseases: http://www.ntsad.org/
- Genetics Home Reference: http://ghr.nlm.nih.gov/condition/tay-sachs-disease

References:

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3. Scott S, *et al*. Experience with carrier screening and prenatal diagnosis for 16 Ashkenazi Jewish genetic diseases. *Hum Mut*. 2010; 31: 1-11.
4. Martin DC, *et al*. Evaluation of the risk for Tay-Sachs disease in individuals of French Canadian ancestry living in New England. *Clin Chem.* 2007; 53(3): 392-398.
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