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My46 Trait Profile

# Mucopolysaccharidosis Type 1

Other Names: Hurler syndrome, Hurler-Scheie syndrome, Scheie syndrome

*Mucopolysaccharidosis type I is a genetic condition characterized by the body's inability to break down complex sugar molecules called glycosaminoglycans. It is caused by mutations in the IDUA gene that makes the alpha-L-iduronidase protein.*

**Characteristics of Mucopolysaccharidosis Type 1**

Individuals with Mucopolysaccharidosis type I (MPS I) cannot properly break down complex sugar molecules called glycosaminoglycans (GAGs) because the enzyme, alpha-L-iduronidase, is not working properly. Without enough enzyme, GAGs build up in various tissues of the body. As the GAGs accumulate, disease symptoms become debilitating and life threatening.

Disease severity and onset of symptoms seen in MPS I are highly variable and affect many different parts of the body. Historically, there are three different types of MPS I based on severity of the symptoms: Hurler (severe), Hurler-Scheie (intermediate), and Scheie (mild). However, MPS I is now seen as a spectrum of disease with the most severely affected individuals on one end, the less severely affected (attenuated) individuals on the other end with a range of different severities in between. The most common features of MPS I include umbilical and inguinal hernias, skeletal abnormalities, recurrent and persistent upper respiratory tract infections, distinct facial features, stiff joints, hydrocephalus, carpal tunnel syndrome, snoring, sleep apnea, hearing loss, enlarged spleen and liver, heart problems, and eye problems such as corneal clouding, glaucoma, retinal degeneration, optic atrophy.

**Diagnosis/Testing**

A diagnosis of MPS I can be made by measuring the alpha-L-iduronidase enzyme activity from a blood sample. A person with MPS I often has deficient (low) enzyme activity. A diagnosis of MPS I can also be done by genetic testing for changes or mutations in the IDUA gene. This gene makes the alpha-L-iduronidase enzyme that is responsible for breaking down specific GAGs. Mutations in the IDUA gene prevent the enzyme from working properly, resulting in a build-up of specific GAGs in various organs of the body.

**Management/Surveillance**

Management of MPS I focuses on improving quality of life, slowing down disease progression, and treating complications. Due to the progressive nature of MPS I, constant surveillance and evaluation of clinical signs and symptoms are recommended. This includes brain imaging, spine imaging, echocardiograms to monitor heart symptoms, hearing exams, eye exams, pulmonary function testing, bone imaging and x-rays, and abdominal imaging to monitor liver and spleen size. There is no cure at this time for MPS I; however, early intervention and treatment may help prevent irreversible damage.

There are two main treatment options for MPS I. For individuals with severe MPS I, Hematopoietic Stem Cell Transplant (HSCT) is recommended before the child reaches 2 years of age. HSCT has been shown to stop the progression of central nervous system, heart, and liver/spleen involvement as well as prolong life expectancy. HSCT cannot correct skeletal conditions or reverse cognitive impairment. The other treatment available for MPS I is enzyme

replacement therapy (ERT). ERT provides the alpha-L-iduronidase enzyme that is missing in individuals with MPS I through regular intravenous (IV infusions). ERT is a lifelong treatment for MPS I and is not a cure.

Because most individuals with MPS I have joint stiffness, limitation of motion, and bone problems, competitive and contact sports should be avoided. They should be as active as possible to maintain joint function and improve general health without increasing risk for injury. Physical and occupational therapies are recommended to achieve these goals.

Individuals with MPS I are at an increased for anesthesia complications. Due to the accumulation of GAGs, there is narrowing of the nasal passages and airways as well as enlargement of the tonsils, adenoids and tongue. This often makes it difficult to visualize the airway. It is important to select an anesthesiologist who has experience with difficult airways and it is recommended that the surgery or procedure be performed at an experienced hospital with an ICU in the event serious complications arise. Additionally, it is recommended that cardiac, respiratory, and upper-airway systems be evaluated before any procedure that requires sedation or anesthesia.

**Mode of inheritance**

MPS I is inherited in an autosomal recessive pattern. This means that an individual has to inherit two IDUA mutations (i.e., one from each parent) to be affected with MPS I. If both parents are carriers of a IDUA mutation, they have a 1 in 4 (25%) chance with each pregnancy of having a child with MPS I.

**Risk to family members**

Parents of a child with MPS I are carriers of MPS I. If a sibling of a child with MPS I is unaffected, he/she has a 2 in 3 (or 66%) chance of being a carrier of MPS I.

**Special considerations**

None

**Resources**

National MPS Society
http://www.mpssociety.org
Mucopolysaccharidosis (MPS I)
http://www.mps1disease.com
Genetics Home Reference: Mucopolysaccharidosis type I
http://ghr.nlm.nih.gov/condition/mucopolysaccharidosis-type-i
Medical Home Portal: Mucopolysaccharidosis Type I
http://www.medicalhomeportal.org/diagnoses-and-conditions/mucopolysaccharidosis-type-i/description

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