

### **What is mucopolysaccharidosis type I?**

Mucopolysaccharidosis type I (MPS I) is an inherited disease characterized by developmental delays, distinctive facial features, enlarged organs, and skeletal and joint abnormalities.<sup>1</sup> It involves abnormalities in the enzyme  $\alpha$ -L-iduronidase, which breaks down large sugars (known as glycosaminoglycans or mucopolysaccharides).<sup>1,2</sup> The symptoms of MPS I are due to the build-up of mucopolysaccharides within cells. Mucopolysaccharidosis type I is also known as Hurler syndrome (MPS IH), Hurler-Scheie syndrome (MPS I H/S), or Scheie syndrome (MPS I S).<sup>1</sup>

### **What are the symptoms of mucopolysaccharidosis type I and what treatment is available?**

Mucopolysaccharidosis type I is a disease that varies in age of onset and severity. Affected individuals appear normal at birth. Symptoms of the severe form typically appear in infancy and may include<sup>3</sup>:

- Umbilical or groin hernias
- Frequent infections
- Coarsening (thickening) of facial features (usually after age one)
- Hepatosplenomegaly (enlarged liver and spleen)
- Progressive mental retardation
- Hypertrichosis (excess body hair)
- Spinal and joint deformity and stiffness, causing short stature
- Corneal clouding, causing vision loss
- Heart problems, especially valve disease
- Hearing loss
- Hydrocephalus (fluid build-up in the brain)
- Death usually by age 10 without treatment

Attenuated MPS I is characterized by onset after two years of age and a slower progression of symptoms. Hearing loss and heart valve disease are common, and learning disabilities or developmental delay may also occur. Without treatment, life expectancy ranges from the 20s or 30s to a usual lifespan.<sup>3</sup>

There is no cure for MPS I. Treatment includes supportive care for symptoms. For individuals who meet specific criteria, hematopoietic stem cell transplantation (HSCT) and/or enzyme replacement therapy (ERT) may be available and can improve some of the physical symptoms of MPS I. While neither will reverse intellectual disability, HSCT may prevent further intellectual impairment.<sup>3</sup>

MPS I is included in newborn screening panels in some states in the US.<sup>4</sup>

### **How is mucopolysaccharidosis type I inherited?**

MPS I is an autosomal recessive disease caused by mutations in the *IDUA* gene.<sup>1</sup> An individual who inherits one copy of an *IDUA* 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 MPS I.

If both members of a couple are carriers of a mutation in the *IDUA* gene, 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 mucopolysaccharidosis type I?**

MPS I can occur in individuals of all races and ethnicities. Worldwide, the estimated incidence is 1 in 100,000,<sup>3</sup> with a calculated carrier frequency of 1 in 158.



Having a relative who is a carrier or is affected can 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 MPS society: <http://www.mpssociety.org/mps/mps-i>
- MPS I: <http://mps1disease.com>

#### **References**

1. Mucopolysaccharidosis type I. *Genetics Home Reference*. Available at: <http://ghr.nlm.nih.gov/condition/mucopolysaccharidosis-type-i> Accessed June 1, 2012.
2. IDUA. *Genetics Home Reference*. Available at: <http://ghr.nlm.nih.gov/gene/IDUA>. Accessed June 6, 2012.
3. Clarke L and Heppner J. Mucopolysaccharidosis Type I. *GeneReviews* Available at: <http://www.ncbi.nlm.nih.gov/books/NBK1162>. Accessed June 1, 2012.
4. National Newborn Screening Status Report: Updated 2/15/12. Available at: <http://genes-r-us.uthscsa.edu/nbsdisorders.pdf>.

