**Overview**

**Useful For**

Confirmation of a diagnosis of mucopolysaccharidosis type II (Hunter syndrome)

Carrier testing when there is a family history of mucopolysaccharidosis type II (Hunter syndrome), but disease-causing mutations have not been previously identified

**Genetics Test Information**

Testing includes full gene sequencing of the \( IDS \) gene.

**Reflex Tests**

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<th>Reporting Name</th>
<th>Available Separately</th>
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<tbody>
<tr>
<td>CULFB</td>
<td>Fibroblast Culture for Genetic Test</td>
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</table>

**Testing Algorithm**

If skin biopsy is received, fibroblast culture for genetic test will be added and charged separately.

The recommended first-tier test for mucopolysaccharidosis type II is biochemical testing that measures iduronate 2-sulfatase enzyme activity in fibroblasts: IDNS / Iduronate Sulfatase, Fibroblasts. Individuals with decreased or absent enzyme activity are more likely to have a mutation in the \( IDS \) gene identifiable by this test.

See [Lysosomal Storage Disorders Diagnostic Algorithm, Part 1](#) in Special Instructions.

**Special Instructions**

- [Molecular Genetics: Biochemical Disorders Patient Information](#)
- [Informed Consent for Genetic Testing](#)
- [Blood Spot Collection Card-Spanish Instructions](#)
- [Blood Spot Collection Card-Chinese Instructions](#)
- [Informed Consent for Genetic Testing (Spanish)](#)
- [Lysosomal Storage Disorders Diagnostic Algorithm, Part 1](#)
- [Blood Spot Collection Instructions](#)

**Method Name**

Polymerase Chain Reaction (PCR) Amplification/DNA Sequencing

**NY State Available**

Yes

**Specimen**

**Specimen Type**

Varies

**Shipping Instructions**
Specimen preferred to arrive within 96 hours of draw.

**Specimen Required**

**Patient Preparation:** A previous bone marrow transplant from an allogenic donor will interfere with testing. Call 800-533-1710 for instructions for testing patients who have received a bone marrow transplant.

Submit only 1 of the following specimens:

**Preferred:**

**Specimen Type:** Whole blood

**Container/Tube:**

**Preferred:** Lavender top (EDTA) or yellow top (ACD)

**Acceptable:** Any anticoagulant

**Specimen Volume:** 3 mL

**Collection Instructions:**

1. Invert several times to mix blood.
2. Send specimen in original tube.

**Specimen Stability Information:** Ambient (preferred)/Refrigerated

**Specimen Type:** Cultured fibroblasts

**Container/Tube:** T-75 or T-25 flask

**Specimen Volume:** 1 Full T-75 flask or 2 full T-25 flasks

**Specimen Stability Information:** Ambient (preferred)/Refrigerated <24 hours

**Specimen Type:** Skin biopsy

**Container/Tube:** Sterile container with any standard cell culture media (eg, minimal essential media, RPMI 1640). The solution should be supplemented with 1% penicillin and streptomycin. Tubes can be supplied upon request (Eagle’s minimum essential medium with 1% penicillin and streptomycin [T115]).

**Specimen Volume:** 4-mm punch

**Specimen Stability Information:** Refrigerated (preferred)/Ambient

**Specimen Type:** Blood spot

**Supplies:** Card - Blood Spot Collection (Filter Paper) (T493)
**Container/Tube:**

**Preferred:** Collection card (Whatman Protein Saver 903 Paper)

**Acceptable:** Ahlstrom 226 filter paper, or Blood Spot Collection Card (T493)

**Specimen Volume:** 2 to 5 Blood Spots on collection card (Whatman Protein Saver 903 Paper; Ahlstrom 226 filter paper; or Blood Spot Collection Card, T493)

**Collection Instructions:**

1. An alternative blood collection option for a patient greater than 1 year of age is finger stick.
2. Let blood dry on the filter paper at ambient temperature in a horizontal position for 3 hours.
3. Do not expose specimen to heat or direct sunlight.
4. Do not stack wet specimens.
5. Keep specimen dry.

**Additional Information:**

1. For collection instructions, see [Blood Spot Collection Instructions](#) in Special Instructions.
2. For collection instructions in Spanish, see [Blood Spot Collection Card-Spanish Instructions](#) (T777) in Special Instructions.
3. For collection instructions in Chinese, see [Blood Spot Collection Card-Chinese Instructions](#) (T800) in Special Instructions.

**Forms**

1. **New York Clients-Informed consent is required.** Document on the request form or electronic order that a copy is on file. The following documents are available in Special Instructions:
   - [Informed Consent for Genetic Testing](#) (T576)
   - [Informed Consent for Genetic Testing-Spanish](#) (T826)

2. [Molecular Genetics: Biochemical Disorders Patient Information](#) (T527) in Special Instructions

3. If not ordering electronically, complete, print, and send an [Inborn Errors of Metabolism Test Request](#) (T798) with the specimen.

**Specimen Minimum Volume**

Blood: 1 mL
Blood Spots: 5 punches, 3-mm diameter

**Reject Due To**

All specimens will be evaluated by Mayo Clinic Laboratories for test suitability.

**Specimen Stability Information**
Clinical and Interpretive

Clinical Information

Mucopolysaccharidosis type II (MPS-II), also known as Hunter syndrome, is a rare X-linked condition caused by mutations in the *IDS* gene. MPS-II is characterized by reduced or absent activity of the iduronate 2-sulfatase enzyme.

The clinical features and severity of symptoms of MPS-II are widely variable, ranging from severe disease to an attenuated form, which generally presents at a later onset with a milder clinical presentation. In general, symptoms may include coarse facies, short stature, enlarged liver and spleen, joint contractures, cardiac disease, and profound neurologic involvement leading to developmental delays and regression. Female carriers are usually asymptomatic.

The *IDS* gene is located on the X chromosome and has 9 exons. *IDS* is the only known gene to be associated with MPS-II. The recommended first-tier test for MPS-II is biochemical testing that measures iduronate 2-sulfatase enzyme activity in fibroblasts: IDNS / Iduronate Sulfatase, Fibroblasts. Individuals with decreased or absent enzyme activity are more likely to have a mutation in the *IDS* gene identifiable by molecular gene testing. However, enzymatic testing is not reliable to detect carriers.

This test screens for mutations in all 9 exons of the *IDS* gene.

Reference Values

An interpretive report will be provided.

Interpretation

All detected alterations are evaluated according to American College of Medical Genetics recommendations.(1) Variants are classified based on known, predicted, or possible pathogenicity and reported with interpretive comments detailing their potential or known significance.

Cautions

A small percentage of individuals who are carriers or have a diagnosis of mucopolysaccharidosis type II (MPS-II) may have a mutation that is not identified by this method (eg, large genomic deletions, promoter mutations). The absence of a mutation, therefore, does not eliminate the possibility of positive carrier status or the diagnosis of MPS-II. The preferred approach to carrier testing is to first document the presence of an *IDS* gene mutation in an affected family member.

In some cases, DNA alterations of undetermined significance may be identified.

Rare polymorphisms exist that could lead to false-negative or false-positive results. If results obtained do not match the clinical findings, additional testing should be considered.

Test results should be interpreted in the context of clinical findings, family history, and other laboratory data. Errors in our interpretation of results may occur if information given is inaccurate or incomplete.
Clinical Reference


Performance

Method Description

Bidirectional sequence analysis is performed to test for the presence of a mutation in all coding regions and intron/exon boundaries of the *IDS* gene. In addition, a PCR-based assay is utilized to examine DNA for the presence of rearrangements between the *IDS* gene and pseudogene, *IDSP1*. (Lagerstedt K, Karsten SL, Carlberg BM, et al: Double-strand breaks may initiate the inversion mutation causing the Hunter syndrome. Hum Mol Genet 1997;6(4):627-633)

PDF Report

No

Day(s) and Time(s) Test Performed

Performed weekly; Varies

Analytic Time

14 days

Maximum Laboratory Time

20 days

Performing Laboratory Location

Rochester

Fees and Codes

Fees

- Authorized users can sign in to Test Prices for detailed fee information.
- Clients without access to Test Prices can contact Customer Service 24 hours a day, seven days a week.
- Prospective clients should contact their Regional Manager. For assistance, contact Customer Service.

Test Classification

This test was developed and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA requirements. This test has not been cleared or approved by the U.S. Food and Drug Administration.
**Test Definition: MPS2Z**  
Hunter Syndrome, Full Gene Analysis

### CPT Code Information

81405-IDS (iduronate 2-sulfatase) (eg, mucopolysaccharidosis, type II), full gene sequence

Fibroblast Culture for Genetic Test

88233-Tissue culture, skin, or solid tissue biopsy (if appropriate)

88240-Cryopreservation (if appropriate)

### LOINC® Information

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