Multiple Sulfatase Deficiency: *SUMF1* Gene Sequencing

<table>
<thead>
<tr>
<th>Test Code: SSUMF</th>
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<td>Turnaround time: 4 weeks</td>
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<td>CPT Codes: 81479 x1</td>
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**Condition Description**

Multiple sulfatase deficiency (MSD) is an autosomal recessive inborn error of metabolism. Enzyme activity of all sulfatases is reduced or absent in MSD. The deficiency of the entire enzyme family is caused by a defect affecting a posttranslational modification of sulfatases that is required for catalytic activity. Mutations in the *SUMF1* gene (3p26.1) cause MSD.

MSD has similar clinical characteristics to other sulfatase deficiencies, such as metachromatic leukodystrophy, the mucopolysaccharidoses, chondrodysplasia punctata type I, and X-linked ichthyosis. Clinical features include neurological deterioration, developmental delay, dysmorphism, organomegaly, skeletal abnormalities, and skin findings. The age of onset of features of MSD distinguish the subtypes: neonatal, late infantile, and juvenile disease. While neonatal MSD has the most severe phenotype, the majority of MSD cases are late infantile.

For patients with suspected MSD, sequence analysis is recommended as the first step in mutation identification. For patients in whom mutations are not identified by full gene sequencing, deletion/duplication analysis is appropriate.

**References:**
- OMIM #607939: *SUMF1* gene
- OMIM #272200: MSD

**Genes**

*SUMF1*

**Indications**

This test is indicated for:
- Confirmation of a clinical diagnosis of multiple sulfatase deficiency.
- Carrier testing in adults with a family history of multiple sulfatase deficiency.

**Methodology**

PCR amplification of 9 exons contained in the *SUMF1* gene is performed on the patient's genomic DNA. Direct sequencing of amplification products is performed in both forward and reverse directions, using automated fluorescence dideoxy sequencing methods. The patient's gene sequences are then compared to a normal reference sequence. Sequence variations are classified as mutations, benign variants unrelated to disease, or variations of unknown clinical significance. Variants of unknown clinical significance may require further studies of the patient and/or family members. This assay does not interrogate the promoter region, deep intronic regions, or other regulatory elements, and does not detect large deletions.

**Detection**

Clinical Sensitivity: Unknown. Mutations in the promoter region, some mutations in the introns and other regulatory element mutations cannot be detected by this analysis. Large deletions will not be detected by this analysis. Results of molecular analysis should be interpreted in the context of the patient's clinical and/or biochemical phenotype.

Analytical Sensitivity: ~99%

**Specimen Requirements**

**Additional Specimen Collection/Handling Instructions Required for this Test**

Arylsulfatase A and B enzyme activity studies are recommended. To order Arylsulfatase A enzyme activity, please order Metachromatic Leukodystrophy, test code LA. To order Arylsulfatase B enzyme activity, please order Mucopolysaccharidosis Type VI, Arylsulfatase B enzyme activity, test code BMPS6.

Additionally, GAGs may be ordered, test code GA.

Submit only 1 of the following specimen types
* Preferred specimen type: Whole Blood

**Type: Whole Blood**

Specimen Requirements:

In EDTA (purple top) or ACD (yellow top) tube:
- Infants (2 years): 3-5 ml
- Older Children & Adults: 5-10 ml

Specimen Collection and Shipping: Refrigerate until time of shipment. Ship sample within 5 days of collection at room temperature with overnight delivery.

**Type: Saliva**

Specimen Requirements:

Oragene™ Saliva Collection kit (available through EGL) used according to manufacturer instructions.

Specimen Collection and Shipping: Store sample at room temperature. Ship sample within 5 days of collection at room temperature with overnight delivery.

**Special Instructions**

Submit copies of diagnostic biochemical test results with the sample, if appropriate. Contact the laboratory if further information is needed.

**Related Tests**

- Deletion/duplication analysis of the \textit{SUMF1} gene by CGH array is available for those individuals in whom sequence analysis is negative.
- Custom diagnostic mutation analysis (KM) is available to family members if mutations are identified by targeted mutation testing or sequencing analysis.
- Prenatal testing is available only for known familial mutations to individuals who are confirmed carriers of mutations. Please contact the laboratory genetic counselor to discuss appropriate testing prior to collecting a prenatal specimen.