Multiple Sulfatase Deficiency: \textit{SUMF1} Gene Sequencing

\textbf{Test Code: SSUMF}
\textbf{Turnaround time: 4 weeks}
\textbf{CPT Codes: 81479 x1}

\section*{Condition Description}
Multiple sulfatase deficiency (MSD) is an autosomal recessive inborn error of metabolism. Enzyme activity of all sulfatas is reduced or absent in MSD. The deficiency of the entire enzyme family is caused by a defect affecting a posttranslational modification of sulfatas that is required for catalytic activity. Mutations in the \textit{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:
\begin{itemize}
\item OMIM \#607939: \textit{SUMF1} gene
\item OMIM \#272200: MSD
\end{itemize}

\section*{Genes}
\textbf{SUMF1}

\section*{Indications}
This test is indicated for:
\begin{itemize}
\item Confirmation of a clinical diagnosis of multiple sulfatase deficiency.
\item Carrier testing in adults with a family history of multiple sulfatase deficiency.
\end{itemize}

\section*{Methodology}
PCR amplification of 9 exons contained in the \textit{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.

\section*{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%

\section*{Specimen Requirements}
\textit{Submit only 1 of the following specimen types}

\subsection*{Type: DNA, Isolated}
\textbf{Specimen Requirements:}
- Microtainer
- 8µg DNA
- Isolation using the Perkin Elmer™Chemagen™ Automated Extraction method or Qiagen™ Puregene kit for DNA extraction is recommended.

\textbf{Specimen Collection and Shipping:}
Refrigerate until time of shipment in 100 ng/µL in TE buffer. Ship sample at room temperature with overnight delivery.

\subsection*{Type: Saliva}
\textbf{Specimen Requirements:}
- Oragene™ Saliva Collection Kit
- Orangene™ Saliva Collection Kit used according to manufacturer instructions. Please contact EGL for a Saliva Collection Kit for patients that cannot
provide a blood sample.

**Specimen Collection and Shipping:**
Please do not refrigerate or freeze saliva sample. Please store and ship at room temperature.

**Type: Whole Blood (EDTA)**

**Specimen Requirements:**
EDTA (Purple Top)
- Infants and Young Children (2 years of age to 10 years old): 3-5 ml
- Older Children & Adults: 5-10 ml
- Autopsy: 2-3 ml unclotted cord or cardiac blood

**Specimen Collection and Shipping:**
Ship sample at room temperature for receipt at EGL within 72 hours of collection. Do not freeze.

**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 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.