Neurodegeneration due to Cerebral Folate Transport Deficiency: \textit{FOLR1} Gene Sequencing

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

\subsection*{Condition Description}

Loss-of-function mutations in the \textit{FOLR1} gene (11q13.4) cause an inherited disorder of brain-specific folate deficiency. The \textit{FOLR1} gene encodes the folate receptor alpha (FR?), one of two GPI-anchored receptors that mediate cellular uptake of 5-methyltetrahydrofolate (MTHF). Mutations in the \textit{FOLR1} gene impair the cerebral folate transport function. Features of this autosomal recessive disorder begin in late infancy and include severe developmental regression, movement disturbances, epilepsy, and leukodystrophy.

\textbf{References:}

- \textit{OMIM} \#613068: Neurodegeneration due to cerebral folate transport deficiency  \\
- \textit{OMIM} \#136430: \textit{FOLR1} gene

\subsection*{Genes}

\textbf{\textit{FOLR1}}

\subsection*{Indications}

This test is indicated for:

- Confirmation of a clinical diagnosis of Neurodegeneration due to Cerebral Folate Transport Deficiency.  \\
- Carrier testing in adults with a family history of Neurodegeneration due to Cerebral Folate Transport Deficiency.

\subsection*{Methodology}

PCR amplification of 4 exons contained in the \textit{FOLR1} 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.

\subsection*{Detection}

\textbf{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.

\textbf{Analytical Sensitivity:} \sim 99\%

\subsection*{Specimen Requirements}

\textit{Submit only 1 of the following specimen types}

\subsubsection*{Type: Whole Blood (EDTA)}

\textbf{Specimen Requirements:}

\begin{itemize}
  \item EDTA (Purple Top)  \\
  \item Infants and Young Children (2 years of age to 10 years old): 3-5 ml  \\
  \item Older Children & Adults: 5-10 ml  \\
  \item Autopsy: 2-3 ml unclotted cord or cardiac blood
\end{itemize}

\textbf{Specimen Collection and Shipping:}

Ship sample at room temperature for receipt at EGL within 24 hours of collection. Do not refrigerate or freeze.

\subsubsection*{Type: DNA, Isolated}

\textbf{Specimen Requirements:}

\begin{itemize}
  \item Microtainer  \\
  \item Isolation using the Perkin Elmer™Chemagen™ Chemagen™ Automated Extraction method or Qiagen™ Puregene kit for DNA extraction is recommended
\end{itemize}

\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.
Type: Saliva

Specimen Requirements:
Oragene™ Saliva Collection Kit
Oragene™ 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.

Related Tests
- Deletion/duplication analysis of the FOLR1 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.