Ataxia with Oculomotor Apraxia Type 2: \textit{SETX} Gene Sequencing

\textbf{Test Code:} \textit{SSETX}  \\
\textbf{Turnaround time:} 6 weeks  \\
\textbf{CPT Codes:} 81479 x1

\section{Condition Description}

Mutations in the \textit{SETX} gene (9q34) are associated with three different conditions: ataxia with oculomotor apraxia type 2 (AOA2), juvenile amyotrophic lateral sclerosis (ALS4) and autosomal dominant ataxia.

AOA2 is characterized by cerebellar ataxia, axonal sensory-motor neuropathy, oculomotor apraxia, and elevated serum concentration of alpha-fetoprotein. Other characteristics include marked cerebellar atrophy on MRI and signs of axonal neuropathy on EMG. The age of onset is between ages three and 30 years. There is a slow progression of the phenotype. Cardiac involvement, cancer predisposition, and immunodeficiency are usually absent. Ataxia is often the first sign of AOA2 and causes the majority of disability early in the disease progression. Later in the disease course, peripheral sensorimotor neuropathy, especially in the lower limbs, causes the majority of disease progression.

Both sequence alterations and partial or whole gene deletions and duplications of the \textit{SETX} gene have been reported. AOA2 is inherited in an autosomal recessive manner. Carriers are asymptomatic.

ALS4 is associated with three different autosomal dominant missense mutations in the \textit{SETX} gene: T3I, L389S, R2136H. It is characterized by severe distal muscle weakness and atrophy and signs associated with degeneration of motor neurons in the central nervous system. Individuals with ALS4 have normal sensation, onset before the age of 25, slow disease progression, and a normal life span.

Two mutations in \textit{cis} in the \textit{SETX} gene have been identified in a family with an autosomal dominant form of ataxia. Affected individuals in this family had cerebellar ataxia with atrophy of the cerebellum, dysarthria, oculomotor defects, and tremor. Mental status, reflexes, sensation, muscle tone, and levels of alpha-fetoprotein were in the normal range.

\section{References:}

- GeneReviews

\section{Genes}

\textit{SETX}

\section{Indications}

This test is indicated for:

- Confirmation of a clinical diagnosis of AOA2.
- Carrier testing in adults with a family history of AOA2.

\section{Methodology}

\textbf{Next Generation Sequencing:} In-solution hybridization of all coding exons is performed on the patient's genomic DNA. Although some deep intronic regions may also be analyzed, this assay is not meant to interrogate most promoter regions, deep intronic regions, or other regulatory elements, and does not detect single or multi-exon deletions or duplications. Direct sequencing of the captured regions is performed using next generation sequencing. The patient's gene sequences are then compared to a standard reference sequence. Potentially causative variants and areas of low coverage are Sanger-sequenced. Sequence variations are classified as pathogenic, likely pathogenic, benign, likely benign, or variants of unknown significance. Variants of unknown significance may require further studies of the patient and/or family members.

\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: \(\sim 99\%\)

\section{Specimen Requirements}

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

\section{Type: Saliva}

\textbf{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.

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.

Type: DNA, Isolated

Specimen Requirements:
Microtainer
8µg
Isolation using the Perkin Elmer™Chemagen™ Chemagen™ Automated Extraction method or Qiagen™ Puregene kit for DNA extraction is recommended.

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

Related Tests

- 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.