Galactosemia (Epimerase): \textbf{GALE} Gene Deletion/Duplication

\textbf{Test Code:} JV  
\textbf{Turnaround time:} 2 weeks  
\textbf{CPT Codes:} 81228 x1

\section*{Condition Description}

UDP-Galactose-4-Epimerase (GALE) deficiency is one of the three known forms of galactosemia, along with galactose-1-phosphate uridylyltransferase (GALT) deficiency (classic galactosemia) and galactokinase (GALK) deficiency \cite{1-2}. GALE deficiency has been defined as a continuous disorder with a spectrum of enzyme impairment and corresponding metabolic compromise impacting a variety of tissues in affected individuals \cite{3}. The patients may present with symptoms reminiscent of classic galactosemia and demonstrate severely impaired GALE activity in both RBCs and lymphoblast resulting in accumulation of abnormally high levels of RBC galactose, gal-1P and UDP-gal. GALE deficiency should be considered in individuals with elevated RBC galactose, gal-1-P and UDP-gal but normal GALT enzyme activity. Mutations in the \textit{GALE} gene, located on 1p36, are associated with a biochemical diagnosis of GALE deficiency \cite{3}. Gene sequence analysis is available to test for mutations in the \textit{GALE} gene in patients with a biochemical diagnosis of GALE deficiency \cite{JU}. \url{Click here} for the GeneReviews summary on this condition. Also, refer to the Comprehensive Galactosemia Panel for a disease overview.


\section*{References:}

\section*{Genes}
\textbf{GALE}

\section*{Indications}

This test is indicated for:

\begin{itemize}
  \item Individuals with elevated gal-1-P and UDP-gal but with normal GALT and GALK enzyme activity and biochemical findings consistent with GALE deficiency
  \item Carrier testing for individuals with a family history of GALE deficiency
\end{itemize}

\section*{Methodology}

DNA isolated from peripheral blood is hybridized to a CGH array to detect deletions and duplications. The targeted CGH array has overlapping probes which cover the entire genomic region.

\section*{Detection}

Detection is limited to duplications and deletions. Array CGH will not detect point mutations or intronic mutations. Results of molecular analysis must be interpreted in the context of the patient's clinical and/or biochemical phenotype.

\section*{Specimen Requirements}

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

\textbf{Type: DNA, Isolated}

\begin{itemize}
  \item \textbf{Specimen Requirements:}
    \begin{itemize}
      \item Microtainer
      \item 3\mu g
    \end{itemize}
  \item Isolation using the Perkin Elmer™Chemagen™ Chemagen™ Automated Extraction method or Qiagen™ Puregene kit for DNA extraction is recommended.
\end{itemize}

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

\textbf{Type: Whole Blood (EDTA)}

\begin{itemize}
  \item \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
    \end{itemize}
  \item Autopsy: 2-3 ml unclotted cord or cardiac blood
\end{itemize}

\begin{itemize}
  \item \textbf{Specimen Collection and Shipping:}
    \begin{itemize}
      \item Ship sample at room temperature for receipt at EGL within 24 hours of collection. Do not refrigerate or freeze.
    \end{itemize}
\end{itemize}
Special Instructions

Submit copies of diagnostic biochemical test results with the sample. Sequence analysis is required before deletion/duplication analysis by targeted CGH array. If sequencing is performed outside of EGL Genetics, please submit a copy of the sequencing report with the test requisition. Contact the laboratory if further information is needed.

Click here for the Epimerase Deficiency Clinical Information Form to send with the sample.

Related Tests

- **Sequencing of GALT and GALK Genes** for transferase deficient and galactokinase deficient galactosemia
- **Comprehensive Galactosemia Panel** includes: GALT enzyme activity, isozyme pattern, gal-1-P concentration, GALT common mutation panel
- **Urine Galactitol Concentration**
- Custom Diagnostic Mutation Analysis (KM) is available to family members if mutations are identified by sequencing.
- Prenatal testing is available to couples who are confirmed carriers of mutations. Please contact the laboratory genetic counselor to discuss appropriate testing prior to collecting a prenatal specimen.