Galactosemia (Galactokinase Deficiency): GALK1 Gene Deletion/Duplication

Test Code: JA
Turnaround time: 2 weeks
CPT Codes: 81228 x1

Condition Description

Galactokinase (GALK) deficiency is one of the three known forms of galactosemia, along with galactose-1-phosphate uridylyltransferase (GALT) deficiency (classic galactosemia) and UDP-galactose-4’-epimerase (GALE) deficiency [1-2]. GALK deficiency is an autosomal recessive disorder characterized by an elevation of blood galactose concentration and diminished galactose-1-phosphate concentration, leading to production of alternative metabolic products such as galactitol [3]. Galactokinase-deficiency may present in the neonatal period with cataracts; no other clinical complications have been consistently associated with GALK-deficiency [2].

GALK deficiency should be considered in individuals with cataracts, elevated red cell galactose, galactosuria, or elevated urinary galactitol and normal GALT enzyme activity. GALK activity is used to rule-out variant galactosemia due to galactokinase deficiency which should not be confused with classical galactosemia secondary to GALT deficiency, or epimerase-deficiency galactosemia secondary to GALE deficiency. The vast majority of patients with biochemical diagnosis of GALK deficiency have mutations in the GALK1 (17q25) gene [4-6]. Gene sequence analysis is available to test for mutations in the GALK1 gene in patients with a biochemical diagnosis of GALK deficiency (IQ).


Click here for the GeneReviews summary on this condition. Also, refer to the Comprehensive Galactosemia Panel for a disease overview.

References:
4. Sanguineto et al. Biochemical Characterization of Two GALK1 Mutations in Patients with Galactokinase Deficiency Hum Mutat 2004 Apr;23(4):396-403
5. Park et al. Molecular and biochemical characterization of the GALK1 gene in Korean patients with galactokinase deficiency. Mol Genet Metab. 2007. 91:234-8

Genes

GALK1

Indications

This test is indicated for:
- Individuals with elevated blood galactose but with normal GALT and GALE enzyme activities.
- Carrier testing for individuals with a family history of GALK deficiency.

Methodology

Detection is limited to duplications and deletions. Array CGH will not detect point mutations or intronic mutations.

Detection

The vast majority of patients with clinical and biochemical diagnosis will have an abnormal DNA test.
Clinical Sensitivity: 26/26 mutations identified in 13 patients [8], 4/4 mutations identified in 2 patients [9].
Analytical Sensitivity: ~99%
Results of molecular analysis must be interpreted in the context of the patient’s clinical and/or biochemical phenotype.

Specimen Requirements

Submit only 1 of the following specimen types

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
- 3µg

Isolation using the Perkin Elmer™ 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.

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.

Related Tests
- **GALT and GALE Gene Sequencing** for transferase deficient and epimerase deficient galactosemia
- **Comprehensive Galactosemia Panel** includes: GALT enzyme activity, isozyme pattern, gal-1-P concentration
- **Urine Galactitol Concentration**
- Custom Diagnostic Mutation Analysis (KM) is available to family members if mutations are identified by sequencing.
- Prenatal testing is available for known familial mutations only. Please call the Laboratory Genetic Counselor before collecting a fetal sample.