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).

Visit [www.ThinkGenetic.com](http://www.ThinkGenetic.com) for patient-friendly information on galactosemia. Click [here](http://www.ThinkGenetic.com) 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 24 hours of collection. Do not refrigerate or freeze.
Type: DNA, Isolated

Specimen Requirements:
Microtainer
3 µg
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.