

## Phosphoglycerate Kinase-1 Deficiency: *PGK1* Gene Deletion/Duplication

**Test Code:** DPGK1

**Turnaround time:** 2 weeks

**CPT Codes:** 81228 x1

### Condition Description

Phosphoglycerate kinase-1 (PGK) deficiency is an X-linked condition with a highly variable clinical phenotype that can include hemolytic anemia, myopathy, rhabdomyolysis, intellectual disability, and other neurologic involvement. These symptoms may occur individually or in various combinations. The anemia may be severe and transfusion dependent. Episodes of rhabdomyolysis, myoglobinuria, and acute renal failure may occur without hemolytic anemia, especially after exercise. Reported neurological manifestations include seizures, severe encephalopathy, spastic tetraparesis, and hemiplegic migraines.

Individuals with PGK deficiency tend to fall into two groups: those that have a predominantly hemolytic form and those that have a predominantly myopathic form. Varying degrees of intellectual disability and other neurological symptoms can be seen in both forms. The clinical phenotype is usually similar in affected individuals in the same family. Female carriers of PGK deficiency may show chronic, mild hemolytic anemia.

Mutations in the *PGK1* gene (Xq13) cause PGK deficiency. Most families have unique mutations. The *PGK1* gene encodes the phosphoglycerate kinase-1 protein, which catalyzes the reversible conversion of 1,3-diphosphoglycerate to 3-phosphoglycerate during glycolysis, generating one molecule of ATP.

For patients with suspected PGK deficiency, sequence analysis is recommended as the first step in mutation identification. For patients in whom mutations are not identified by full gene sequencing, deletion/duplication analysis is appropriate.

References:

- [OMIM #300653](#): Phosphoglycerate Kinase 1 Deficiency
- Beutler, E. PGK Deficiency. *British Journal of Haematology* 2006; 136:3-11.

### Genes

[PGK1](#)

### Indications

This test is indicated for:

- Confirmation of a clinical diagnosis of PGK deficiency in an individual in whom sequence analysis was negative.
- Carrier testing in adult females with a family history of PGK deficiency in whom sequence analysis was negative.

### 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.

### Detection

Detection is limited to duplications and deletions. The CGH array will not detect point or intronic mutations. 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: DNA, Isolated**

**Specimen Requirements:**

Microtainer

3µg

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.

**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.

**Special Instructions**

Submit copies of diagnostic biochemical test results with the sample, if appropriate. Contact the laboratory if further information is needed.

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**

- Sequence analysis of the *PGK1* gene is available and is required before deletion/duplication analysis.
- A next generation sequence analysis panel of 90+ XLID genes is available.
- A CGH array-based test for deletion/duplication analysis of 90+ XLID genes is available.
  
- 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.