Argininosuccinate Lyase Deficiency: ASL Gene Deletion/Duplication

**Test Code:** JC  
**Turnaround time:** 2 weeks  
**CPT Codes:** 81228 x1

## Condition Description

Argininosuccinate lyase deficiency (ASL deficiency) is an autosomal recessive disorder of the urea cycle caused by mutations in the ASL gene (7cen-q11.2). Urea cycle disorders are characterized by hyperammonemia, encephalopathy, and respiratory alkalosis. Five disorders involving different defects in the biosynthesis of the enzymes of the urea cycle have been described: ornithine transcarbamylase deficiency, carbamyl phosphate synthetase deficiency, argininosuccinate synthetase deficiency, or citrullinemia, ASL deficiency, and arginase deficiency.

Two forms of ASL deficiency have been recognized: an early-onset, or malignant, type and a late-onset type. Onset of symptoms of early-onset argininosuccinic aciduria occurs in the first weeks of life. Features include mental and physical retardation, convulsions, episodic unconsciousness, liver enlargement, skin lesions, and dry and brittle hair showing trichorrhexis nodosa microscopically and fluorescing red. The late-onset type of ASL deficiency is characterized by residual enzyme activity as measured by the incorporation of C-14-citrulline into proteins. Symptoms include relatively mild clinical symptoms, variable age of onset, marked argininosuccinic aciduria, and severe, but not complete, deficiency of argininosuccinate lyase. Early treatment of partial argininosuccinate lyase deficiency with arginine supplementation can result in normal intellectual and psychomotor development.

Sequencing of the ASL gene is recommended after a biochemical analysis consistent with ASL deficiency, and provides a complementary method to confirm the presence of mutations in a proband, identify carriers among the proband's relatives, and provide prenatal diagnosis in families with known mutations.

[Click here](https://omim.org/phenotype/608250) for the OMIM summary on this condition.

## Genes

**ASL**

## Indications

This test is indicated for:

- Confirmation of a clinical/biochemical diagnosis of ASL deficiency.
- Carrier testing in adults with a family history of ASL deficiency.

## 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. Array CGH will not detect point mutations or intronic mutations. Results of molecular analysis must interpreted in the context of the patients 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™ 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.

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**Special Instructions**

Submit copies of diagnostic biochemical test results with the sample. 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**

- Plasma amino acid (AA) analysis.
- Urine organic acids (OA) analysis.
- Ornithine transcarbamylase deficiency gene sequencing (HU).
- Citrullinemia gene sequencing (JG).

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.