

Carnitine-Acylcarnitine Translocase Deficiency: *SLC25A20* Gene Deletion/Duplication

Test Code: HR

Turnaround time: 2 weeks

CPT Codes: 81404 x1

Condition Description

Mitochondrial oxidation of fatty acids provides the chief source of energy during prolonged fasting as well as for skeletal muscle during exercise and for cardiac muscle. Carnitine-acylcarnitine translocase is 1 of 10 closely related mitochondrial-membrane carrier proteins that shuttle substrates between cytosol and the intramitochondrial matrix space. Other genetic defects in this pathway can cause LCAD deficiency, MCAD deficiency, SCAD deficiency, CPT I deficiency, and CPT II deficiency. Patients with these defects present with coma after a period of starvation and have low serum ketone concentrations (hypoketotic hypoglycemia). They may also have hyperammonemia, hepatomegaly, cardiomyopathy and muscle weakness.

Carnitine-acylcarnitine translocase deficiency is a rare autosomal recessive disorder of fatty acid oxidation. CACT is the second component of the carnitine shuttle for the import of long-chain fatty acids from the cytosol into the mitochondrion where they undergo oxidation. It is an inner mitochondrial membrane protein which mediates the transport of acylcarnitine esters into the mitochondrial matrix in exchange for free carnitine.

CACT deficiency is caused by mutations in the *SLC25A20* gene (3p21.31). CACT deficiency is, together with infantile carnitine palmitoyltransferase II (CPT2) deficiency, the most severe of the mitochondrial fatty acid oxidation defects. The pathogenesis of the disorder is a combination of the deficient production of energy from mitochondrial fatty acid oxidation and the toxicity of accumulating long-chain acylcarnitines. It usually presents in the early newborn period, with a high mortality at the initial presentation or during the first year of life. The typical features include:

- cardiomyopathy
- arrhythmias
- hepatic dysfunction
- skeletal muscle damage
- hyperammonemia
- hypoketotic hypoglycemia with dicarboxylic aciduria
- elevation of long-chain acylcarnitines
- deficiency of free carnitine

A minority of patients have a later onset with a milder clinical phenotype. In a significant proportion of cases, the presentation is as sudden, unexpected death, presumably due to an arrhythmia.

Please [click here](#) for the OMIM summary on this gene and condition.

Reference:

Korman, SH et al. A novel *SLC25A20* splicing mutation in patients of different ethnic origin with neonatally lethal carnitine-acylcarnitine translocase (CACT) deficiency. *Molec. Genet. Metab.* 2006, 89(4):332-338.

Genes

[SLC25A20](#)

Indications

This test is indicated for:

- Confirmation of a clinical/biochemical diagnosis of CACT deficiency.
- Carrier testing in adults with a family history of CACT 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. 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/ μ L 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 24 hours of collection. Do not refrigerate or freeze.

Special Instructions

Please submit copies of diagnostic biochemical test results along with the sample. Contact the laboratory if further information is needed.

Related Tests

- [Known Mutation Analysis \(KM\)](#) is available to family members if mutations are identified by sequencing.
- Prenatal Custom Diagnostics 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.