Disease Name	**Carnitine uptake deficiency**
Alternate name(s)	Systemic carnitine deficiency, Carnitine deficiency, Carnitine transporter deficiency
Acronym	SCD, CUD
Disease Classification	Fatty Acid Oxidation Disorder
Variants	N/A
Variant name	N/A
Symptom onset	Infancy or childhood with fasting hypoglycemia, weakness and/or cardiomyopathy.
Symptoms	Hypoketotic hypoglycemia, seizures, vomiting, lethargy progressing to coma. Chronic muscle weakness, cardiomyopathy, hepatomegaly.
Natural history without treatment	Non-progressive developmental delay due to hypoglycemia, cardiomyopathy and muscle weakness.
Natural history with treatment	Developmental delay, if present, is not reversed by treatment. Cardiomyopathy and muscle weakness can be reversed by treatment.
Treatment	Carnitine supplementation, no fasting.
Physical phenotype	Cardiomyopathy, muscle weakness.
Inheritance	Autosomal recessive
General population incidence	1/40,000
Ethnic differences	No
Population	N/A
Ethnic incidence	N/A
Enzyme location	Muscle, heart, kidney, leukocytes and fibroblasts
Enzyme Function	Transports carnitine into cells
Missing Enzyme	Carnitine transporter
Metabolite changes	Decreased free carnitine in plasma, increased carnitine in urine, decreased carnitine in muscle.
Prenatal testing	Protein analysis in cultured amniocytes, biochemical analyte testing. If a mutation in a proband is detected, DNA prenatal diagnosis via CVS or amniocytes is possible.
MS/MS Profile	Reduced concentrations of free carnitine and various acylcarnitine species.
OMIM Link	http://www.ncbi.nlm.nih.gov/omim/212140
Genetests Link	www.genetests.org
Support Group	FOD Family Support Group http://www.fodsupport.org Save Babies through Screening Foundation http://www.savebabies.org Genetic Alliance http://www.geneticalliance.org

Newborn Screening ACT Sheet
[Decreased C0 and other Acylcarnitines]
Carnitine uptake Defect (CUD)

Differential Diagnosis: Carnitine uptake defect (CUD), maternal carnitine deficiency and prematurity.

Condition Description: CUD is caused by a defect in the carnitine transporter that moves carnitine across the plasma membrane. Reduced carnitine limits acylcarnitine formation preventing transport of long-chain fatty acids into mitochondria, thereby limiting energy production. Tissues with high energy needs (skeletal and heart muscle) are particularly affected.

YOU SHOULD TAKE THE FOLLOWING ACTIONS:

- Contact family to inform them of the newborn screening result and ascertain clinical status (poor feeding, lethargy, tachypnea).
- Consult with pediatric metabolic specialist.
- Evaluate the newborn (tachycardia, hepatomegaly, reduced muscle tone); initiate emergency treatment as indicated by metabolic specialist.
- Initiate timely confirmatory/diagnostic testing as recommended by specialist.
- Educate family about signs, symptoms, and need for urgent treatment if infant becomes ill.
- Report findings to newborn screening program.

Diagnostic Evaluation: Plasma carnitine analysis will reveal decreased free and total carnitine (C0) in plasma in an affected infant. If the total and free carnitine are normal in the infant, it may suggest a maternal carnitine deficiency and plasma carnitine analysis in the mother is indicated. Transporter assays in fibroblasts and *SLC22A5* (OCTN2 carnitine transporter) gene sequencing establish the diagnosis. Prematurity should be considered in the differential diagnosis.

Clinical Considerations: Carnitine transporter defect has a variable expression and variable age of onset. Characteristic manifestations include lethargy, hypotonia, hepatomegaly, and cardiac decompensation due to cardiomyopathy. Hypoglycemia is typical in acute episodes. These are rarely present in the neonatal period.

Additional Information:

OMIM
Genetics Home Reference

Referral (local, state, regional and national):

Testing
Clinical Services