Disease Name	**Medium-chain acyl-CoA dehydrogenase deficiency**
Alternate name(s)	None
Acronym	MCAD
Disease Classification	Fatty Acid Oxidation Disorder
Variants	N/A
Variant name	N/A
Symptom onset	Typically 6-24 months but ranges from neonatal to adult
Symptoms	Recurrent episodes of hypoglycemia, vomiting, coma, sudden death and possible seizures. Hepatomegaly usually present.
Natural history without treatment	Metabolic episodes can cause developmental and physical delays, neurologic impairment and sudden death.
Natural history with treatment	Normal intellect and physical functioning expected.
Treatment	Dietary: avoid fasting, low-fat diet (<30% of dietary fat), carnitine supplementation, cornstarch supplementation.
Physical phenotype	None
Inheritance	Autosomal recessive
General population incidence	1/15,000
Ethnic differences	Yes
Population	Incidence higher in Northern Europeans and U.S Caucasians.
Ethnic incidence	Approximately 1/70 carrier rate
Enzyme location	Liver, heart, muscle and fibroblasts
Enzyme Function	Mitochondrial beta-oxidation of fat stores
Missing Enzyme	Medium-chain acyl-CoA dehydrogenase
Metabolite changes	Increased medium chain fatty acids, increased glycine/carnitine esters, increased dicarboxylic acids.
Prenatal testing	DNA and enzymatic testing
MS/MS Profile	Elevated C10:1, C8, C6
OMIM Link	http://www.ncbi.nlm.nih.gov/omim/201450
Genetests Link	www.genetests.org
Support Group	FOD Family Support Group http://www.fodsupport.org Organic Acidemia Association Http://www.oaanews.org Save Babies through Screening Foundation http://www.savebabies.org Genetic Alliance http://www.geneticalliance.org

Newborn Screening ACT Sheet
[Elevated C8 with Lesser Elevations of C6 and C10 Acylcarnitine]
Medium-chain Acyl-CoA Dehydrogenase (MCAD) Deficiency

Differential Diagnosis: Medium-chain acyl-CoA dehydrogenase (MCAD) deficiency.

Condition Description: MCAD deficiency is a fatty acid oxidation (FAO) disorder. Fatty acid oxidation occurs mainly during prolonged fasting and/or periods of increased energy demands (fever, stress), when energy production relies increasingly on fat metabolism. In an FAO disorder, fatty acids and potentially toxic derivatives accumulate because of a deficiency in one of the mitochondrial FAO enzymes.

YOU SHOULD TAKE THE FOLLOWING ACTIONS:

- Contact family to inform them of the newborn screening result and ascertain clinical status (poor feeding, vomiting, lethargy).
- Consult with pediatric metabolic specialist.
- Evaluate the newborn (poor feeding, lethargy, hypotonia, hepatomegaly). If signs are present or infant is ill, transport infant to hospital for emergency treatment that would include IV glucose and any further treatment in consultation with the metabolic specialist.
- If infant is normal initiate timely confirmatory/diagnostic testing, as recommended by specialist.
- Educate family about need for infant to avoid fasting and the need for immediate medical attention if the infant even becomes mildly ill (poor feeding, vomiting, or lethargy).
- Report findings to newborn screening program.

Diagnostic Evaluation: Plasma acylcarnitine analysis will show a characteristic pattern consistent with MCADD. Urine organic acid analysis may also show an abnormal profile. Diagnosis may be confirmed by mutation analysis of the MCAD gene.

Clinical Considerations: MCAD deficiency is usually asymptomatic in the newborn although it can present acutely in the neonate with hypoglycemia, metabolic acidosis, hyperammonemia, and hepatomegaly. MCAD deficiency is associated with high mortality unless treated promptly; milder variants exist. Hallmark features include vomiting, lethargy, and hypoketotic hypoglycemia. Untreated MCAD deficiency is a significant cause of sudden death.

Additional Information:

Emergency Treatment Protocol (New England Consortium of Metabolic Programs)
Genetics Home Reference

Referral (local, state, regional and national):

Testing
Clinical Services