ACMG
American College of Medical Genetics and Genomics
Translating Genes Into Health®

ACT Sheet

Newborn Screening ACT Sheet

[Elevated C8 with Lesser Elevations of C6 and C10 Acylcarnitine]

Medium-Chain Acyl-CoA Dehydrogenase (MCAD) Deficiency

Differential Diagnosis: Glutaric acidemia type II.

Condition Description: MCAD deficiency is a fatty acid oxidation (FAO) disorder, disrupting fatty acid breakdown at the level of medium-chain fats and is associated with characteristic elevations of medium-chain acylcarnitines. 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. Presentation in the neonatal period can occur with decreased caloric intake often related to breast feeding with insufficient milk production and/or prolonged fasting.

You Should Take the Following IMMEDIATE Actions:

- Inform family of the newborn screening result.
- Ascertain clinical status (poor feeding, vomiting, lethargy).
- Consult with pediatric metabolic specialist the same day.
- Evaluate the newborn (hypoglycemia, poor feeding, lethargy, hypotonia). If any of these signs are present or if the newborn is ill, transport to a hospital for further treatment in consultation with the metabolic specialist. If the newborn becomes even mildly ill (poor feeding, vomiting or lethargy), immediate treatment with IV glucose is indicated.
- Initiate confirmatory/diagnostic testing and management, as recommended by the specialist.
- Provide family with basic information about MCAD and its management, including information about the avoidance of fasting in the newborn.
- Report final diagnostic outcome to newborn screening program.

Diagnostic Evaluation: Plasma acylcarnitines: Medium-chain acylcarnitines are characteristically elevated in MCAD deficiency. Urine organic acids may show a pattern of elevated medium-chain dicarboxylic acids and glycine conjugates (e.g. hexanoylglycine). Molecular genetic testing may be required to confirm the diagnosis.

Clinical Considerations: MCAD deficiency is usually asymptomatic in the newborn although it can present acutely with severe hypoglycemia, metabolic acidosis, especially when breast milk production is insufficient. Illnesses causing vomiting, poor oral intake, and prolonged fasting can cause lethargy and hypoketotic hypoglycemia with high mortality rates unless treated promptly. Untreated MCAD deficiency is a significant cause of sudden death.

Additional Information:

How to Communicate Newborn Screening Results
Emergency Protocols (New England Consortium of Metabolic Programs)
Gene Reviews
Medline Plus
Condition Information for Families- HRSA Newborn Screening Clearinghouse
ClinGen Actionability Report

Referral (local, state, regional, and national):

Find a Genetics Clinic Directory
Genetic Testing Registry

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State and Other Resources

State Newborn Screening Program

Newborn Screening Program, Utah Department of Health and Human Services
801-584-8256, newbornscreening.health.utah.gov/

Genetics/Metabolic Consultants

Pediatric Medical Genetics, University of Utah Department of Pediatrics
801-213-3599, healthcare.utah.edu/pediatrics/programs-services/genetics.php

Information for Clinicians and Families

Utah Medical Home Portal (see also the Parents & Families section)
ut.medicalhomeportal.org/newborn/mcadd

Parent/Family Support

Fatty Oxidation Disorders (FOD) Family Support Group
www.fodsupport.org/

Minutes Matter
minutesmatter-mcadd.org

National Resources (with web addresses)

Additional Information

How to Communicate Newborn Screening Results
www.hrsa.gov/sites/default/files/hrsa/advisory-committees/heritable-disorders/Resources/achdnc-communication-guide-newborn.pdf

Emergency Protocols (New England Consortium of Metabolic Programs)
www.newenglandconsortium.org/mcadd

Gene Reviews
www.ncbi.nlm.nih.gov/books/NBK1424/

Medline Plus
medlineplus.gov/genetics/condition/medium-chain-acyl-coa-dehydrogenase-deficiency/

Condition Information for Families-HRSA Newborn Screening Clearinghouse
newbornscreening.hrsa.gov/conditions/medium-chain-acyl-coa-dehydrogenase-deficiency

ClinGen Actionability Report
actionability.clinicalgenome.org/ac/Pediatric/ui/stg2SummaryRpt?doc=AC1016

Referral (local, state, regional and national)

Find a Genetics Clinic Directory
clinics.acmg.net

Genetic Testing Registry
www.ncbi.nlm.nih.gov/gtr/