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

ACT Sheet

Newborn Screening ACT Sheet

[Decreased C0]

Carnitine Uptake Defect (CUD; Primary Carnitine Deficiency)

Differential Diagnosis: Carnitine uptake defect (CUD); Maternal carnitine deficiency (primary or secondary); prematurity.

Condition Description: Carnitine Uptake Defect (CUD), a fatty acid oxidation (FAO) disorder, is caused by a defect in the carnitine transporter in the cell membrane. This leads to decreased free carnitine in cells and increased excretion of carnitine in urine. The resulting carnitine deficiency disrupts the transport of long-chain fatty acids into mitochondria, leading to decreased energy production, particularly in tissues with high energy needs (skeletal and heart muscle). FAO occurs during prolonged fasting and/or periods of increased energy demands (fever, stress) after glycogen stores become depleted and energy production relies increasingly on fat metabolism. The presentation and age of onset of symptoms are variable.

You Should Take the Following Actions:

- Inform family of the newborn screening result.
- Ascertain clinical status (poor feeding, lethargy, tachypnea).
- Consult with pediatric metabolic specialist.
- Evaluate the newborn (tachycardia, hepatomegaly, 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.
- Initiate confirmatory/diagnostic testing and management, as recommended by the specialist.
- Provide family with basic information about CUD and its management.

- Report final diagnostic outcome to newborn screening program.

Diagnostic Evaluation: **Plasma carnitines (free and total):** are decreased. **Urinary carnitine** excretion may be increased. **Molecular genetic testing** may confirm the diagnosis.

Clinical Considerations: Carnitine uptake defect has a variable presentation and age of onset. Characteristic manifestations include lethargy, hypotonia, hepatomegaly, and cardiac decompensation due to cardiomyopathy. Hypoketotic hypoglycemia is typical in acute episodes. These findings are rarely present in the neonatal period. Maternal carnitine deficiency (primary or secondary), other fatty acid oxidation defects, organic acidurias, and prematurity can cause low carnitine levels in a newborn.

Additional Information:

How to Communicate Newborn Screening Results
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

 (Funded in part through MCHB/HRSA/HHS grant #U22MC03957;#UH9MC30770 National Coordinating Center for the Regional Genetics Networks)

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 Newborn Disorders and Parents & Families sections)
ut.medicalhomeportal.org/newborn/carnitine-uptake-defect

Parent/Family Support

FOD Family Support Group
fodsupport.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

Gene Reviews
www.ncbi.nlm.nih.gov/books/NBK84551/

Medline Plus
medlineplus.gov/genetics/condition/primary-carnitine-deficiency/

Condition Information for Families-HRSA Newborn Screening Clearinghouse
newbornscreening.hrsa.gov/conditions/primary-carnitine-deficiency

ClinGen Actionability Report
actionability.clinicalgenome.org/ac/Pediatric/ui/stg2SummaryRpt?doc=AC1022

Referral (local, state, regional and national)

Find a Genetics Clinic Directory
clinics.acmg.net

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

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