

ACT Sheet

Newborn Screening ACT Sheet

[Elevated C4 Acylcarnitine]

Short-Chain Acyl-CoA Dehydrogenase (SCAD) Deficiency

Differential Diagnosis: Short-chain acyl CoA dehydrogenase (SCAD) deficiency; Isobutyryl-CoA dehydrogenase (IBDH) deficiency (also known as isobutyrylglycinuria (IBG)); ethylmalonic encephalopathy (EE).

Condition Description: SCAD deficiency disrupts fatty acid oxidation at the level of short chain fatty acids, leading to elevated C4 acylcarnitine (as butyrylcarnitine). IBDH is a disorder of valine metabolism leading to elevated C4 acylcarnitine (as isobutyrylcarnitine). Both conditions have limited, if any, clinical significance. EE is a disorder caused by variants in a gene coding for a mitochondrial enzyme. In EE, potentially toxic metabolites accumulate preventing the mitochondria from producing energy.

You Should Take the Following Actions:

- Inform family of the newborn screening result.
- Ascertain clinical status (typically asymptomatic; rarely lethargy, hypotonia, vomiting).
- Consult with pediatric metabolic specialist.
- Evaluate newborn for signs of hypoglycemia, lethargy, or metabolic acidosis. If any of these findings are present or if the newborn is ill, transport to a hospital for further treatment in consultation with a metabolic specialist.
- Initiate confirmatory diagnostic testing and management, as recommended by the specialist.
- Provide the family with basic information about these conditions and their management.
- Report final diagnostic outcome to newborn screening program.

Diagnostic Evaluation: Plasma acylcarnitines: C4 is elevated in both SCAD and IBDH deficiencies. C4 (+/- C5) is elevated in EE. **Urine organic acids** demonstrate elevated ethylmalonic acid in SCAD and isobutyrylglycine in IBDH deficiency. EE is associated with elevated ethylmalonic acid and mild elevations of glycine conjugates. **Molecular genetic testing** may be required to differentiate these disorders.

Clinical Considerations: SCAD deficiency and IBDH deficiencies are typically benign. EE can present in infancy with developmental delay, diarrhea and petechiae.

Additional Information:

How to Communicate Newborn Screening Results

Emergency Protocols (New England Consortium of Metabolic Programs)

Gene Reviews (SCAD | EE)

Medline Plus (SCAD | EE | IBDH)

Condition Information for Families- HRSA Newborn Screening Clearinghouse (SCAD | EE | IBDH)

Referral (local, state, regional, and national): Find a Genetics Clinic Directory Genetic Testing Registry

This practice resource is designed primarily as an educational resource for medical geneticists and other clinicians to help them provide quality medical services. Adherence to this practice resource is completely voluntary and does not necessarily assure a successful medical outcome. This practice resource should not be considered inclusive of all proper procedures and tests or exclusive of other procedures and tests that are reasonably directed to obtaining the same results. In determining the propriety of any specific procedure or test, the clinician should apply his or her own professional judgment to the specific clinical circumstances presented by the individual patient or specimen. Clinicians are encouraged to document the reasons for the use of a particular procedure or test, whether or not it is in conformance with this practice resource. Clinicians also are advised to take notice of the date this practice resource was adopted, and to consider other medical and scientific information that becomes available after that date. It also would be prudent to consider whether intellectual property interests may restrict the performance of certain tests and other procedures.



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State and Other Resources

State Newborn Screening Program

Nevada Newborn Screening Program, Nevada State Public Health Laboratory 775-682-6238, med.unr.edu/nsphl/newborn-screening

Genetics/Metabolic Consultants

Nicola Longo, MD, PhD, University of Utah Genetics/Pediatrics 801-585-2457, healthcare.utah.edu/fad/mddetail.php?physicianID=u0305101

Information for Clinicians and Families

Nevada Medical Home Portal (see Newborn Disorders and Parents & Families sections) nv.medicalhomeportal.org/newborn/short-chain-acyl-coa-dehydrogenase-deficiency

Parent/Family Support

FOD Family Support Group - fodsupport.org/ United Mitochondrial Disease Foundation - www.umdf.org Organic Acidemia Association - www.oaanews.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/scadd

Gene Reviews

- www.ncbi.nlm.nih.gov/books/NBK63582/
- www.ncbi.nlm.nih.gov/books/NBK453432/

Medline Plus

- medlineplus.gov/genetics/condition/short-chain-acyl-coa-dehydrogenase-deficiency/
- medlineplus.gov/genetics/condition/ethylmalonic-encephalopathy/
- medlineplus.gov/genetics/condition/isobutyryl-coa-dehydrogenase-deficiency/

Condition Information for Families-HRSA Newborn Screening Clearinghouse

- newbornscreening.hrsa.gov/conditions/short-chain-acyl-coa-dehydrogenase-deficiency
- newbornscreening.hrsa.gov/conditions/ethylmalonic-encephalopathy
- newbornscreening.hrsa.gov/conditions/isobutyryl-coa-dehydrogenase-deficiency

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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