

# ACT Sheet

# Newborn Screening ACT Sheet [Increased Leucine] Maple Syrup Urine Disease

Differential Diagnosis: Maple syrup urine disease (MSUD); hydroxyprolinemia.

**Condition Description:** In MSUD, leucine, isoleucine, alloisoleucine, and valine (branched-chain amino acids) cannot be metabolized beyond their  $\alpha$ -ketoacid intermediates (due to a block in the shared catabolic pathway). Branched-chain amino acids and branched-chain ketoacids accumulate and produce severe toxicity often within the first 48 hours of life.

#### You Should Take the Following <u>IMMEDIATE</u> Actions:

- Inform family of the newborn screening result.
- Ascertain clinical status (poor feeding, vomiting, lethargy, tachypnea).
- Consult with pediatric metabolic specialist the same day.
- Evaluate the newborn for signs of poor feeding, lethargy, tachypnea, alternating hypertonia/hypotonia, or seizures. If any of these findings 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 the family with basic information about MSUD, including dietary management.
- Report final diagnostic outcome to newborn screening program.

**Diagnostic Evaluation:** In MSUD, plasma amino acid analysis demonstrates elevations of leucine, isoleucine, alloisoleucine, and valine (the branched-chain amino acids), and urine organic acid analysis reveals elevated branched-chain alpha-hydroxy- and alpha-keto-acids. In newborn screening, leucine, isoleucine, alloisoleucine, and hydroxyproline are not differentiated: if the newborn has hydroxyprolinemia, confirmatory amino acid analysis will only show increased hydroxyproline.

**Clinical Considerations:** MSUD presents in the neonate with feeding intolerance, failure to thrive, vomiting, lethargy, and maple syrup odor, particularly in urine and cerumen. If untreated, the condition will rapidly progress to seizures, coma, cerebral edema, irreversible developmental delay, and possibly death. Individuals with variant forms of MSUD may not present with clinical symptoms until later in infancy or childhood but remain at risk for severe metabolic decompensation. Hydroxyprolinemia is a benign condition.

#### 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

#### 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/maple-syrup-urine-disease

#### Parent/Family Support

Maple Syrup Urine Disease Family Support Group (National) msud-support.org/contacts/

## National Resources (with web addresses)

## **Additional Information**

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

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

Gene Reviews www.ncbi.nlm.nih.gov/books/NBK1319/

Medline Plus medlineplus.gov/genetics/condition/maple-syrup-urine-disease/

Condition Information for Families-HRSA Newborn Screening Clearinghouse newbornscreening.hrsa.gov/conditions/maple-syrup-urine-disease

#### 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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