

## 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 *IMMEDIATE* 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](#)

## State and Other Resources

### State Newborn Screening Program

Newborn Screening, State of Rhode Island Department of Health  
401-921-7619, [health.ri.gov/newbornscreening/](http://health.ri.gov/newbornscreening/)

### Genetics/Metabolic Consultants

Division of Genetics, Lifespan Physician's Group, Hasbro Children's Hospital  
401-444-4000, [www.lifespan.org/centers-services/childrens-neurodevelopment-center/genetics-and-dysmorphology](http://www.lifespan.org/centers-services/childrens-neurodevelopment-center/genetics-and-dysmorphology)

### Information for Clinicians and Families

Rhode Island Medical Home Portal (see also the Parents & Families section)  
[ri.medicalhomeportal.org/newborn/maple-syrup-urine-disease](http://ri.medicalhomeportal.org/newborn/maple-syrup-urine-disease)

### Parent/Family Support

Maple Syrup Urine Disease Family Support Group (National)  
[msud-support.org/contacts/](http://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/heritable-disorders/Resources/achdnc-communication-guide-newborn.pdf](http://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/msud](http://www.newenglandconsortium.org/msud)

Gene Reviews  
[www.ncbi.nlm.nih.gov/books/NBK1319/](http://www.ncbi.nlm.nih.gov/books/NBK1319/)

Medline Plus  
[medlineplus.gov/genetics/condition/maple-syrup-urine-disease/](http://medlineplus.gov/genetics/condition/maple-syrup-urine-disease/)

Condition Information for Families-HRSA Newborn Screening Clearinghouse  
[newbornscreening.hrsa.gov/conditions/maple-syrup-urine-disease](http://newbornscreening.hrsa.gov/conditions/maple-syrup-urine-disease)

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

Find a Genetics Clinic Directory  
[clinics.acmg.net](http://clinics.acmg.net)

Genetic Testing Registry  
[www.ncbi.nlm.nih.gov/gtr/](http://www.ncbi.nlm.nih.gov/gtr/)