

# ACT Sheet

### **Newborn Screening ACT Sheet**

### [Elevated Methionine +/- Elevated Homocysteine] Homocystinuria (Cystathionine beta-synthase deficiency [CBS Deficiency])

**Differential Diagnosis:** Classic homocystinuria, methionine adenosyltransferase (MAT) I/III deficiency, glycine n-methyltransferase (GNMT) deficiency; adenosylhomocysteine hydrolase deficiency, liver disease, parenteral nutrition, prematurity.

**Condition Description:** Homocystinuria refers to a group of inherited disorders that result in elevated levels of homocysteine in urine. The amino acid, methionine, derived from ingested protein, is normally converted to homocysteine. In classic homocystinuria, homocysteine cannot be converted to cystathionine. As a result, the concentration of homocysteine and its precursor, methionine, become elevated. In MAT I/III deficiency and the other hypermethioninemias, methionine is increased but homocysteine levels are normal or only slightly increased. Presentation in the neonatal period is rare.

#### You Should Take the Following Actions:

- Inform family of the newborn screening result.
- Ascertain clinical status (newborns are expected to be asymptomatic).
- Consult with pediatric metabolic specialist.
- Evaluate the newborn with attention to liver disease.
- Initiate confirmatory/diagnostic testing and management, as recommended by the specialist.
- Provide family with basic information about the possible diagnoses and their management.
- Report the final diagnostic outcome to newborn screening program.

**Diagnostic Evaluation:** Plasma amino acids: Methionine and homocysteine are both elevated in classic homocystinuria (cystathionine-b-synthase deficiency), while methionine alone is elevated in the other disorders. Urine amino acids: Homocysteine is markedly elevated in classic homocystinuria. Total plasma homocysteine is markedly elevated in classic homocystinuria and normal or only slightly increased in the other disorders. Molecular genetic testing may be required to establish the diagnosis.

**Clinical Considerations:** Neonates with classic homocystinuria are usually asymptomatic. Treatment includes a protein restricted diet and vitamin supplementation. If untreated, later features may include ectopia lentis, developmental delay, abnormalities in long bone formation and an increased risk of thrombosis. MAT I/III deficiency may be benign. Adenosylhomocysteine hydrolase deficiency is a very rare condition associated with developmental delay and hypotonia, and both this disorder and GNMT deficiency can cause liver abnormalities.

#### 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

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

Metabolic (Bloodspot) Screening, Montana's Newborn Screening Programs 406-444-0984, dphhs.mt.gov/ecfsd/cshs/newbornscreeningprograms/

Short-term Follow-up Coordinator - Crystal Fortune, MT Laboratory Services Bureau 406-444-0930 or 800-821-7284 cfortune@mt.gov

#### Genetics/Metabolics Consultants

Shodair Children's Hospital Medical Genetics Staff will contact you with recommendations. Metabolic Clinic: 406-444-1099; Clinics held across Montana: 406-444-1016 shodair.org/about-shodair/contact/

If emergency consultation with a metabolic specialist is necessary, contact One Call (24/7) at Children's Hospital Colorado (800-525-4871) and ask to speak to the metabolic specialist on call.

#### Information for Clinicians and Families

Montana Medical Home Portal (see also the Parents & Families section) mt.medicalhomeportal.org/newborn/homocystinuria

#### Parent/Family Support

HCU Network America hcunetworkamerica.org

#### 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/homocystinuria-hcu

Gene Reviews www.ncbi.nlm.nih.gov/books/NBK1524/

Medline Plus

medlineplus.gov/genetics/condition/homocystinuria/

Condition Information for Families- HRSA Newborn Screening Clearinghouse newbornscreening.hrsa.gov/conditions/homocystinuria

ClinGen Actionability Report

actionability.clinicalgenome.org/ac/Adult/ui/stg2SummaryRpt?doc=AC097

#### 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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