



## Medium Chain Acyl-CoA Dehydrogenase Deficiency (MCADD) Information for Health Professionals

Medium-chain acyl-CoA dehydrogenase deficiency is a fatty acid oxidation disorder. This enzyme is involved in the mitochondrial beta-oxidation of fatty acids.

### ➤ Clinical Symptoms

Clinical symptoms usually appear as early as 2 months of age but can occur at any time in life.

Clinical findings may include:

- hypoglycemia
- lethargy
- hypotonia
- persistent vomiting
- failure to thrive
- hepatomegaly, liver failure
- rhabdomyolysis
- Reye syndrome-like episodes
- seizures

Coma and sudden death are possible. Children with MCADD have a significant risk (25%) of death during their first episode of hypoglycemia. The first episode generally occurs following illness or fasting and in the past was sometimes attributed to SIDS.

### ➤ Incidence

MCADD occurs in greater than 1 in 25,000 births.

### ➤ Genetics and Inheritance Patterns

*ACADM* is the only gene known to be associated with medium-chain acyl-coenzyme A dehydrogenase deficiency.

MCADD is inherited in an autosomal recessive pattern. Both parents of an affected child are unaffected, healthy carriers who have one normal *ACADM* gene and one abnormal *ACADM* gene. Each pregnancy by carrier parents has a 25% chance of producing a child affected with MCAD, a 50% chance of having an unaffected carrier child, and a 25% chance of having a child who is unaffected and is not a carrier.

\*\*\*Siblings of individuals diagnosed with MCADD should be tested for MCADD.

### ➤ Screening Methodology

In Kansas, newborn screening for fatty acid oxidation defects is performed using tandem mass spectrometry to detect elevated acylcarnitine levels. Early specimen collection (after first 24 hours of age) may enhance the detection of these disorders, as acylcarnitine levels may decrease with infant age. False positive and false negative results are possible with this screening. Some drug therapies, such as valproic acid, benzoic acid, pivalic acid, and medium chain triglyceride oil, can cause false positive results, as can carnitine supplementation.

➤ **Treatment**

Treatment involves avoiding long periods of time without eating and having meals that are high in carbohydrates and low in fats. Infants should have at least one night-time feeding, or a late night snack, to reduce the time they go without eating. Special care must be taken if a person with MCAD deficiency becomes ill and has trouble keeping food down. This is usually treated in the hospital with an intravenous glucose. It is important that children with MCAD deficiency receive specialized management through a clinic with experience in treating this disorder. **Parents should always travel with a letter from the child's physician, including treatment guidelines, for any situation that may necessitate hospital admission during an acute illness.**

➤ **What to do After Receiving Presumptive Positive MCADD Screening Results:**  
**MEDICAL EMERGENCY - TAKE THE FOLLOWING IMMEDIATE ACTIONS**

- 1) **Consult with pediatric metabolic specialist.**
- 2) **Evaluate the newborn and refer as appropriate. Such individuals should be evaluated for clinical symptoms including hypoglycemia, lethargy, hypotonia, and dehydration.**
- 3) **Initiate confirmatory/diagnostic tests in consultation with the metabolic specialist.**
- 4) **Call KS Newborn Screening Program at 785-291-3363 with questions about these results.**
- 5) **Report clinical findings to the Newborn Screening Program at 785-291-3363.**

➤ **Confirmation of Diagnosis**

Individuals with a positive screen require immediate clinical evaluation. Prompt confirmatory testing should be performed and the infant should not have periods of fasting during this time. Confirmation of MCAD deficiency can be made through DNA mutation analysis. The diagnosis of MCADD requires an integrated interpretation of various analyses, as well as consideration of the clinical status of the individual. Initial testing should include: plasma acylcarnitine analysis, urine organic acid analysis, and urine acylglycine analysis. Additional skin fibroblast testing or DNA analysis may be done.

➤ **Communication of Results to Parents**

If a baby has a **presumptive positive MCADD** newborn screening result, additional testing needs to be performed to confirm a diagnosis. In accordance with Kansas Administrative Regulation 28-4-502, it is the responsibility of the attending physician or other birth attendant to obtain repeat specimens when needed to complete the screening process.

If a baby is diagnosed with MCADD, the following points should be conveyed to parents:

- ***Treatment is essential to the health of the child and is life-long.***
- ***Episode triggers, such as fasting and illness, need immediate attention.***
- ***If warning signs of the disorder are shown, parents should seek immediate medical care.***
- ***The child should be seen by a pediatric metabolic specialist.***
- ***Genetic counseling may be indicated. A list of counselors and geneticists, whose services are available in Kansas, should be given to the parents if they have not already seen a geneticist.***

For consultation, contact:

Bryce Heese, MD  
Biochemical Genetics  
Children's Mercy Hospital- Kansas City, MO

Clinic phone: 816-234-3771  
Hospital Operator: 816-234-3000  
Office Fax: 816-302-9963