Alberta Health Services

Newborn Metabolic Screening

Information for Health Professionals

Methylmalonic Acidemia (MMA)

(metabolic condition: organic acid disorder)

Also known as:

- methylmalonic aciduria
- adenosylcobalamin deficiency
- cobalamin A, B

What are organic acid disorders?

Organic acid disorders (sometimes called organic acidemias) are a group of inherited metabolic conditions in which certain components of proteins, for example amino acids, cannot be broken down. This leads to an accumulation of toxic metabolites in the body which can cause serious health problems.

What is MMA?

MMA is a group of disorders in which methymalonyl-CoA cannot be broken down by methylmalonyl-CoA mutase (MUT), an enzyme involved in the breakdown of several amino acids which are components of all proteins. When this enzyme does not function well or is missing in classic MMA, toxic metabolites accumulate.

What causes MMA?

MUT is an enzyme which requires vitamin B12 (cobalamin, Cbl) to function normally. MMA may be caused by mutations in the gene for MUT resulting in absent or decreased enzyme activity or may result from a number of defects in processing vitamin B12 to cobalamin (cobalamin defects).

How common is MMA?

The incidence of MMA is about 1 in every 50,000 to 100,000 infants born worldwide.

What are the clinical features of MMA?

Clinical presentation of the various MMA types is similar although the severity of the disorder may vary. MMA may be present with a metabolic crisis in the newborn period or in the first few months of life. The clinical features include lethargy, vomiting, dehydration, hypotonia, acidosis and increased ammonia level, which may progress to seizures and coma. Some patients with a less severe form present later with symptoms precipitated by a period of fasting or during a minor illness. Infants with cobalamin defects may also have megaloblastic anemia and homocystinuria.

What is the screening test for MMA?

A specific pattern of organic acid metabolites is detected on the newborn blood spot screen. Newborn blood spot screening is not 100% perfect. Infants with clinical symptoms need timely assessment and diagnostic testing even if their screen result is normal.

How is the diagnosis confirmed?

The diagnosis of MMA is confirmed by detecting specific metabolites in urine or on blood acylcarnitine analysis, together with amino acid profile in blood. Further testing may include enzyme analysis and/or mutation analysis of the genes involved in vitamin B12 processing as well as the MUT gene. Specialists at the clinics listed below will arrange diagnostic testing.

How is MMA treated?

MMA is treated by avoidance of fasting and dietary supplementation with carnitine. A low protein diet and vitamin B12 injections may also be recommended. Parent education is an important component of treatment, including advising parents on actions to be taken when their child develops a minor illness. Prompt treatment of a metabolic crisis with intravenous fluids of glucose and lipids is necessary. Children with MMA may be more susceptible to infections. The treatment is lifelong.

What is the outcome of treatment for MMA?

Prevention and prompt treatment of metabolic crises improves the outcome of MMA. However, some patients may have developmental delay even with treatment. Renal disease may be a complication of MMA in older children and adults.

Is MMA inherited?

MMA is inherited as an autosomal recessive trait. Parents of a child with MMA are carriers of the condition and have a 1 in 4 chance of having another affected child in each subsequent pregnancy. MMA carriers are healthy. Genetic counselling and prenatal testing is available to all families with MMA.

For additional resources, please call:

Clinical & Metabolic Genetics Program (Edmonton)

8-53 Medical Sciences Building
8440 – 112 St. NW
Edmonton, AB T6G 2H7
Phone: 780-407-7333
Fax: 780-407-6845

Emergency consultations:
Phone 780-407-8822 and ask for the specialist on call for metabolic diseases.

Clinical & Metabolic Genetics Program (Calgary)

Alberta Children's Hospital
28 Oki Drive NW
Calgary, AB T3B 6A8
Phone: 403-955-7587
Fax: 403-955-3091

Emergency consultations:
Phone 403-955-7211 and ask for the specialist on call for metabolic diseases.

Early screening, detection and treatment – every infant, every time

For more information about the NMS Program, visit www.albertahealthservices.ca/newbornscreening.asp

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