Alberta Health Services
Alberta Newborn Screening

**Talking with Parents >** When talking to a parent whose baby has received an abnormal screen result, let them know that an abnormal screen result doesn't mean that the infant has the condition. It means that they have a higher chance of having the condition, and they need more tests to find out for sure. A printable sheet for parents with more condition specific information can be used to support your conversation, visit ahs.ca/nms and under Quick Reference click on *What conditions are screened for?*

# Methylmalonic Acidemia (MMA) & Propionic Acidemia (PA)

## (metabolic condition: organic acid disorders)

*Information for Health Professionals*

## Also known as:

MMA
- methylmalonic aciduria
- adenosylcobalamin deficiency
- cobalamin A, B

PA
- propionic aciduria
- ketotic glycinemia
- ketotic hyperglycinemia

## 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 (amino acids and fats) cannot be broken down. This leads to an accumulation of toxic metabolites in the body which can cause serious health problems.

## What are MMA and PA?

Newborn screening cannot distinguish MMA and PA results therefore the screen result is reported as critical for both conditions.

MMA occurs when methymalonyl-CoA cannot be broken down by the enzyme methylmalonyl-CoA mutase (MUT). MUT is an enzyme which requires vitamin B12 (cobalamin, Cbl) to function normally. MMA may be caused by pathogenic variants 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).

PA occurs when the enzyme propionyl-CoA carboxylase is missing or does not function well due to pathogenic variants in the genes for this enzyme.

These enzymes are involved in the breakdown of amino acids which are components of all proteins. If either enzyme does not function well or is missing, toxic metabolites accumulate.

## How common are MMA and PA?

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

## What are the clinical features of MMA and PA?

MMA and PA may both be present with a metabolic crisis in the newborn period or in the first few months of life. The clinical features include lethargy, vomiting, 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.

## What is the screening test for MMA and PA?

A specific pattern of organic acid metabolites is detected on the newborn blood spot screen. Newborn screening will not detect all infants with MMA and PA. Infants with clinical symptoms need timely assessment and diagnostic testing even if their screen result is normal.

## How is the diagnosis confirmed?

A diagnosis of MMA or PA 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 molecular genetic analysis. The Clinical and Metabolic Genetics Program will arrange diagnostic testing.

## How are MMA and PA treated?

MMA and PA are treated by avoidance of fasting and dietary supplementation with carnitine. A low protein diet and a special formula low in some amino acids are also recommended. Prompt treatment of a metabolic crisis with intravenous fluids of glucose and lipids is necessary. Prevention and prompt treatment of metabolic crises improves the outcome of MMA and PA. However, some patients may have developmental delay even with treatment. Renal disease may be a complication of MMA in older children and adults. Children with MMA may be more susceptible to infections. Patients require regular monitoring and lifelong treatment.

## Are MMA and PA inherited?

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

Additional resources are available through:

### 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 and follow-up care – every baby, every time*

For more information about the Alberta Newborn Screening Program, visit www.ahs.ca/newbornscreening