Expanded Newborn Screening &
Inuit Carnitine Palmitoyl Transferase 1A Deficiency Variant

Every baby born in Manitoba whether residing in Manitoba, Northwest Ontario or western Nunavut is now screened through the Cadham Provincial Laboratory newborn screening programme for more than 30 metabolic conditions using tandem mass spectrometry. A small sample of blood is taken and is tested for rare, treatable diseases. One of these disorders is carnitine palmitoyl transferase type 1A (CPT1A) deficiency. The “classic form” CPT1A is a rare serious inherited disease where a baby with a deficiency of this enzyme cannot use fat as an energy source. Usually when a baby has not eaten for a while – such as when he or she is sick– the body switches to using fat as an energy source when glucose stores are depleted. A baby with classic CPT1A can get very sick with prolonged fasting or recurrent vomiting as the body is unable to use fat for energy when needed.

There is also a mild variant of CPT1A deficiency in about 7 out of 10 Inuit babies from the Kivalliq region of Nunavut - the P479L variant. With this variant usually there is enough enzyme activity for the body to function normally, but still some babies with this variant may be at an increased risk for hypoglycemia or seizures.

Some babies with the P479L variant will have a positive newborn screen, having higher levels of C0 (free carnitine) and lower levels of C16 (palmitoylcarnitine) and C18 (stearoylcarnitine) than expected. In these babies, a DNA test for the P479L variant will be automatically performed as part of our ongoing surveillance projects to determine the significance of this variant and to clarify other potential modifier genes/environmental factors. The DNA test will also help confirm that the newborn screening findings are not due to another metabolic disorder. For babies with the variant, no other additional action is necessary unless the baby is symptomatic with hypoglycemia, or if you are contacted by the pediatric metabolic program at the Winnipeg Children’s Hospital.

Many Inuit babies with the two copies of the P479L variant will have a normal newborn screen result because the C0, C16 and C18 levels are normal. Therefore a normal newborn screen result does not rule out the Inuit variant of CPT1A deficiency and the risk of hypoglycemia. We are uncertain why some babies with this variant have a positive newborn screen and others do not. As well, we are still attempting to clarify the clinical significance of this variant and other potential modifier genes/environmental factors.

If you have further questions about expanded newborn screening and the impact on the Inuit newborn population, further information can be provided by the pediatric metabolic program at the Winnipeg Children’s Hospital by calling 204-787-2494 or paging the metabolic specialist on call through HSC paging 204-787-2071.