Silent killers uncovered – Inborn Errors of Metabolism

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Inborn Errors of Metabolism (IEM) affect 1 in 3,000 births in Singapore and worldwide. Many can be treated; however delayed diagnosis and treatment can lead to irreversible negative effects on the child.

What are Inborn Errors of Metabolism?

Inborn Errors of Metabolism (IEM) are a variety of genetic disorders that cause children to be unable to process nutrients such as fats or proteins from their diet.

IEM can present in many ways. Some of the common ways of presentation include liver or heart disease, Metabolic Acidosis, low blood sugar and seizures.

When should doctors suspect an IEM condition?

Doctors should be suspicious where a family's history reveals previous undiagnosed baby deaths or unexplained severe childhood illnesses in which no satisfactory diagnosis was reached.

Maternal complications during pregnancy can also be a clue – In the case of a foetus with Fatty Acid Oxidation Disorders (FAOD), the pregnant mother is predisposed to developing acute fatty liver of pregnancy (AFLP), excessive breakdown of red blood cells, elevated liver enzymes and low platelet count, also referred to as HELLP syndrome.

Diagnosis also enables doctors to provide genetic counselling to first-time parents, and help them plan for subsequent pregnancies.

Benefits of screening for IEM

The metabolic screening test is universally available at every birthing hospital in Singapore. A few drops of blood from a pinprick of the newborn's heel are all it takes. The test is optional, but here are three reasons why parents should not opt out.

1. **Babies with IEM disorders often appear healthy at birth**
   IEM disorders are often undetectable until symptoms appear. The child usually appears healthy at birth, but becomes ill after some time.
2. **No family history of IEM disorders is not a guarantee that the baby will not have it**
   IEMs are hereditary; therefore having blood relatives with a particular IEM increases the risk of a child having the same disorder. However in most cases of IEM conditions, there is no clear family history, and the best way to be sure is to undergo screening.
3. **Serious health problems can be prevented through early detection and treatment**
   IEM disorders most commonly present in babies within their first month of life. Early screening enables doctors to detect and treat a number of these disorders before the onset of symptoms, and is crucial for optimal patient outcomes.

National Newborn Screening for IEM conditions

The National Expanded Newborn Screening Programme was established by KK Women's and Children's Hospital (KKH) in 2006. The biochemical genetics laboratory at KKH receives blood samples from hospitals nationwide, and screens newborn babies for over 30 IEM conditions.

To date, the programme has identified a wide range of IEM, some of which were earlier not known to occur in Singapore. Two IEM conditions which commonly occur in Singapore are Methylmalonic Aciduria (MMA) and Fatty Acid Oxidation Disorders (FAOD).

Information for Parents

Babies delivered at KKH or Singapore General Hospital (SGH) will be screened. Parents may choose to opt out of the metabolic screening test for their child, but should seek medical advice before doing so. For hospitals other than KKH or SGH, parents should speak to their healthcare provider, to request for the test.

For more information about the metabolic screening test in Singapore, please speak to your healthcare provider, or contact the National Expanded Newborn Screening Laboratory at **metabolic.screening.laboratory@kkh.com.sg** or **+65 6394 5049**.

IEM Profile: Methylmalonic Aciduria (MMA)

- Patients with MMA have difficulty metabolising protein, which results in excess acid in the body fluids.
- Symptoms resembling neonatal blood infection typically appear by day 3-4 of life. These include breathing problems, vomiting and poor feeding.
- Management includes a low protein diet and carnitine supplements.

IEM Profile: Fatty Acid Oxidation Disorders (FAOD)

- Patients with FAODs have difficulty metabolising fats, which are an important source of energy for the body.
- Symptoms include low blood sugar, heart muscle disease or muscle disease and can appear at any time from the first month of life to adulthood.
- Management includes avoidance of fasting and administration of intravenous dextrose.

Dr Tan Ee Shien started practice as a general paediatrician in 2002 and subsequently trained in the area of clinical genetics and genetic metabolic disease. She is an Assistant Professor at Duke-NUS Graduate Medical School and Yong Loo Lin School of Medicine.

Dr Tan was awarded the SingHealth Clinician Scientist Award in 2008. Her current interests include the clinical management of Inborn Errors of Metabolism and newborn screening.