**INTRODUCTION:**

Maple Syrup Urine Disease derives its name from the sweet, burnt sugar, or maple syrup smell of the urine. The autosomal recessive disorder affects the way the body metabolizes, or processes, certain components of protein. Mutations in the BCKDHA, BCKDHB, DBT, and DLD genes cause maple syrup urine disease. These four genes provide instructions for making proteins that work together as a complex.

**MUTATIONS:**

The most common among these genes is the BCKDHA, or branched chain keto acid dehydrogenase. An 8-base pair deletion in exon 7 is present in one allele of a compound, or heterozygous patient. A single C nucleotide insertion in exon 2 occurs in one allele of an intermediate. The second allele of this patient carries an A-to-G transition in exon 9 of the E1 alpha gene. This complex is essential for breaking down the amino acids leucine, isoleucine, and valine, which are present in many kinds of food (particularly protein-rich foods such as milk, meat, and eggs). Mutations in any of these genes reduce or eliminate the function of the complex, preventing the normal breakdown of leucine, isoleucine, and valine. As a result, these amino acids and their byproducts build up in the body. Because high levels of these substances are toxic to the brain and other organs, their accumulation leads to the serious medical problems associated with maple syrup urine disease.

**FREQUENCY:**

This disease kills 1 in every 185,000 infants worldwide. The disease is much more frequent in Mennonites (Amish) killing 1 in every 358 newborn babies of their population and the number of families affected by this disease is on the rise.

**TREATMENT:**

Treatment requires dietary restriction of branched-chain amino acids, a special medical formula (drink similar to milk) and intensive dietary monitoring. Treatment of children with MSUD must be started as soon as possible, preferably at birth. It involves a complex approach of maintaining metabolic control. A special, carefully controlled diet is the focus of daily treatment. This requires careful monitoring of protein intake and close medical supervision. The diet centers on a synthetic formula or “medical food” which provides nutrients and all the amino acids except leucine, isoleucine and valine. These three amino acids are added to the diet with carefully controlled amounts of food to provide the protein necessary for normal growth and development without exceeding the level of tolerance. Various tests are available to monitor the levels of the amino acids and their keto acid derivatives in the blood and urine. Illnesses and stress, as well as consuming too much protein, raise these levels. Even mild illnesses can become life-threatening. A metabolic imbalance requires dietary changes and at times hospitalization.

**Symptoms:**

The way a person obtains Maple Syrup Urine Disease is through a defect on a gene on the 19th chromosome.

The first symptoms in an infant are poor appetite, irritability, and the characteristic odor of the urine. Within days they lose their sucking reflex and grow listless, have a high-pitched cry, and become limp with episodes of rigidity. Without diagnosis and treatment, symptoms progress rapidly to seizures, coma, and death. In some variant types, failure to thrive may be the first sign.

**Sources:**

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