UREA CYCLE DEFECTS

What is the Urea Cycle?

Our body breaks down food specially proteins to smaller substances to be used efficiently for our body's function. For this, our body makes use of enzymes to cut up proteins into building blocks called amino acids. Usually more protein is taken than our body needs. The excess protein is then broken down into ammonia and organic acids. A high amount of ammonia in the body is dangerous and should be properly excreted. The urea cycle is the pathway for the ammonia to be processed and excreted by the body.

What is a Urea Cycle Defect?

A urea cycle defect occurs if there is a lack or absence of any enzyme within the cycle. While the presentation may be variable, it is one of the conditions that can be detected through newborn screening. Untreated children may have drowsiness, fast breathing, vomiting, irritability and they may die.

What is Citrullinemia?

Citrullinemia is a condition that results from a lack of the enzyme argininosuccinate synthetase. Argininosuccinate synthetase is one of the enzymes which are part of the urea cycle. The condition is called citrullinemia because citrulline (an amino acid) accumulates along with ammonia.

What is Arginosuccicinic Aciduria?

Argininosuccinate Aciduria (or ASA) is a condition that results from a lack of the enzyme argininosuccinate lyase. Argininosuccinate lyase is one of the enzymes which are part of the urea cycle. The condition is called argininosuccinate aciduria because arginosuccinate (an intermediate product of the cycle) accumulates along with ammonia.

What Causes Urea Cycle Defects (Citrullinemia and Argininosuccinic Aciduria)?

Citrullinemia and Argininosuccinic aciduria are inherited conditions. The genes coding for the enzymes are contained in the genetic material that are inherited from parents. Because one part of the genetic material comes from the father and the other from the mother, the gene comes in pairs. In order to work correctly, at least one of the pairs should be working.

Parents of children with this condition have one working and one non-working gene coding for the enzyme. They do not manifest the disease but can pass them on to their children. They are known as carriers. If the child inherits the non-working gene from both parents, he or she will have the condition.

What are the signs and symptoms of UCD?

Children with UCD may have drowsiness, fast breathing, vomiting, convulsions, irritability and they may die.

How do you diagnose UCD?

UCDs can be identified by newborn screening in the immediate neonatal period by a simple heal prick blood spot on dried filter paper for determination of amino acids levels. Ammonia levels should be measured in patients who present with typical clinical features of UCDs or who have a suggestive family history or an abnormal newborn screening test. If the plasma ammonia concentration is elevated, further testing is performed to establish a diagnosis including arterial blood gases, serum lactate, serum glucose, serum electrolytes to calculate the anion gap, plasma amino acids, and urine organic acids and urine orotic acid. Additional testing may be undertaken to identify the specific enzyme deficiency, including enzyme analysis and molecular genetic testing.

What is the treatment of UCD?

The main aim of treatment of urea cycle defect is to keep the ammonia levels in the blood low or normal. To achieve this, patients with UCD are advised a low protein diet and to take a special milk formula. Sodium benzoate, a medication that helps in getting rid of excess ammonia, is also prescribed. Because children with UCD are found to have low levels of arginine (an essential amino acid), they are also given arginine supplementation.

What should I do when my baby is sick?

When children with UCD are sick, ammonia may accumulate in the blood. Child may present with drowsiness, vomiting, seizures or convulsions and irritability. If not treated properly and immediately, it might lead to serious brain damage. Once these signs and symptoms are present, it is advised to bring your child to the hospital for management and alert your pediatrician or metabolic physician.