**METABOLIC DISORDERS IN NEWBORN**

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**METABOLIC DISORDERS IN NEWBORN**

**Phenylketonuria**

It is autosomal recessive disease where the abnormal metabolism of phenylalanine on chromosome number 12 which is the encoding genes get mutated. Phenylalanine hydrolase ezyme is not formed halting metabolism of phenylalanine however it is converted into phenyl pyruvic acid which accumulates in the blood which crosses the blood brain barrier into cerebrospinal fluid inhibiting growth of the brain causing mental retardation in newborns.

PKU prevents phenylalanine from turning into melanin. A woman with PKU who is not following a strict low phenylalanine diet during pregnancy, her baby may suffer from intellectual disabilities, heart defects and a small head (microcephaly), even though her baby may not Inherit PKU.

**Normal metabolism of phenylalanine**

In normal metabolism phenylalanine is converted to tyrosine in presence of phenylalanine hydrolase ezyme.Tyrosine is converted to p-hydroxyphenyl pyruvate presence of tyrosine transaminase. P-Hydroxyphenyl pyruvate through a series of reaction it is converted to acetic acid responsible for normal development and functioning of the brain.

**Etiology**

Accumulation of amino acids (phenylalanine) into toxic levels in the brain causing severe brain disorders.

**Signs and symptoms**

 They are not apparent at birth but babies with PKU shows within few months however the brain maybe already damaged so treatment need to start during the first week of life

**This signs includes**

Severe intellectual disabilities

Loss of IQ

Skin rashes

Pale skin and blue eyes

**Seizures**

**Diagnosis and treatment**

Newborn screening is carried out within the two days after birth. High phenylalanine with low tyrosine levels indicates PKU.

Babies testing positive for PKU have their results sent to a physician who refer them for metabolic disorder blood test.

Metabolic blood test It’s used to confirm the newborn screening test results.Test is done within the first week after birth, or earlier. Analyzes the levels of amino acids including phenylalanine and tyrosine. High levels of phenylalanine indicate PKU.A urine specimen is collected by applying a special collection bag to the baby’s

**Treatment**

The main treatment is avoid diet with high protein levels e.g beef ,fish , chicken, peas ,diet sodas ,milk, chocolate e.t.c and taking special formula as prescribed

Phenylalanine free baby formula or continues of breastfeeding supplemented with special formula.

Medication known as sapropretin(kuvan) should also prescribed.

**Very long -chain ACYL-CoA**

Very long-chain acyl-CoA dehydrogenase deficiency (VLCADD) is a rare genetic disorder of fatty acid metabolism that is transmitted in an autosomal recessive pattern. It occurs when an enzyme needed to break down certain very long-chain fatty acids is missing or not working properly. VLCADD is one of the metabolic diseases known as fatty acid oxidation (FOD) diseases.

Breakdown of fatty acid takes place in the mitochondria found in each cell. Mitochondria breakdown complex substances into simple substances to generate energy.

**Classification of very-long AcyL-Coa**

Early-onset which is the severe form which if unrecognized and undiagnosed can lead to extreme weakness of heart muscles and can be life threatening.

Late- onset it is characterized by bouts of low blood sugar and later life causes muscle cramping ,pain exercises intolerance and intermediate episodes of rhabdomyolysis.

**Etiology of Very-long AcyL-Coa**

Mutation in ACADVL gene which provides instruction for producing the long chain AcyL-Coa dehydrogenase enzyme needed to Breakdown very long chain fatty acids. Deficiencies in the ezyme disrupt the normal process of converting fatty acids into energy leading to health issues such as lethargy and hypoglycemia. Very long-chain fatty acids or partially metabolized fatty acids may also build up in tissues and damage the heart, liver, and muscles. This abnormal buildup causes the other signs and symptoms of VLCAD deficiency.

**Clinical manifestations of very-long AcyL-Coa**

Heart muscles weakness, cardiomyopathy and heart muscles diseases

Hepatic encephalopathy (brain dysfunction due to liver problems

Rhabdomyolysis later in life Individuals with childhood-onset VLCAD deficiency typically experience an enlarged liver (hepatomegaly) and low blood glucose. This form is sometimes referred to as the hepatic or hypoketotic hypoglycemic form because of these signs. Additional signs and symptoms include other liver problems or muscle weakness.

Problems related to VLCAD deficiency can be triggered by periods of fasting, illness, exercise, and exposure to hot or cold temperatures. In children, this disorder is sometimes mistaken for Reye syndrome, a severe disorder that may develop in children while they appear to be recovering from viral infections such as chicken pox or flu. Most cases of Reye syndrome occur in children who take aspirin during these viral.

Symptoms become more pronounced during periods of fasting or increased energy demand e.g during periods of fever.

**Diagnostic approaches of very-long AcyL-Coa**

Biomedical testing asymptomatic neonates are now screened for C14:1, C14:2 and C14 acylcarnitines and an increased C14:1/C16 ratio, thus increasing the estimated incidence of this disorder to 1 in 30,000 births

Genetic testing can identify mutation in ACADVL gene

Blood test can detect elevated levels of specific substances related to impaired fatty acid metabolism.

**Management of very-long AcyL-Coa**

Dietary management are advised to follow a diet that provide easily digestible carbohydrates which can be efficiently, utilized for energy.

Avoiding fasting and consuming frequent balanced meal.

Supplements essential for aiding energy production.

 Avoidance of trigger of the disease e.g stress, fasting and illnesses to minimize the risk of metabolic crises.

**References**

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