

Disorders of Amino Acids Metabolism.

1) Hyperhomocysteinemia $\div$ This is caused by the imbalance between the rate of production of homocysteine through methylation reactions utilizing SAM and its breakdown by either remethylation to form methionine or reaction with ~~serine~~ serine to form cystathionine in the cysteine biosynthetic pathway. This results in the increase of homocysteine to the extracellular medium, and ultimately the plasma and urine.

Elevation of the plasma concentration of homocysteine leads to Cardiovascular diseases, Cognitive Impairment, and neural tube defects (the causes of variety of severe birth defects such as defects in the spinal column that leads to paralysis, and Anencephaly which is the failure of the brain to develop which is the leading cause of infant death due to congenital anomalies).

This disorder is managed by ingesting the vitamin precursors of the coenzyme that participated in homocysteine breakdown and sulfate.

olate appears to alleviate hyperhomocysteinemia. Its administration to pregnant women dramatically reduce the incidence of neural tube disorder or defect in new born.

Alkaptonuria:

this is the first disease to be characterized as inborn or metabolic defect. This is a disease in which one of the intermediates in the catabolism of phenylalanine and tyrosine homogentate accumulates. A deficiency of homogentate decarboxylase, the enzyme that catalyzes oxidative cleavage of this intermediate, prevents the further metabolism of the intermediate.

This metabolic disorder turns the urine dark. Individuals with this disorder often develop arthritis but how the metabolic defect is produced is yet unknown.

Cystinuria:

This happens when there is a defect in the kidney transport of cysteine and the basic Amino acids leading to the accumulation of cysteine in the blood leading to cystinuria.

Cystine has low solubility and forms calculi. Patients with this disorder drink large amount of water to dissolve the stones or are given compounds that react with cysteine to form soluble derivatives.

Gyrate Atrophy

This metabolic disorder comes from the defect in ornithine transaminase, activity which ultimately affects the choroid and retina of the eye. Gyrate atrophy leads to tunnel vision.

and later to blindness. The progress of this disorder can be slowed down by dietary intake of arginine or the administration of pyridoxine.

Phenylketonuria

This is a common disorder of amino acid metabolism. It is caused by mutation in the gene that codes for phenylalanine hydroxylase. affected individuals are unable to convert dietary phenylalanine to tyrosine and the blood of children with this disease contains high level of phenylalanine and low levels of tyrosine. instead of being converted to tyrosine, phenylalanine is converted to phenylpyruvate. new borns are often screened for PKU by testing for elevated levels of phenylpyruvate in the urine and phenylalanine in the blood during the first days after birth. (4)

deficient individuals often develop normally if the dietary intake of phenylalanine is strictly limited early in life.

Some women with PKU must restrict their dietary intake of phenylalanine during pregnancy to ensure proper fetal development.

Although dietary control can treat PKU, it excludes many natural protein rich foods. Such as meat, fish, milk, eggs etc.