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METABOLIC DISORDERS

CARNITINE DEFICIENCY SYNDROMES

Carnitine deficiency syndromes manifested as metabolic encephalopathy, lipid storage myopathy, or cardiomyopathy are reviewed from the Department of Pediatrics, Park Nicollet Medical Center, Minneapolis, MN. Carnitine deficiency may be primary and caused by impaired renal conservation, or secondary to various inborn errors of metabolism that promote excretion of carnitine as acylcarnitine. The genetic defects of intermediary metabolism with secondary systemic carnitine deficiency include: 1) Acyl-CoA dehydrogenase deficiencies; 2) organic acidemias; 3) mitochondrial respiratory disorders; and 4) carnitine octanoyltransferase deficiency. Other disorders with secondary carnitine deficiency include Reye syndrome, valproate-induced, renal Fanconi, chronic renal failure with hemodialysis, parenteral nutrition in premature infants, Kwashiorkor, cirrhosis, severe myopathies, myxedema, adrenal insufficiency, hypopituitarism and pregnancy. Systemic carnitine deficiency was first described in an 11 year old male with recurrent attacks resembling Reye syndrome from the age of three, and progressive muscle weakness from the age of ten. Metabolic encephalopathy is a frequent mode of presentation and the acute encephalopathic crises of systemic carnitine deficiency present with vomiting, progressive deterioration of consciousness, hepatomegaly, hypoglycemia, hyperammonemia, increased transaminase and hypoprothrombinemia. Acute crises produced by carnitine deficiency are treated with intravenous glucose supplementation to correct hypoglycemia. When hyperammonemia is present protein intake is restricted. Organic acidemias are treated with dietary modifications and/or vitamin supplementation. Frequent meals of high carbohydrate content and a low fat diet are advisable in all patients with carnitine

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deficiency. Maintenance therapy consists of L-carnitine 100 mg/kg/daily in infants and children. There are no known serious side effects of L-carnitine. (Breningstall GN. Carnitine deficiency syndromes. Pediatr Neurol March 1990; 6:75-81).

COMMENT. Early diagnosis of carnitine deficiency syndromes and prompt supplementation with oral carnitine may reduce mortality since oral carnitine administration in recommended doses is free from adverse effects except for occasional diarrhea. Supplementation with carnitine is recommended in infants and children with acute or recurrent encephalopathies, myelopathies, or cardiomyopathies associated with proven or presumed carnitine deficiencies. Meat products, especially red meats and dairy products, are important dietary sources of carnitine which maintain tissue stores.

NEW TREATMENT FOR PHENYLKETONURIA

Sixteen adolescents and young adults with phenylketonuria were treated with a mixture of valine, isoleucine, and leucine for four 3-month periods, and biochemical and neuropsychological tests were carried out before and after treatment at the Metabolic Disease Center, Children's Hospital Medical Center, University of Cincinnati College of Medicine. The performance of timed attentional tests and a continuous performance test was improved during the valine, isoleucine, and leucine periods compared to the control mixture periods. The attention diagnostic method, a test with strong attentional components, showed significant improvements. These results were consistent with earlier reports of improvement in specific cognitive processes with valine, isoleucine, and leucine treatment in patients who were unable to maintain low serum phenylalanine levels. (Berry HK et al. Valine, isoleucine, and leucine. A new treatment for phenylketonuria. AJDC May 1990; 144:539-543).

COMMENT. Phenylalanine and other large neutral amino acids share common receptocytes on a blood brain barrier transport system. The administration of other large neutral amino acids to patients with elevated plasma phenylalanine may reduce the amount of phenylalanine reaching the brain and prevent further deficits in cognition. The amino acid mixture consisted of 150 mg/kg Valine, 150 mg/kg Isoleucine, and 200 mg/kg Leucine. This mixture was prescribed as a supplement to the low phenylalanine formula.

SKIN BIOPSY IN GLYCOGENOSIS TYPE III

Electron microscopy of skin specimens of five patients with glycogenosis type III were correlated with clinical, biochemical, and electrophysiological findings from the Divisions of Neuropathology and Neuropediatrics, Ciudad Sanitaria Valle de Hebron, Barcelona, Spain. The disease began in infancy in four patients and at 38 years of age in one adult patient. Massive glycogen storage was observed in epithelial secretory cells of eccrine sweat glands and other cells, including Schwann cells of myelinated and unmyelinated fibers, were not