

Choline: an important nutrient in brain development, liver function and carcinogenesis.

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Abstract

Choline is required to make certain phospholipids which are essential components of all membranes. It is a precursor for biosynthesis of the neurotransmitter acetylcholine and also is an important source of labile methyl groups. Much attention has been given to the effect of supplemental choline upon brain function, i.e., enhancement of acetylcholine synthesis and release. In addition, choline supplements administered to rats in utero or shortly after birth permanently alter brain function. The mechanisms for this effect is unknown and under investigation at this time. Healthy humans fed diets deficient in choline, and humans fed parenterally have decreased plasma choline concentrations and develop liver dysfunction that is similar to that seen in choline-deficient animals. In experimental animals, fatty liver occurs in choline deficiency because phosphatidylcholine synthesis is required for very low-density lipoprotein secretion. This accumulation of lipids in liver may explain why choline-deficient rats spontaneously develop hepatocarcinoma. We found that choline deficiency was associated with the accumulation of 1,2-diacylglycerol, an activator of protein kinase C. Several lines of evidence indicate that cancers might develop secondary to abnormalities in protein kinase C-mediated signal transduction.

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