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Choline may Optimize Healthy Aging and Fetal Development

OPPORTUNITY

Choline may optimize liver function, brain function and fetal development.

BACKGROUND

The ability of the body to make choline, an essential nutrient, is insufficient to prevent liver or muscle dysfunction in adult men and postmenopausal women, and insufficient to prevent birth defects or optimize fetal cognitive development. Yet, the dietary requirement for choline has not been established.

POTENTIAL ECONOMIC BENEFIT

The potential economic impact of improved choline intake/status is unknown but could be substantial given the epidemic of nonalcoholic fatty liver disease, the high cost of birth defects, and the effect of poor neuron-cognitive development on individual achievement.

LANDMARK STUDIES

The prevention of human liver dysfunction by choline was first demonstrated in the early 1990s.¹ A role for choline in fetal brain development emerged from rodent studies showing that supplementation of the maternal diet with choline produced lasting beneficial effects on memory and attention in the progeny.

PUBLIC HEALTH & EDUCATION APPLICATION

In 1998, the Institute of Medicine established its first choline recommendations based on the estimated level of choline required to prevent liver damage. Shortly thereafter, USDA added choline to the database that tracks the nutritional content of common foods. This enabled estimates of choline intake in select populations and facilitated inquiries into the relationship between choline and chronic/developmental diseases. Recently, infant formulas have been modified to contain choline at levels similar to those present in breast milk.

GAPS IN KNOWLEDGE AND FUTURE RESEARCH

We need to confirm the role of choline in optimizing fetal neurodevelopment and cognitive potential, and determine maternal intake levels required to achieve these improved birth outcomes. Likewise, determination of intake levels to optimize liver function is required to set human choline requirements in children and adults. Recent studies suggest that an individual's genetics may impact choline requirements

REFERENCES

1. Zeisel SH. Choline: critical role during fetal development and dietary requirements in adults. *Annual Reviews in Nutrition* 2006; 26: 229-250
2. Meck, WH and Williams CL. Metabolic imprinting of choline by its availability during gestation: implications for memory and attentional processing across the lifespan. *Neuroscience and Biobehavioral Reviews* 2003; 4: 385-399.