

Effects of Maternal Choline Supplementation on Infant Cognitive Development

Principal Investigator: Barbara Strupp

The Need

Choline is an essential nutrient critical for fetal brain development. Extensive animal studies have shown that the amount of choline a mother consumes during pregnancy has lifelong effects on her offspring's memory, attention and emotion regulation, and that higher choline intake can offer protection against numerous disorders, including autism, Down syndrome and Alzheimer's disease. Despite its importance in fetal development, choline is not currently part of a standard prenatal vitamin regimen, and more than 90% of pregnant women in the U.S. consume less than the current recommended amount (450 mg/day). Further, results from a prior human feeding study conducted at Cornell suggest that the current daily choline recommendation for pregnant women is not high enough, and perhaps should be doubled. A recent study by this Cornell group (Strupp, Canfield and Caudill) demonstrated that when pregnant women consumed a little over twice the recommended choline intake (930 mg/day), their children showed faster information processing as infants and performed better on a task requiring sustained attention at 7 years of age, as compared to children born to mothers who consumed the current recommended amount.

The Approach

This study recruited a group of pregnant women to participate in a randomized, controlled trial in which half the women received 25 mg/day in choline supplements, and half received 550 mg/day during their second and third trimesters of pregnancy. These women continued to consume their normal diets (typically containing 300-350 mg choline/day) to more closely approximate the conditions that would be seen if choline was added to a prenatal vitamin regimen. The researchers then tested infants' attention, memory and emotion regulation at 4, 7, 10 and 13 months of age. Attention, or information processing speed, was assessed based on infant eye movements in reaction to animated images. Significantly, this type of infant reaction time has been found to predict a child's IQ through adolescence.

The Impacts

This is the first randomized controlled human trial demonstrating the benefit of a choline supplement (on top of a usual diet) during pregnancy on a measure predictive of child cognitive performance. Children of mothers who consumed more choline did show improved information processing speed: Reaction time for infants born to choline-supplemented mothers was, on average, 22.3 milliseconds faster than for infants born to mothers in the control group. Potential impacts on memory and emotion regulation are still being analyzed. These findings provide further evidence of the importance of increased choline intake during pregnancy. Few prenatal vitamins include choline, and current recommendations for choline intake during pregnancy are not adequate to support optimal fetal brain development. The researchers support efforts to increase maternal choline intake during pregnancy, as the nutrient could provide lifelong, population-wide improvements in child cognitive and emotional development.