

Maternal Choline Supplementation during Pregnancy Improves Executive Functioning in Children at Age 7 y (E10-06)

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Current Developments in Nutrition, Volume 2, Issue 11, November 2018

Objective: The aim of this study was to determine whether maternal choline supplementation during pregnancy improves offspring executive function. We hypothesized that children whose mothers consumed 930 mg (vs. 480 mg) choline/d during late pregnancy would perform better on an assessment of executive function.

Methods: Healthy pregnant women ($n = 26$) were randomly assigned to consume 100 or 550 mg of choline chloride supplement plus 380 mg of choline from a controlled diet (totaling 480 or 930 mg choline/d) during the third trimester. Their children returned for cognitive and affective function assessments at age 7 y ($n = 20$). Executive function was evaluated with a computer-based Tower of London task, in which children were presented with 3 colored balls placed on 3 pegs and asked to move the balls into a goal configuration. Children had 3 chances to solve each of 13 problems in the minimum number of moves. Solving a problem on the first attempt earned a child 3 points, with 1 point less given for each subsequent attempt. Primary outcomes included the total score across all problems and the number of problems solved at the first attempt. Planning time, which was also measured, was defined as the time between the presentation of the problem and the child's first move. Data were analyzed by the use of logistic and linear hierarchical models.

Results: Total score did not differ significantly by choline group, but children whose mothers consumed 930 mg choline/d (vs. 480) were more likely to solve problems at the first attempt (OR = 1.9, $P = 0.03$), an effect that remained significant (OR=2.5, $P=0.03$) after controlling for problem difficulty. Planning time did not differ by choline group in univariate models. However, the interaction between choline group and problem difficulty trended to significance ($P = 0.1$), such that children whose mothers consumed 930 mg choline/d (vs. 480) spent up to 8.5 s longer planning for the most difficult problems, indicative of improved executive functioning.

Conclusions: This study provides the first evidence that increased maternal choline intake improves child cognitive functioning in the school-age years, broadly corroborating numerous animal studies. These data highlight the potential benefits of increasing choline intake during pregnancy, an important goal in light of the low choline intakes that characterize most pregnant women.

Funding Sources

Funded in part by the Egg Nutrition Center, The Beef Checkoff, the US Department of Agriculture (USDA) Cooperative State Research, Education, and Extension Service (Special

Research Grant 004,44528), The Institute for the Social Sciences Small Grants Program, a Bronfenbrenner Life Course Center Research Grant, the National Institute of Food and Agriculture and the USDA (Hatch accession number 1,007,195), and the Balchem Corporation. JEHN and CLB are supported by NIH Traineeships (1T32HD087137-01; PI: KM Rasmussen). CLB is supported by an Egg Nutrition Center Young Investigator Research Award for Early Exploration.