

Chan J, et al. Low dietary choline and low dietary riboflavin during pregnancy influence reproductive outcomes and heart development in mice, *Am J Clin Nutr* 2010;91:1035-43.

**Background:** Embryonic development may be compromised by dietary and genetic disruptions in folate metabolism because of the critical role of folate in homocysteine metabolism, methylation, and nucleotide synthesis. Methylenetetrahydrofolate reductase (MTHFR), choline, and riboflavin play distinct roles in homocysteine detoxification and generation of one-carbon donors for methylation. The effect of low dietary choline and riboflavin on pregnancy complications and heart development has not been adequately addressed.

**Objective:** Our goal was to determine whether dietary deficiencies of choline and riboflavin in pregnant mice, with and without mild MTHFR deficiency, affect embryonic development.

**Design:** Female *Mthfr*<sup>+/+</sup> and *Mthfr*<sup>+/-</sup> mice were fed a control diet (CD), a choline-deficient diet (ChDD), or a riboflavin-deficient diet (RbDD) and were then mated with male *Mthfr*<sup>+/-</sup> mice. Embryos were collected 14.5 d postcoitum and examined for reproductive outcomes and cardiac defects.

**Results:** Plasma homocysteine was higher in ChDD- than in CD-fed females. Liver MTHFR enzyme activity was greater in ChDD-fed *Mthfr*<sup>+/+</sup> than in CD-fed *Mthfr*<sup>+/+</sup> females. The RbDD resulted in a higher percentage of delayed embryos and smaller embryos than did the CD. There were more heart defects, which were all ventricular septal defects, in embryos from the ChDD- and RbDD-fed females than from the CD-fed females. Dietary riboflavin and MTHFR deficiency resulted in decreased left ventricular wall thickness in embryonic hearts compared with embryos from CD-fed *Mthfr*<sup>+/+</sup> females.

**Conclusions:** Low dietary choline and riboflavin affect embryonic growth and cardiac development in mice. Adequate choline and riboflavin may also play a role in the prevention of these pregnancy complications in women.