

Egg Media Hotline

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Several studies support the role of choline in fetal development and throughout the lifespan

Essential nutrient in eggs may reduce risk of infant heart defects

A study published in the *American Journal of Clinical Nutrition* found that a choline-deficient diet is associated with increased risk for heart defects during prenatal development.¹ Choline is an essential nutrient required for normal cell activity, healthy brain and nerve function, liver metabolism and transportation of nutrients throughout the body. Research shows that only 10 percent or less of older children, men, women and pregnant women in America are meeting the Adequate Intake (AI) levels for choline; despite a growing body of science which supports the importance of choline especially in healthy fetal development.²

Vital Role of Choline During Pregnancy

A growing body of science, conducted in both animals and humans, supports the need for more dietary choline. Researchers from McGill University and Cornell University examined the offspring of mice that consumed a choline-deficient diet during pregnancy compared to the offspring of mice that consumed a diet containing the recommended amount of choline. The researchers observed that heart defects were more prevalent among the offspring of mice consuming a choline-deficient diet. The study also found that low choline intake was associated with increased levels of homocysteine, an amino acid in the blood that, when elevated, is associated with an increased risk of cardiovascular disease and declined cognitive function.

"Choline is a complex nutrient that is intricately involved in fetal development, and this research reveals another piece of the puzzle," according to Cornell University Associate Professor, Marie Caudill, Ph.D., R.D. "Women with diets low in choline have two times greater risk of having babies with neural tube defects so it's essential that nutrition education during pregnancy and breastfeeding highlight the importance of dietary sources of choline."

Another study, published in the June issue of *Behavioral Neuroscience*, reported that choline intake during pregnancy and lactation is associated with improved attention function.³ The researchers observed that offspring of female mice consuming a diet supplemented with choline during pregnancy and lactation performed significantly better on attention tasks compared to offspring from mothers consuming a diet not supplemented with choline.

The Importance of Choline Throughout the Lifespan

Another study published in the *American Journal of Clinical Nutrition* examined adult dietary intake of choline and betaine (a nutrient related to choline) and found that higher intakes of choline and betaine were associated with lower blood homocysteine concentrations, especially in subjects with low blood levels of folate and vitamin B12.⁴ Choline, like folate, is involved in breaking down homocysteine in the blood. Elevated homocysteine concentrations have been associated with increased risk of stroke, coronary heart disease and cognitive decline.

In May, a study published online in the *Journal of Nutrition* reported on the role of choline in the complex system that regulates DNA production and stability. Researchers studied the impact of choline intake on DNA damage in 60 Mexican-American men. They found that individuals with greater intakes of choline, even exceeding current dietary recommendations, exhibited the least amount of DNA damage.⁵

Focusing on a Choline-Rich Diet

"Choline is important for people of all ages, particularly moms and moms-to-be," says Neva Cochran, M.S., R.D., nutrition communications consultant and nutrition writer and researcher for *Woman's*

World magazine. "It is easy to meet the recommended choline intake with delicious foods like an egg, which is an excellent source of choline and provides roughly one-quarter of a pregnant or breastfeeding woman's choline needs."

Cochran recommends the following choline-rich meal ideas as part of a balanced diet:

- [Basic Hard-Cooked Eggs](#) – Prepare a batch of hard-cooked eggs on Sunday to have, high-quality protein meals and snacks on hand throughout the week which is especially important for moms-to-be.
- [Cereal Bowl Egg & Cheese Breakfast Burrito](#) – Try this microwavable burrito bowl topped with cheese and salsa - a quick, easy breakfast that can be enjoyed in seconds.
- [Basic Frittata](#) – Make fillings from your favorite foods or from leftovers. Use a combination of meat, seafood or poultry, cheese, vegetables and cooked pasta or grains.

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Choline Resources

- To learn more about choline and to download free educational materials, visit www.cholineinfo.org.
- To learn more about prenatal nutrition and download a free copy of the Pregnancy Food Guide, visit <http://www.pregnancyfoodguide.org/>.
- For more information on the nutritional benefits of eggs, visit the Egg Nutrition Center at www.enc-online.org.
- For additional choline-rich egg recipes and preparation tips, visit the American Egg Board at www.incredibleegg.org.

About the American Egg Board (AEB)

AEB is the U.S. egg producer's link to the consumer in communicating the value of The incredible edible egg™ and is funded from a national legislative checkoff on all egg production from companies with greater than 75,000 layers, in the continental United States. The board consists of 18 members and 18 alternates from all regions of the country who are appointed by the Secretary of Agriculture. The AEB staff carries out the programs under the board direction. AEB is located in Park Ridge, Ill. Visit www.IncredibleEgg.org for more information.

About the Egg Nutrition Center (ENC)

The Egg Nutrition Center (ENC) is the health education and research center of the American Egg Board. Established in 1979, ENC provides science-based information to health promotion agencies, physicians, dietitians, nutritional scientists, media and consumers on issues related to egg nutrition and the role of eggs in the American diet. ENC is located in Park Ridge, IL. Visit www.enc-online.org for more information

1. Chan J, Deng L, Mikael LG, Yan J, Pickell L, Wu Q, Caudill M, Rozen R. 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.
2. Jensen HH, Batres-Marquez P, Carriquiry A, Schalinske KL. Choline in the diets of the US population: NHANES, 2003-2004. *The FASEB Journal* 2007;21:lb219.
3. Moon J, Chen M, Gandhi SU, Strawderman M, Levitsky DA, Maclean KN, Strupp BJ. Perinatal choline supplementation improves cognitive functioning and emotion regulation in the Ts65Dn mouse model of down syndrome. *Behavioral Neuroscience* 2010;124:346-361.
4. Lee JE, Jacques PF, Dougherty L, Selhub J, Giovannucci E, Zeisel SH, Cho E. Are dietary choline and betaine intakes determinants of total homocysteine concentration? *Am J Clin Nutr* 2010;91:1303-10.
5. Shin W, Yan J, Abratte CM, Vermeylen F, Caudill M. Choline intake exceeding current dietary recommendations preserves markers of cellular methylation in a genetic subgroup of folate-compromised men. *J Nutr* 2010;140:975-980.