

## Egg Media Hotline

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### Essential Nutrient Found in Eggs May Help Lower Risk of Neural Tube Defects

*Only 1 in 10 Women Achieve Adequate Choline Intake*

**Park Ridge, Ill. (August 12, 2009)** - Research published online in the journal *Epidemiology* found that higher levels of total blood choline are associated with a 2.5-fold reduction in risk for neural tube birth defects (NTDs).<sup>1</sup> NTDs are birth defects of the brain and spinal cord, and the two most common NTDs are spina bifida and anencephaly. According to the Centers for Disease Control and Prevention (CDC), an estimated 3,000 pregnancies in the U.S. are affected by NTDs each year.<sup>2,3</sup> This study adds to the growing body of evidence demonstrating the important role of choline in fetal development.

#### Study Findings

The *Epidemiology* study investigated blood samples from more than 180,000 pregnant women and found 80 cases of NTDs. Researchers compared the blood samples to samples from 409 controls without birth defects and examined the specimens for markers including choline, folate, homocysteine, methionine and betaine among others. The researchers observed:

- a 2.5-fold reduction in risk for NTDs with the highest blood choline levels
- no other significant differences between the two study groups for any of the other blood markers

In the research discussion, the investigators note that the cause of NTDs is very complex and that supplementation of the food supply with folic acid, though effective, is only part of the solution. "This study is exciting because it offers new clues for preventing serious birth defects like spina bifida," said Dr. Gary M. Shaw, co-author of the study and professor of pediatrics at Stanford University School of Medicine. "This research should be repeated in other settings so we can learn more about the best nutrition advice to give pregnant women."

#### The Benefits of Choline

Choline is an essential nutrient needed for many of life's most basic functions including brain and nerve function, liver metabolism, the transportation of nutrients and the normal functioning of every cell in the body. Adequate choline intake is especially important for pregnant and breastfeeding women because it has been shown to influence prenatal and infant brain and spinal cord development as well as lifelong memory and learning functions. There is a high rate of choline transfer from mother to fetus and breast milk is also rich in choline, so meeting maternal choline needs is very important.

Emerging research also shows that choline may have additional benefits in areas such as:

- Memory function: Animal studies have demonstrated that age-associated memory decline seems to be delayed in offspring when mothers' diets are supplemented with choline during pregnancy.<sup>4</sup>
- Breast cancer prevention: A study funded by a grant from the National Institutes of Health (NIH) found that the risk of developing breast cancer was 24 percent lower among women with the highest intake of choline compared to women with the lowest intake.<sup>5</sup>
- Cardiovascular health: Choline has been shown to play an important role in reducing homocysteine, an amino acid in the blood that may be associated with an increased risk of chronic inflammation, which is considered a risk factor for heart disease.<sup>6</sup>

#### Closing the Choline Consumption Gap

Despite its important role in the body, only one in 10 Americans is meeting the Adequate Intake (AI) guidelines for choline.<sup>7</sup> "Most people don't know how important choline is for their bodies, or how easy it is to get the choline you need from food," explains Elizabeth Ward, a registered dietitian in private practice and author of the new book "Expect the Best: Your Guide to Healthy Eating Before, During, &

After Pregnancy." Ward, who is not affiliated with Stanford, also notes "One large egg can help meet roughly one-quarter of the recommended daily intake of choline for men, women and women who are pregnant or nursing."

For those looking to add more choline to their diet, Ward offers these additional tips:

- **Focus on Foods:** Most prenatal and regular multivitamins provide far less than the AI for choline. The easiest way to get the choline you need is by eating a balanced diet rich in foods that contain choline such as eggs, lean beef, salmon, cauliflower, milk and peanut butter.
- **Don't Skip the Yolk:** Choline is found exclusively in the egg yolk, and one yolk contains 125 milligrams of choline. The egg yolk also contains nearly half the protein in an egg, and the yolk is the only place you'll find the nutrients lutein and zeaxanthin which are important antioxidants related to eye health. While eggs contain a small amount of lutein and zeaxanthin, research suggests that these nutrients may be more bioavailable from eggs than from richer sources.

### Looking for More Information?

For more information on the nutritional importance of choline, visit [www.CholineInfo.org](http://www.CholineInfo.org). Also visit the Egg Nutrition Center at [www.enc-online.org](http://www.enc-online.org) for information on the health benefits of eggs and visit the American Egg Board at [www.incredibleegg.org](http://www.incredibleegg.org) for nutritious egg recipes and preparation tips.

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### 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](http://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 Washington, DC. Visit [www.enc-online.org](http://www.enc-online.org) for more information.

<sup>1</sup>Shaw, Gary M. et al. Choline and risk of neural tube defects in a folate-fortified population. *Epidemiology*; published online July 10, 2009. Paper to be published September 2009.

<sup>2</sup>Centers for Disease Control and Prevention (CDC). Folic Acid Data and Statistics (March 13, 2009). Retrieved on July 29, 2009 from <http://www.cdc.gov/ncbddd/folicacid/data.html>.

<sup>3</sup>Mercereau, P., et al. Spina Bifida and Anencephaly Before and After Folic Acid Mandate-United States, 1995-1996 and 1999-2000. *Morbidity and Mortality Weekly Report*, volume 53, number 17, May 7, 2004, pages 362-365.

<sup>4</sup>Zeisel SH. Choline: Needed for normal development of memory: *JACN* 2000; 19 (5); 528S-531S.

<sup>5</sup>Xu X. Choline metabolism and risk of breast cancer in a population-based study. *FASEB* 2008; 22:1-8.

<sup>6</sup>Cho E, et al. Dietary choline and betaine assessed by food-frequency questionnaire in relation to plasma total homocysteine concentration in the Framingham Offspring Study. *AJCN* 2006; 83: 905-11.

<sup>7</sup>Jensen HH, et al. Choline in the diets of the US population: NHANES, 2003-2004. Abstract presented at Experimental Biology 2007. Paper in publication.