

For more information, contact:
Public Relations

Edelman

312-233-1211
info@eggnutrition.org

Essential Nutrient Found In Eggs Reduces Risk of Breast Cancer By 24 Percent Most Women in the U.S. Consume Too Little Choline

Park Ridge, Ill. (April 3, 2008)Choline, an essential nutrient found in foods such as eggs, is associated with a 24 percent reduced risk of breast cancer, according to a study supported by a grant from the U.S. National Institutes of Health (NIH), to be published in *The FASEB Journal's* print issue in June.ⁱ This study adds to the growing body of evidence that links egg consumption to a decreased risk of breast cancer.

In this new case-control study of more than 3,000 adult women, 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. Women with the highest intake of choline consumed a daily average of 455 mg of choline or more, getting most of it from coffee, eggs and skim milk. Women with the lowest intake consumed a daily average of 196 milligrams or less.

“Choline is needed for the normal functioning of cells, no matter your age or gender,” says Steven H. Zeisel, MD, PhD, University of North Carolina, who is an author of the study and a leading choline researcher. “Increasing evidence shows that it may be particularly important for women, particularly those of child-bearing age.”

Only ten percent of Americans currently meet the recommended intake for choline, identifying a need to increase choline intake across the population.ⁱⁱ According to the Institute of Medicine, adequate choline intake is 550 milligrams per day for men and breastfeeding women, 425 milligrams per day for women, and 450 milligrams per day for pregnant women.ⁱⁱⁱ One egg contains 125.5 milligrams of choline, or roughly a quarter the recommended daily supply, making eggs an excellent source of this essential nutrient.^{iv} Choline is found exclusively in the egg's yolk. Other top food sources of choline include liver, wheat germ and cauliflower.

“While choline is an essential nutrient to the human diet, most people haven't even heard of it,” says Gerald Weissmann, MD, Editor in Chief of *The FASEB Journal* and research professor of medicine and director of the Biotechnology Study Center at the New York University School of Medicine. “Given that in the U.S. there is a real need to understand how much choline we require in our diet, we hope that research, education and awareness about choline will increase as a result of this study published in *The FASEB Journal*”

Eggs and Decreased Risk of Breast Cancer

Two previously published studies, supported by NIH grants, have shown that women who eat eggs have a lower risk of developing breast cancer:

- A study published in 2003 by researchers at Harvard University found that women who reported higher consumption of eggs, vegetable fat and fiber during adolescence had a smaller risk of developing breast cancer as adults. Specifically, eating one egg per day was associated with an 18 percent reduced risk of breast cancer.^v
- A study of Chinese women published in *Cancer Epidemiology, Biomarkers & Prevention* in 2005 showed that those who consumed the most fruit, vegetables and eggs were significantly less likely to have breast cancer. For those that reported eating at least six

eggs per week, the risk of developing breast cancer was 44 percent lower than for those who ate two or less eggs per week.^{vi}

Other Benefits of Choline

In addition to playing a role in the normal functioning of all cells, including brain and nerve function, liver metabolism and the transportation of nutrients throughout the body, choline has been shown to:

- Prevent Birth Defects: According to population-based research, infants from mothers whose diets were deficient in choline were four times more likely to have neural tube defects such as spina bi fda. This increased risk was observed even when other nutrients that help prevent birth defects, such as folic acid, were in adequate supply.^{vii}
- Improve Memory: Research suggests that choline is essential for proper fetal and infant brain development. It appears that choline affects the areas of the brain responsible for memory function and life-long learning ability.^{viii}
- Reduce Heart Disease Risk: Choline, like folate, is involved in breaking down homocysteine, an amino acid in the blood that may be associated with an increased risk of heart disease. In fact, research shows that choline deficiency results in increased homocysteine levels.^{ix} This may help to explain why 30 years of research have shown that healthy adults can consume eggs without increasing their risk of heart disease.^x

For More Information

- To receive an educational brochure on choline and for more information on the benefits of eggs, visit the Egg Nutrition Center at www.enc-online.org
- Join the discussion on eggs and nutrition science on Dr. Donald J. McNamara's blog, www.UnscramblingTheScience.com
- For choline-rich egg recipes and preparation tips, visit the American Egg Board at www.incredibleegg.org

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About *The FASEB Journal*

The FASEB Journal (<http://www.fasebj.org>) is published by the Federation of American Societies for Experimental Biology (FASEB) and is consistently ranked among the top three biology journals worldwide by the Institute for Scientific Information. FASEB comprises 21 nonprofit societies with more than 80,000 members, making it the largest coalition of biomedical research associations in the United States. FASEB advances biological science through collaborative advocacy for research policies that promote scientific progress and education and lead to improvements in human health.

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 Washington, DC. Visit www.enc-online.org for more information.

- ⁱ Xu X, et al. Choline metabolism and risk of breast cancer in a population-based study. *The FASEB Journal*, published online on January 29, 2008.
- ⁱⁱ Jensen HH, et al. Choline in the diets of the US population: NHANES, 2003-2004, Iowa State University (presented at Experimental Biology 2007, Washington DC).
- ⁱⁱⁱ Dietary Reference Intakes, Institute of Medicine of the National Academies, National Academies Press, Washington, DC, 2006.
- ^{iv} U.S. Department of Agriculture. USDA database for the choline content of common foods, U.S. Department of Agriculture, Beltsville, Maryland, 2004.
- ^v Frazier AL, et al. Adolescent diet and risk of breast cancer. *Breast Cancer Res* 2003; 5: R59-R64.
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- ^{vii} Shaw GM, et al. Periconceptional dietary intake of choline and betain and neural tube defects in offspring. *Am J Epidemiol* 2004; 160: 102-109.
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- ^{ix} Da Costa K-A, et al. Choline deficiency in mice and humans is associated with increased plasma homocysteine concentration after a methionine load. *Am J Clin Nutr* 2007; 85:1275-1285.
- ^x Lee A and Griffin B. Dietary cholesterol, eggs and coronary heart disease risk in perspective. *Nutrition Bulletin* (British Nutrition Foundation) 2006; 31: 21-27.