

WELCOME TO THE GOOD NEWS ABOUT EGGS

This CD presents the latest information regarding the role of eggs in the diet, recent studies on the contribution of eggs to elevated blood cholesterol levels and heart disease risk as well as studies on the health promotion - disease prevention benefits of including eggs as part of a dietary pattern. The materials contained in this CD represent a small number of the numerous studies on the role of eggs in the diet. The goal is to provide an over view of the current state of knowledge about eggs and the rationale for the changing guidelines on egg recommendations around the world.

The various sections of the CD cover:

1. **Introduction:** A general introduction to egg nutrition (Eggs.pdf) and a history of the changes views on eggs in the diet (Eggs_Full_Circle.pdf).
2. **Egg Nutrition:** A collection of reviews on the nutritional contribution of eggs in the diet, from high quality protein to the essential nutrient choline. One review (Bord_Bia_Review.pdf) was the basis for the recommendation in Ireland that everyone eat an egg a day.
3. **Eggs, Cholesterol & Heart Disease Risk:** Eggs have been unfairly blamed for causing high blood cholesterol levels and increased heart disease risk yet virtually all studies have failed to find a relationship between egg intake and heart disease incidence (Hu et al JAMA 281 1387 1999.pdf; MedSciMonit.pdf; Nakamura et al Brit J Nutr96 921 2006.pdf). This section also contains reviews on the dietary cholesterol – heart disease issue (Brit Nutr Fdn_Lee and Griffin.pdf; Eggs and Heart Disease.pdf; Kritchevsky.pdf) documenting the lack of a relationship within and between populations. Two other studies show how egg feeding maintains the LDL:HDL ratio (Ballesteros et al AJCN 80 855 2004.pdf) and the egg feeding actually lowers the inflammatory response (Ratliff et al Nutr Metab 1743-7075-5-6.pdf).
4. **Egg Protein:** Eggs contain the highest quality protein of any food item and dietary protein plays many important roles in the diet especially in weight loss (Layman.pdf) due to its high satiety effects (Dhurandhar JACN05.pdf; Egg-2-IJO-reprint.pdf). Studies have also shown that intake of high quality animal protein effectively reduces the rate of sarcopenia in the elderly (Houston et al AJCN 87 150 2008.pdf). For growing children, adults trying to lose weight or maintain a healthy weight, and for the elderly, eggs provide a convenient, affordable source of high quality animal protein at a very reasonable cost per kg.
5. **Egg Xanthophylls:** Egg yolks contain two important xanthophylls (lutein and zeaxanthin) which play a role in maintaining the health of the macula region of the eye (Carotenoids_Publication.pdf; Blumberg.pdf) and lutein intake is related

to a reduced risk of age-related macular degeneration, a leading cause of irreversible blindness in the elderly. Egg yolk xanthophylls have high bioavailability (Chung et al J Nutr 134 1887 2004.pdf). Egg feeding studies have been shown to result in both elevated blood levels of lutein as well as increased deposition of xanthophylls in the macular region of the eye (Goodrow et al J Nutr 136 2519 2006.pdf; Greene et al Nutr Metab 1743-7075-3-6.pdf; Vishwanathan et al AJCN 90 1272 2009.pdf). As research finds more roles for lutein in health (ADVANCE_Eggs_Eyesight.pdf), eggs can become a major source since egg lutein levels can be increased ten-fold with modification of the hen's feed.

6. **Egg Choline:** While egg intake was being restricted because of unwarranted fears of dietary cholesterol, an unintended consequence was a reduction in dietary choline intake. Eggs are a rich source of choline and choline plays many essential roles in metabolism (AEB_Choline_factsheet.pdf).

- *Fetal Development, Memory & Cognition:* Research shows that choline plays an important role in fetal brain development. Animal studies have shown that choline affects the areas of the brain responsible for memory function and life-long learning ability. Maternal choline intake is critical not only for proper fetal brain development, but also for maintaining normal maternal homocysteine levels. Elevated maternal homocysteine has been associated with an increased incidence of birth defects. Women with diets deficient in choline have a four times greater risk of their babies to have neural tube defects such as spina bifida. Additionally higher levels of total blood choline are associated with a 2.5-fold reduction in risk for neural tube birth defects (Zeisel.pdf; JADACHolineFactSheet.pdf; Choline_Fetal_Dev.pdf; ENC_Choline.pdf).
- *Neural Tube Defects:* Studies have shown that higher intakes of choline are related to a significantly lower risk of neural tube defects (Shaw et al Am J Epi 160 102 2004l.pdf).
- *Heart Health:* Choline, like folate, is involved in breaking down homocysteine, an amino acid in the blood that may be associated with an increased risk of cardiovascular disease, dementia and Alzheimer's disease. Researchers have found that dietary choline deficiency is associated with increased plasma homocysteine. Alternatively, emerging research shows that higher dietary intake of choline and betaine, an oxidative end product of choline, are related to lower homocysteine concentrations (Cho et al AJCN 83 905 2006.pdf; Detopoulou AJCN 87 424 2008.pdf).
- *Breast Cancer Risk:* There is a growing body of evidence which suggests that adequate choline consumption is linked to a decreased risk of breast cancer. Women who reported higher consumption of choline-rich foods such as eggs 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. Similar research 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.

- *Choline Needs & Consumption*: Only ten percent of Americans currently meet the recommended Adequate Intake (AI) for choline, identifying a need to increase choline intake across the population. 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 (Closing_the_Choline_Gap.pdf).

While the research doesn't support egg restrictions as an effective intervention to lower heart disease risk, data do support the many health benefits of including eggs in the diet. This is especially true in the case of the inadequate choline intake in the population due to unnecessary egg restrictions. From the developing fetus' need for sufficient choline for optimal brain development to the needs of the elderly for an affordable, convenient, easy to chew source of high quality protein, eggs satisfy a large number of nutritional needs. The only health risk associated with egg consumption is when there are insufficient eggs in the diet.