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Eggs Are Okay, Every Day

Even though eggs contribute only a third of the cholesterol in the American diet, over the last twenty-five years eggs have become the visual icon of high cholesterol, both dietary and blood cholesterol, and many consumers have responded by limiting, or eliminating eggs from their diets. Between 1970, when the public first started hearing the diet - cholesterol message, to 1995, egg consumption decreased 24%, from 311 to 238 eggs per person per year. The avoid dietary cholesterol messages have been so effective that recent surveys show that 45 to 50% of consumers consider dietary cholesterol "a serious health risk." And since everyone seems to replay the same nutritional messages, "less than 300 mg per day of dietary cholesterol and no more than 3 to 4 whole eggs a week," consumers assume that surely the recommendations must be science based and proven safe and effective. But as we are learning about many aspects of the more traditional conventional wisdom in nutrition, the proscriptions against eggs and dietary cholesterol are coming under increasing scrutiny as new research not only questions the validity of old concepts but presents documented evidence that the old beliefs don't hold up well to rigorous

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scrutiny.

Over the years there have been numerous reports that egg consumption is not related to either plasma cholesterol levels or coronary heart disease (CHD) incidence. Epidemiological surveys across cultures, such as the Twenty Countries Study (1), reported that dietary cholesterol and egg consumption were related to cardiovascular disease mortality using simple correlation analyses but, when included in multivariate analyses correcting for saturated fat calories, there were no relationships between CHD and either dietary cholesterol or egg intakes. Data from the Framingham Heart Study (2, 3), the Multiple Risk Factor Intervention Trial (MRFIT) (4), the Lipid Research Clinics Prevalence Trial (5), the Alpha-Tocopheral, Beta-Carotene Cancer Prevention Study (6), the Nurses' Health Study (7), and the Health Professionals Follow-Up Study (8) all reported that dietary cholesterol intake was not related to either plasma cholesterol levels or CHD incidence.

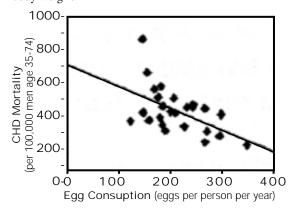
In 1999 Hu and colleagues at the Harvard School of Public Health reported in the Journal of the American Medical Association (JAMA) an analysis of data from the Nurses' Health Study and the Health Professionals Follow-Up Study on the relationships between weekly egg consumption and CHD and stroke incidences (9). The Nurses' Health Study included 80,082 nurses aged 34 to 59 years at study onset followed for 14 years (1980-1994) and the Health Professionals Follow-Up Study involved 37,851 males aged 40 to 75 years in 1986 and followed for 8 years (1986-1994). The investigators determined daily egg consumption from multiple food-frequency questionnaires and measured incidences of nonfatal myocardial infarction, fatal CHD, and stroke in the two continued on page 2

study populations. risk of CHD or stroke in either

The investigators reported that after adjustments for age, smoking, and other potential CHD risk factors,

> there was no evidence for a significant relationship between egg consumption and

men or women. The researchers concluded "that consumption of up to one egg per day is unlikely to have substantial overall impact on the risk of CHD or stroke among healthy men and women." Using data from subgroups analyses, the authors noted an increased risk of CHD associated with higher egg consumption among study participants with diabetes but not in those with hypercholesterolemia or excess body weight.



Egg Consumption & CHD Risk CHD Relative Risk Egg Consumption Males **Females** Less than 1 per week 1.00 1.00 1 per week 1.06 0.82 2-4 per week 1.12 0.99 5-6 per week 0.90 0.95 More than 1 per day 1.08 0.82

The findings by Hu et al. (9) add to an ever increasing body of evidence indicating a null relationship between egg consumption and CHD risk. The fact is that most industrialized countries have reviewed the experimental and epidemiological evidence and their nutrition experts determined that dietary cholesterol restrictions are unnecessary for a heart healthy diet. In addition, studies are showing that restricting eggs from the diet can have negative nutritional effects. Eggs are a source of biologically available lutein and zeaxanthin which help protect against age related macular degeneration, a leading cause of blindness in the elderly. The protein quality of eggs is the highest value in the supermarket, and its available at the lowest price. Eggs have high nutrient density providing 13 different vitamins and minerals in excess of the caloric contribution. And what else is

there in an egg which nature has included to optimize embryonic development (Should eggs be considered nature's original "functional food"?)?

And surely, if eggs increased the risk of CHD then countries with a high per capita egg consumption should have high rates of CHD. Turns out to be just the opposite (see figure). The countries with the highest per capita egg intakes are Japan #1, then Spain and France, countries with very low rates of CHD mortality compared to the USA.

As the articles in this issue of Nutrition Realities show, there are many reasons to include eggs in a healthy diet. And for segments of the population who are at nutritional risk, the elderly, growing children, lowincome families, and those with serious illnesses, excluding an affordable, nutrient dense source of high quality protein and a variety of essential nutrients makes very little sense. Our current understanding of the relationships between diet and CHD has moved beyond the simplistic view that dietary cholesterol equals blood cholesterol, and shifted towards an emphasis on saturated fats, obesity, and a sedentary lifestyle in CHD risk. Now all we have to do is give the public a new visual icon for heart disease risk and we can correct an unsubstantiated, outdated, unwarranted restriction on a valuable contributor to a nutritional diet. Slowly but surely, and with an ever expanding body of scientific evidence, eggs are coming back to their rightful place in the American diet. And for all those people who have been avoiding a food they enjoy, this will be a valuable shift in the conventional wisdom which will allow them to again welcome eggs back into their heart healthy diet.

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References:

- 1. Hegsted DM, Ausman LM. Diet, alcohol and coronary heart disease in men. J Nutr 1988;118:1184-1189.
- Millen BE, Franz MM, Quatromoni PA, et al. Diet and plasma lipids in women .1. Macronutrients and plasma total and lowdensity lipoprotein cholesterol in women: The Framingham nutrition studies. 7 Clin Epidemiol 1996;49:657-663.
- 3. Dawber TR, Nickerson RJ, Brand FN, Pool J. Eggs, serum cholesterol, and coronary heart disease. Am 7 Clin Nutr 1982;36:617-625.
- 4. Tillotson JL, Bartsch GE, Gorder D, Grandits GA, Stamler J. Food group and nutrient intakes at baseline in the Multiple Risk Factor Intervention Trial. Am J Clin Nutr 1997;65(1) Suppl:228S-257S.
- 5. Esrey KL, Joseph L, Grover SA. Relationship between dietary intake and coronary heart disease mortality: Lipid research clinics prevalence follow-up study. J Clin Epidemiol 1996;49:211-216.
- 6. Pietinen P, Ascherio A, Korhonen P, et al. Intake of fatty acids and risk of coronary heart disease in a cohort of Finnish men - The alpha-tocopherol, beta-carotene cancer prevention study. Am J Epidemiol 1997;145:876-887.
- 7. Hu FB, Stampfer MJ, Manson JE, et al. Dietary fat intake and the risk of coronary heart disease in women. N Engl J Med 1997;337:1491-1499.
- 8. Ascherio A, Rimm EB, Giovannucci EL, Spiegelman D, Stampfer M, Willett WC. Dietary fat and risk of coronary heart disease in men: Cohort follow up study in the United States. BM7 1996;313:84-90.
- 9. Hu FB, Stampfer MJ, Rimm EB, et al. A prospective study of egg consumption and risk of cardiovascular disease in men and women. 7AMA 1999;281:1387-1394.

Cholesterol & Fat

Eggs are viewed as the largest source of cholesterol among the foods eaten by most people. A large egg contains 213 milligrams (mg) of cholesterol which is more than two-thirds of the recommended daily intake of 300 mg. While eggs provide a relatively high amount of cholesterol compared to chicken, beef, and milk, the saturated fat content of eggs is relatively low for the calorie content. One large egg has 75 calories, 4.5 grams of total fat, with 1.5 grams of saturated fat, 0.5 grams of polyunsaturated fat, and 2.0 grams of monounsaturated fat.

Cholesterol is not a fat, but a waxy substance (lipid) produced by all humans and animals, and is essential for bodily function. Cholesterol is found in all cells and is an important component of the central nervous system. Cholesterol is used to produce bile acids which allow the body to absorb fats and fat-soluble vitamins from the digestive tract. The body also uses cholesterol to make steroid hormones, and as the starting material for the synthesis of vitamin D. Dietary cholesterol is the cholesterol consumed in foods while blood cholesterol is the cholesterol that circulates in the bloodstream. Dietary cholesterol does not automatically raise blood cholesterol when a high cholesterol food is eaten. Cholesterol does not have to be supplied by the diet like vitamins since the body produces all the cholesterol it needs. The amount of cholesterol the body makes is determined by weight. People who are obese produce more cholesterol than lean people and weight loss can decrease the amount of cholesterol the body makes. In most people the body balances the amount of dietary cholesterol by changing cholesterol production in body tissues. Eating excess saturated fat causes the liver to put more cholesterol into the blood circulation and slows down the removal of blood cholesterol. This is why too much saturated fat in the diet is considered to be the most important dietary factor in heart disease risk.

Elevated levels of cholesterol in the bloodstream carried by low-density lipoproteins (LDL) are associated with an increased risk of heart disease. The LDL cholesterol ("bad cholesterol") is responsible for cholesterol entering artery walls resulting in blocked arteries. The high-density lipoprotein cholesterol, (HDL), helps move cholesterol from tissues to the liver for removal from the bloodstream. High values of HDL cholesterol ("good cholesterol") are desirable.

High LDL blood cholesterol levels, low HDL cholesterol levels, and high total cholesterol levels are major risk factors for heart disease, along with cigarette smoking, high blood pressure, obesity, and physical inactivity. People with high total blood cholesterol levels are advised to reduce them by modifying their diets and by losing weight. If diet alone is not sufficient then cholesterol-lowering medication can be prescribed to achieve a desirable cholesterol level.

Nutrition professionals recommend consuming no more than 30 percent of total calories from fat, and no more than 10 percent of total calories as saturated fat. Saturated fat is the fat found in many animal foods and some vegetable oils. Trans-fats also raise blood cholesterol levels, just like saturated fats do. Trans-fats are formed when oils are partially hydrogenated to make more solid types of fats, such as shortening. The type and amount of fats in the diet are more important in determining blood cholesterol levels than the amount of cholesterol a food contains. Research has shown that saturated fat raises blood cholesterol and LDL levels more than any other component of the diet. Reducing the saturated fat in one's diet will result in lower cholesterol levels. Monounsaturated and polyunsaturated fats are the two other types of fats found in foods, and these fats lower blood cholesterol levels when they replace saturated fat in the diet.

It is important to remember that a well-balanced diet does not exclude any one food or food group. It includes foods from all of the food groups in moderation. Even though eggs are a source of dietary cholesterol, they should not be excluded from one's diet. Eggs readily fit into a healthy, well-balanced eating plan since they are protein-rich, low in sodium, and contain 13 vitamins and minerals in varying amounts. In addition, they are inexpensive; delicious; easy to prepare, chew and digest; convenient; and useful in numerous recipes. Eggs are a valuable food and most people can eat them without worrying that their blood cholesterol levels or risk of heart disease will be affected, so enjoy them in your diet today!

The Role of Eggs in the Diet. The American Council On Science and Health. New York, NY. 1996.

Heaney, R.P. Bone mass, nutrition, and other lifestyle factors. *Nutr. Rev.* 54 (4):S3, 1996.

National Osteoporosis Foundation. "Fast Facts on Osteoporosis.", 1998. Wood, R.J., P.M. Suter, and R.M. Russell. Mineral requirements of elderly people. *Am. J. Clin. Nutr.* 62: 493, 1995.

FOLIC ACI

Folate, also called folic acid or folacin, is a B vitamin needed for cell division and producing new blood cells. Folic acid is the form found in fortified foods and dietary supplements; the food forms are folate and folacin. Folate is especially important for pregnant women and women trying to conceive who need more folate than usual. Studies have shown that folate helps prevent neural tube birth defects such as spinal bifida, which occurs during early pregnancy, and lowers the risk of low birth weight babies. Folic acid deficiency can cause a blood disorder called megaloblastic anemia when

underdeveloped blood cells are unable to carry adequate oxygen. Everyone needs to be concerned about getting enough folate in their diet.

The U.S. Public Health Service advises that all women of childbearing age, 14-50 years, whether planning on becoming pregnant or not, should consume 400 micrograms (mcg.) of folate per day from food sources, or take a multivitamin containing folic acid, or a combination of the two. Many women do not consume adequate amounts of dietary folate and too often do not realize that they have become pregnant and the need for folate is critical for fetal development.

In April 1998, the Institute of Medicine released new guidelines for B vitamins, including folic acid, and recommended that all adults

Protein

Eggs are a highly nutritious food making valuable contributions to one's diet. A large egg provides six grams of high biological value protein, 10% of the daily value based on a 2,000 calorie diet. In fact, egg protein is the standard against which other food proteins are measured.

Amino acids are the building blocks of proteins which the body requires for cells and tissues, regulation of body processes, and as a source of energy. When proteins are broken down and used for energy they cannot be used to build and repair body tissue since there is no reserve supply of protein in the body.

Proteins are composed of differing combinations of 20 amino acids. The human body needs all 20 amino acids for the synthesis of its wide range of proteins. The body can synthesize 11 of these amino acids, but is unable to make 9 essential amino acids, which must be obtained from the diet.

The egg contains all the essential amino acids in a proper proportion to fulfill the needs for human growth and tissue maintenance. The only food that contains a more ideal mix of essential amino acids than an egg is mother's milk.

Each large egg provides 6 grams of high-quality, complete protein. This is the reason the egg is classified with the Meat, Poultry, Fish, Dry Beans, and Nuts group of the Food Guide Pyramid which recommends eating 2-3 servings of 2-3 ounces daily from this food group. Two eggs can be used to equal two ounces of lean meat, which is considered a serving. Eggs are lower in cost and in calories than many other animal-protein foods grouped in the same food group.

Everyone needs a constant supply of protein to repair body cells as they wear out and to make new body tissues especially during times of growth. The protein content of the body increases from 11 to 15% during the first year of life and body weight increases by approximately 7 kilograms. The recommended dietary allowances (RDA) for protein for an infant aged 0 to 6 months is 2.2 grams/ kilogram (g/kg). The RDA for a child aged 1 to 3 years is 1.2 g/kg. After the first year of life, maintenance requirements represent a gradually increasing proportion of the total protein requirement. By 4 years of age, body protein content reaches the adult value of 18 to 19% of body weight. Adolescent males and females aged 11 to 14 need 1.0 g/kg.

Additional protein is required during pregnancy for the mother and the fetus in order to support expansion of the blood volume, and tissues of the developing baby. Changes in the mother's body, especially the placenta, also require protein. A well-balanced eating plan similar to the Food Guide Pyramid provides enough protein for a healthy pregnancy. A pregnant mother needs only 10 extra grams of protein a day (a total of 60 grams per day) compared to a non-pregnant woman. In order for dietary protein to build new cells and not be used as a source of energy a pregnant woman needs to consume an adequate supply of energy.

As people age most use less calories than they did when they were younger due to basic body processes using energy at a slower rate, and many older Americans live a less active lifestyle. An older person still needs protein, vitamins, and minerals everyday, but does not need anymore protein than they did when they were younger. For some older adults protein-rich foods, such as meat or poultry may be too hard for them to chew while others have problems digesting these foods. And, those with limited finances might avoid meat, poultry, or fish because they often cost more than many other foods. Eggs are an excellent protein source, are easy to chew and digest and contain 13 vitamins and minerals in varying amounts providing a nutrient dense protein source.

Athletes once believed that the more protein they consumed, the more muscle mass they would build. Unfortunately, this is a myth. Protein is not a nutrient that requires special attention only because someone is physically active or building muscle mass. Protein should supply 10 percent of overall energy and extra amounts do not offer any added benefits for athletes. Most athletes need slightly more protein than non-athletes and, because energy needs vary widely among athletes, it is best to base protein needs on body weight, rather than energy needs.

Eggs are a good protein source for nearly everyone in every age group. No wonder eggs are one of nature's most nutritious creations.

Duyff, R. The American Dietetic Association's Complete Food and Nutrition Guide. Chronimed Publishing, Minneapolis, MN. 1998.

age 14 through adulthood consume 400 mcg. daily. This is greater than what most people are getting from their diets. It was suggested that the nutrients come from consuming food sources, however, supplements are also an option. A pregnant woman needs to increase the recommended amount to 600 mcg. daily and, while breast-feeding 500 mcg. is advised.

Food processors began fortifying flour and other grain products with folic acid in 1998 to help ensure that proper amounts of folate are being consumed in American's diets. Folate is now found in all breads, cereals, rice and pastas. It is naturally found in eggs and other foods such as lentils, spinach, orange juice, peas, asparagus, turnip greens, and beans.

If someone needs help increasing the amount of folate in their diet suggest they eat a 2-egg spinach (2 cup) omelet, with 1 slice of bread and a cup of orange juice for breakfast. This will equal 326 mcg. of folate, and this is only for one meal!

Finn, S. The American Dietetic Association Guide to Women's Nutrition for Healthy Living. The Berkley Publishing Group, New York, NY. 1997.

The American Dietetic Association (written by E. Ward). <u>Pregnancy Nutrition Good Health for You and Your Baby</u>. Chronimed Publishing, Minneapolis, MN. 1998.

QUESTIONS FROM

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е Are brown eggs more nutritious C than white eggs? • The color of the egg's shell is determined by the breed of the hen. Since many consumers prefer white n eggs producers most often raise White Leghorn hens, which produce eggs with white shells. Consumers who live in the C New England area often prefer brownshelled eggs, so egg producers there raise breeds such as the Rhode Island Red which produces brown shell eggs. The color of the shell has nothing to do with egg quality,

flavor, or nutritional value, only the breed of hen

laying the eggs. However, brown shell eggs are

usually slightly higher in price than white eggs

because the brown-shell- producing hens are

larger birds and require more feed for the eggs

produced.

 What are organic and free-range eggs and do they differ nutritiously?

Organic eggs are eggs produced by hens fed "organic" feeds grown without pesticides, chemical or commercial fertilizers. In addition, there are no pesticides, herbicides, or fungicides added to the feed. There are no known nutritional difference between organic eggs and regular eggs.

Free-range eggs are produced by hens raised outdoors or with daily access to the outdoors. The hens are free to run around, but in the event of bad weather the hens are kept inside. True free-range eggs are only available on a seasonal basis in the United States. The term free-range can also refer to eggs produced by hens raised inside on an open floor rather than in cages. Free-range eggs do not differ from regular eggs in terms of nutritional value or cholesterol level; however, they are more expensive due to production costs.

Where are the vitamins
 and minerals located
 in the egg?

• The yolk or yellow portion of the egg contains a higher proportion of the egg's vitamins and minerals than the white. The yolk contains all of the egg's vitamins A, D, and E. It is important to point out that Vitamin D occurs naturally in the egg yolk since it is not found in many foods. The yolk also has more phosphorus, folate, manganese, thiamin, iron, iodine, copper, and calcium than the white. And zinc is found entirely in the yolk. The yolk also contains all of the egg's fat and cholesterol, and 44% of the protein.

The egg white, also called albumen, is made up of more than half of the egg's total protein. More than half of the egg's riboflavin and niacin are found in the egg white. Chlorine, magnesium, potassium, sodium, and sulfur are also found primarily in the white.

Is it safe to eat raw eggs?

 Public health authorities and the egg industry continue to warn against consuming raw eggs or lightly cooked eggs. The egg might be contaminated with Salmonella Enteritidis, SE, a bacteria that can cause food borne illness. Eggs and some other animal products have a small possibility of containing SE. The risk of food borne illness is greatest for those who are pregnant, elderly, very young, or who have medical problems resulting in an impaired immune system. These individuals should avoid any raw and undercooked animal foods. Everyone needs to remember that while there is a small risk of contacting SE, consumers need to treat eggs and other raw animal foods safely. It is not recommended that anyone eat raw eggs. SE is killed by properly cooking and it is recommended that eggs be cooked until both the yolk and the whites are firm, not runny.

Nutrition Realities welcomes your Questions from the Clinic. If you have questions or comments, please send them by mail, FAX, or e-mail to:

Questions from the Clinic

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LUTEIN AND ZEAXANTHIN

Age related macular degeneration (ARMD) occurs when the macula of the retina deteriorates and central vision becomes affected. ARMD occurs mostly in people over 50 years of age, and is the leading cause of blindness in the elderly. There presently is no cure for ARMD but laser therapy can be an effective treatment.

New research suggests that ARMD may result from lack of certain nutrients in the diet. Vitamins and minerals, mainly antioxidants found abundantly in fruits and vegetables may reduce the risk of ARMD. One group of vegetable chemicals, carotenoids seem to have a protective effect against ARMD.

Carotenoids exist in high concentrations in eye tissues and function as antioxidants to neutralize damage to cells caused by free radicals such as sunlight. Carotenoids seem to act as filters and form a pigment that protects the eye tissue from blue light,

a potentially destructive band of radiation present in ordinary sunlight.

Lutein and zeaxanthin are two antioxidants making up the macular pigment of the eye and research has shown they reduce a person's risk of ARMD. It had been suggested that consuming green leafy vegetables was the best dietary sources of lutein and zeaxanthin to help decrease the risk of ARMD. A recent study analyzed 33 types of fruits and vegetables, two fruit juices, and egg yolk to see which ones were rich in lutein and/ or zeaxanthin. The results found that egg yolk contained the highest mole percentage (% of total) of lutein and zeaxanthin of all the food and juice sources. Egg volk contained 89 mole % of both lutein and zeaxanthin (54 mole % of lutein and 35 mole % of zeaxanthin). Corn contained 86 mole % of both lutein and zeaxanthin (60 mole % lutein and 25 mole % zeaxanthin), while spinach contained

47 mole %, (47 mole % of lutein and 0 zeaxanthin), and broccoli contained 22 mole %, (22 mole % lutein and 0 zeaxanthin). The results show that the previously recommended dark green leafy vegetables as rich sources of lutein and zeaxanthin were not as high as egg yolk. The egg volk is such a concentrated source because the feed the chicks consume contains corn and the bird concentrates the carotenoids from the feed into the egg volk. Since there is presently no cure for ARMD, the continuing consumption of eggs can be beneficial for obtaining high intakes of lutein and zeaxanthin and helping to prevent ARMD.

Blumberg, J., and Mayer, J. Review article: Nutritional Needs of Seniors. *Am J. Coll. Nutr.* 1997; 16: 517-523.

Sommerburg, Keunen, Bird, et al. Fruits and vegetables that are sources for lutein and zeaxanthin: the macular pigment in human eyes. *Br J. Ophthalmol.* 1998: 82: 907-910.

Nutrient Density

Eggs were designed by nature to be a complete nutrient reserve for the developing chick. Eggs are an important food for humans because of their high nutrition value and affordable cost. Many Americans are sedentary and need to watch their caloric intake to maintain a healthy weight. Yet within their allowable caloric intake they must obtain all of the essential nutrients needed for health. In order to achieve this goal they need to consume foods that are nutrient dense. Nutrient density refers to the quantity of one or more nutrients supplied by a food in relation to its caloric content. Nutrient-dense foods provide a high proportion of a person's daily diet needs of essential nutrients while supplying a small proportion of the daily need for calories. Eggs are a nutrient dense food because they are an excellent source of high quality protein, provide a wide range of vitamins and minerals,

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1050 17th Street, NW Suite 560 Washington, DC 20036 (202) 833-8850 Fax: (202) 463-0102 e-mail: enc@enc-online.org and are relatively low in calories. One large egg has 70 calories with 13 vitamins and minerals.

The amounts of various nutrients supplied in two large eggs are shown in the figure below. As the nutrient daily values show, eggs are not an unusually rich source of any one nutrient, except protein, but they do provide substantial amounts of a wide variety of nutrients for few calories. Two large eggs, represents only 7 percent of the total daily calorie intake of a person on a 2,000 calorie diet and provides 20 percent of the daily value for protein, 30 percent of the daily value for riboflavin, and 8 percent or more of the daily value for several other nutrients including vitamins A, D, E, B-6, B-12, folate, iron, phosphorus, and zinc. And, it is important to realize that the egg is one of the few foods that is a natural source of vitamin D. With all of these nutritional benefits it is not difficult to see why eggs are considered a nutrient dense food.

