

The role of poultry in human nutrition

How important is cholesterol in eggs?

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During the 1990s there was a drastic decline in egg consumption in the developed world. This was due to concerns about the high cholesterol content of eggs, which stemmed from the perceived effects of cholesterol on coronary heart disease (CHD). In fact blood cholesterol level ranks only about fourth or fifth in the risk factors for CHD. Smoking, excessive bodyweight, lack of exercise, hypertension and stress are other important factors, but publicity about the unproven effects of dietary cholesterol on CHD had a major impact on the sale of cholesterol-rich foods, particularly eggs, even though it has been shown that dietary factors may account for only 25 percent of all causes of elevated blood cholesterol (Narahari, 2003).

A 60-g egg contains about 200 mg of cholesterol. The standard daily recommended maximum intake of cholesterol is 300 mg.

IMPORTANT FACTS ABOUT CHOLESTEROL

There are two not widely known facts: i) cholesterol must be in the oxidized (rancid) form to cause the arterial plaques that lead to partial blockage of the blood vessels; and ii) some forms of cholesterol are beneficial. High-density lipoprotein cholesterol (HDL) protects against heart disease by mopping up circulating cholesterol. The culprit is the low-density lipoprotein cholesterol (LDL) in the oxidized form that narrows or “hardens” the arteries. One way of counteracting this process is therefore to eat foods rich in natural antioxidants.

A third important point is that the fat in eggs is in the unusual form of emulsified oil, almost half of which is made up of healthy monounsaturated fats. This combination probably minimizes the effect of eggs on blood cholesterol.

Cholesterol is not a dietary requirement although it is found in almost every cell in the body, particularly in the brain and nervous tissue. The liver produces up to 2 000 mg per day. Only about 50 percent of dietary cholesterol is absorbed, while the rest is excreted.

INDIVIDUALS MAY RESPOND DIFFERENTLY TO DIETARY CHOLESTEROL

Not everyone responds to dietary cholesterol. There are hypo- and hyper-responders (85 and 15 percent of the population respectively). In one experiment (Elkin, 2006), men and women were given 21 eggs per person per week, amounting to about 640 mg of cholesterol per day. Plasma LDL did not change in the hypo-responders; in the hyper-responder group it increased by a small but statistically significant amount (10 to 15 mg/dL). Given the unrealistically high consumption of eggs in this study (three per day), it is surprising that the hypo-responder group did not also show an increase in LDL cholesterol.

REDUCING BLOOD CHOLESTEROL WITH DRUGS

Statins are a group of drugs that inhibit the enzyme HMG-CoA reductase from converting HMG-CoA into mevalonate – an early step in the synthesis of cholesterol. Given the very wide functions of cholesterol, this could be thought to be a retrograde step, but apparently it is not. Consequently, statins frequently account for a very large share of drug sales, as they are routinely prescribed even for people with only mildly elevated cholesterol, who then often stay on them for life.

CAN EGG CHOLESTEROL BE REDUCED?

Attempts have been made to lower the cholesterol in eggs (Elkin, 2007) by feeding different grains to layers, which may reduce egg cholesterol by about 10 percent. Feeding copper at 125 or 250 parts per million (ppm) can reduce cholesterol in eggs by up to 31 percent. Feeding garlic as a paste at up to 8 percent of the diet may reduce egg cholesterol by as much as 24 percent, but there is wide variation. Other natural products have also shown significant but inconsistent responses. Genetic selection for low and high egg cholesterol has met with little success. Although the cholesterol content of the egg is well in excess of that needed for embryo development, reducing egg cholesterol beyond a certain point can decrease hatchability and/or egg production.

CAN WE REDUCE ABSORPTION OF CHOLESTEROL IN FOOD?

Excess cholesterol is removed from the liver as HDL cholesterol, or largely converted into bile salts, then passed into the ileum, absorbed back into the blood stream and returned to the liver. Some continues to the colon and is excreted as bile acids. Compounds such as insoluble dietary fibre and saponins, found in plants (especially the yucca tree), can bind cholesterol in the small intestine, causing it to be excreted. Fibre also increases the rate of food passage, thereby reducing the opportunity to recycle cholesterol via the lower ileum.

HOW MANY EGGS SHOULD WE EAT?

Nearly half (45 percent) of the public in the United Kingdom still believe that they should be eating a maximum of three eggs a week. A recent article in the British Nutrition Foundation's *Nutrition Bulletin* (2009, 34(1): 66–70) reveals that misconceptions about eggs and cholesterol stem largely from incorrect conclusions drawn from early research.

Many heart and lung health organizations have done a complete turn-about and some have even given eggs the “heart tick” of approval. Although the recommendation of 300 mg of cho-

lesterol per day as the upper level still stands, there is general consensus that one egg a day will do no harm – not that the cholesterol content of the egg has changed in the meantime.

Many nutrition and health advisory bodies may have been influenced by several recent scientific papers, which have dispelled myths around eggs and cholesterol. Australian, Canadian and Irish heart foundations and the British Nutrition Foundation have raised their guideline limits in accordance with recent findings that there is no conclusive evidence to link egg consumption with an increased risk of heart disease.

PUBLIC PERCEPTION OF EGGS IS DIFFICULT TO CHANGE

Concern about a link between cholesterol in eggs and risk factors for heart disease is difficult to dispel. Many people living in developing countries still believe in the dangers of eating eggs, even though they would be the least at risk. Except for the few most affluent people, the staple diet in developing countries is mainly plant-based and contains only small amounts of cholesterol.

CONCLUSIONS

Consumption of one egg per day will have no effect on blood cholesterol; recent research suggests that two per day will also have no significant effect for most of the population. The conclusion is that eggs are not detrimental to human health and that for those in low-income countries, eggs are very important for good health and well-being, and their consumption should be encouraged.

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