



Sylvia R. Karasu M.D.
The Gravity of Weight

"Cholesterolphobia" and Eggs: What Do We Know?

Revisiting the "nutritional certainty" about restricting egg intake

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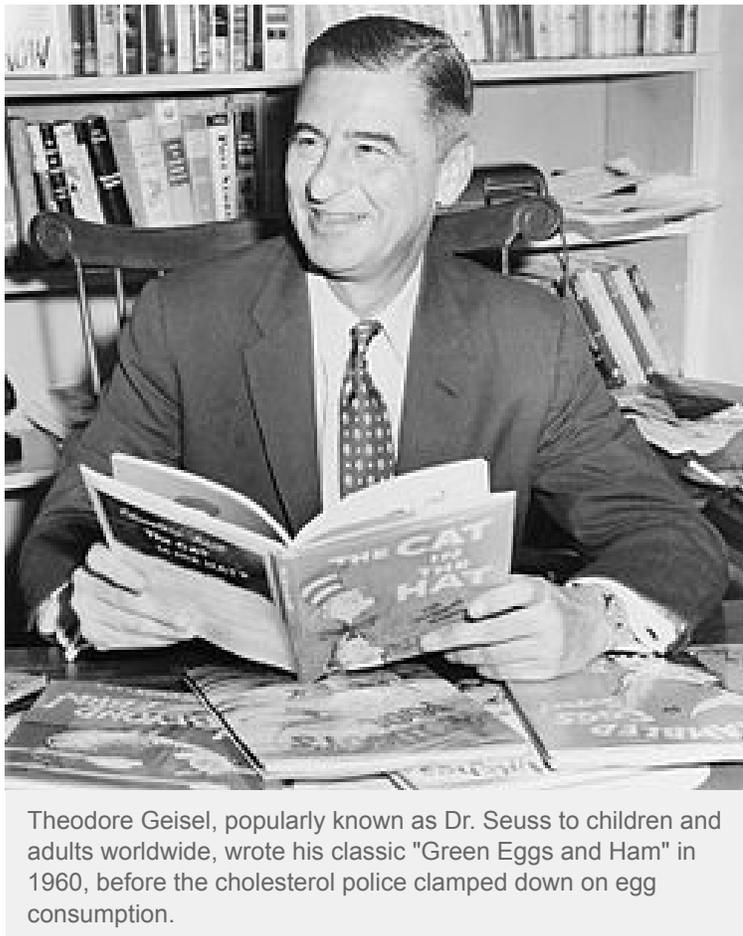
Late 17th century, glazed ceramic egg, made in Turkey but from Armenian culture.

Source: Metmuseum.org/open access for scholars/OASC

Dr. Seuss first published his *Green Eggs and Ham*, about young, oppositional Sam, in 1960.

Had he written his classic in the late 1960s, when organizations like the American Heart Association issued a warning to the public about the dangers of cholesterol, Dr. Seuss might have run into controversy. As the main source of cholesterol in the American diet, the egg, with from 141 mg to 234 mg depending on its size, (Clayton et al, *Nutrition*, 2017) became the target of the food police. The public health mantra became, "Cholesterol in food equals cholesterol in the blood" and leads eventually to cardiovascular disease. (McNamara, *Proceedings of the Nutrition Society*, 2014.)

"Though there was no scientific rationale or justification" for 300 mg/day (and no more than 3 whole eggs per week), other than it was about half of what Americans were consuming at the time, it remains a "mystery" (McNamara, *Nutrients*, 2015) how that specific amount became synonymous with healthier eating. (McNamara, 2014). Adds McNamara (2014), "It has taken 50 years of



Theodore Geisel, popularly known as Dr. Seuss to children and adults worldwide, wrote his classic "Green Eggs and Ham" in 1960, before the cholesterol police clamped down on egg consumption.

Source: Wikimedia Commons/Public Domain

research to undo the effects of those early condemnations and the *cholesterolphobia* much of the world suffered from for decades."

The cholesterol saga "highlights" how researchers can overemphasize the role of a particular nutrient "without acknowledging limitations, uncertainties, and debates over this knowledge" such that information is presented as "nutritional certainty," (i.e., the "myth of nutritional precision.") (Scrinis, *Nutritionism*, p. 31, 2013) Cholesterol levels became an example of a "kind of biomarker reductionism." (p. 41)

What is cholesterol? The National Heart, Lung, and Blood Institute of NIH describes cholesterol as a soft, waxy substance that is one of the lipids (i.e. fats) in the body. It is found in all animal cells and is the precursor of steroid hormones and vitamin D. Further, it is a structural component of cell membranes, including nerve cells, and is found in gall stones. Our body makes its own cholesterol, primarily in the liver, and there is a complex homeostatic system in the body to regulate cholesterol levels when dietary intake is high.

Some people (and animals) are more sensitive to increased intake--called *hyper-responders*--than others--called *hypo-responders*, and it is not clear whether the hyper-responders are more efficient at cholesterol absorption or are not able to suppress their cholesterol pathway sufficiently enough, but there is a strong genetic component. (Beynen et al, *Advances in Lipid Research*, 1987) There is no specific test to determine if you are a hyper-responder other than taking multiple blood samples of cholesterol levels, and it is difficult to substantiate the concept because, unlike in animals, there are no 'inbred strains' and each human, except for identical twins, is genetically different. (Beynen et al 1987) Not only is our



German artist, Georg Flegel, painted "Snack with Fried Eggs," in the 1600s. Staatsgalerie Aschaffenburg.

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There are many different kinds of eggs, most of these not edible by humans. This beautiful photograph had been on a recent cover of "Science." The photograph was taken by Frans Lanting. Used with exclusive and generous permission for scholarly purposes by Frans Lanting/lanting.com.

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cholesterol level determined to some extent by dietary cholesterol but also by our weight, as well as our saturated fat and even fiber intake. Humans, though, are less sensitive to dietary cholesterol intake than some animals (e.g. rabbits or monkeys.) (Beynen et al, 1987) Further, says Ahrens, "...I cannot predict in advance how and by how much any given individual will respond to a given dietary challenge." (Ahrens, *The Lancet*, 1979.)

Cholesterol travels in blood plasma on lipoproteins, which also carry triglycerides and fat-soluble vitamins. Though there are five categories of lipoproteins, the most common are high-density lipoproteins (HDL, often called the 'good cholesterol') and low-density lipoproteins (LDL, often called the 'bad cholesterol.') The ratio of LDL to HDL is more important than total cholesterol.

Though loaded with cholesterol, a large whole egg is a major source of protein (over 6 grams and 18 amino acids); has only 4.76 grams of fat; 27 vitamins, including choline for fetal brain development, vitamin C, and folate; and 10 minerals, including calcium and magnesium. Some even believe eggs have a protective effect against inflammation and atherosclerosis because of their carotenoids and may even decrease the risk of developing cataracts and age-related macular degeneration because of their lutein. (McNamara, 2015; and see Clayton et al, 2017 for a full list of an egg's nutrients.) Further, a small study has suggested that an egg breakfast, as compared to cereal, leads to greater satiety and less food intake (Bailey et al, *FASEB Journal*, 2017) though a comprehensive meta-analysis by Allison and his colleagues has found that randomized controlled



One of the most famous Fabergé eggs, the Imperial Coronation Egg. These eggs were made by the Fabergé Company at the end of the 19th and beginning of the 20th century for the Russian Czars and their families.

Source: wikimedia Commons/Public Domain



Jean-Baptiste Greuze (French, Tournus 1725-1805, Paris.) "Broken Eggs," 1756. (On view at the Met Museum, Fifth Avenue, Gallery 613)

Source: Metropolitan Museum of Art, open access for scholars, OASC)

trials no longer support the general notion that eating (and not skipping) breakfast necessarily leads to greater weight control. (Bohan Brown et al, *FASEB Journal*, 2017; Milanese et al, *FASEB Journal*, 2016)

Given that eggs are so nutritious, how did they become vilified? In those early years, researchers found that both saturated fat and dietary cholesterol raised plasma cholesterol levels and led to heart disease but when dietary fat was eventually factored out, the relationship no longer held. It was Ahrens and his colleagues from Rockefeller University who emphasized that plasma cholesterol levels were more sensitive to saturated fat than dietary cholesterol. (McNamara et al, *Journal of Clinical Investigation*, 1987.)

Some studies, as well, used animal models that did not mimic human responses and often used very high intake of dietary cholesterol so that compensatory mechanisms might have been overwhelmed. Further, they measured total cholesterol rather than LDL/HDL ratios. (McNamara, 2014) Even using different statistical methods led to inconsistencies and methodological flaws in the past. (Nicklas et al, *Journal of Nutrition*, 2015)

Allison and colleagues (Richardson et al, *International Journal of Obesity*, 2017), as well, describe how the success of the anti-smoking campaign led obesity efforts to focus more on public health approaches, "though these policies were not necessarily rigorously evaluated." They acknowledge, "Although we cannot always wait for perfect data to draw strong conclusions about causation," there is clearly a distinction between "*speculative* evidence that may lead to a *policy*



18th century, Attributed to Jean-Baptiste-Siméon Chardin, French, "Still Life with Eggs, Cheese, and a Pitcher." Credit line: John G. Johnson Collection, 1917.

Source: Philadelphia Museum of Art, permanent collection

decision and evidence required for a *scientific conclusion*." Back in the late 1970s, Ahrens had warned, "...if the public's diet is going to be decided by popularity polls and with diminishing regard for the scientific evidence, I fear that future generations will be left in ignorance of the real merits, as well as possible faults in any given dietary regimen." (*The Lancet*, 1979.)

Over the years, many researchers have now accepted that whole egg consumption (one a day) is *not associated* with a risk of cardiovascular disease and cardiac mortality in the general population. Frank Hu and colleagues conducted one of the most thorough prospective studies, including over 37,000 men

and over 80,000 women followed for up to 14 years and reached that conclusion (*JAMA*, 1999), as have systematic reviews and meta-analyses by Kritchevsky and Kritchevsky, *Journal of the American College of Nutrition*, 2000; Shin et al, *American Journal of Clinical Nutrition*, 2013; ; Rong et al, *British Medical Journal*, 2013; Alexander et al, *Journal of the American College of Nutrition*, 2016, among others. Of note is that the 2015-2020 Dietary Guidelines for Americans no longer recommend limiting cholesterol intake to 300 mg/day, but add "individuals should eat as little dietary cholesterol as possible while consuming a healthy eating pattern." (For a discussion, see Clayton et al, 2017 and <http://health.gov/dietaryguidelines/2015/guidelines>.)



Eat the parsley: this enormous ham and cheese omelet, loaded with saturated animal fat, is hardly healthy egg consumption.

Source: istockphoto/JoeGough/used with permission

Bottom line: The scientific literature on the relationship between egg consumption, the major source of cholesterol in the U.S. diet, and the risk of cardiovascular disease, has been confusing and sometimes overtly inconsistent. Research has been complicated because almost all studies use notoriously inaccurate self-reports of dietary intake. Further, there are many confounding factors, such as smoking, weight, hypertension, and other dietary factors (e.g. too much saturated fat or too little fiber intake; size of the egg, its preparation, and many different patterns of use) that are not necessarily taken into account.

What emerges from what we have learned is that eating a whole egg a day (genetic hyper-responders to cholesterol notwithstanding) does not lead to cardiovascular disease in the context of an otherwise healthy diet.

Note: For more on Dr. Gyorgy Scrinis's concept of the "myth of nutritional precision" in his book *Nutritionism*, see my previous blog: <https://www.psychologytoday.com/blog/the-gravity-weight/201311/the-myth-...>

About the Author



Sylvia R. Karasu, M.D., is a clinical professor of psychiatry at Weill Cornell Medical College and the senior author of *The Gravity of Weight*.

In Print: *The Gravity of Weight: A Clinical Guide to Weight Loss and Maintenance*

Online: my own website

