

## Good or Bad Egg

by Ann Gerhardt MD

April 2019

**Bottom Line at the Top: Eggs are a great source of nutrition and deliver few calories. Though eggs' cholesterol may raise blood cholesterol levels of those who eat them, this doesn't occur in a sizable portion of the population.**

Eggs got a bad rap many years ago, when Ancel Keys' studies first linked diet, cholesterol and heart disease. Because egg yolks contain a lot of cholesterol, the medical profession rapidly vilified them. People in the know switched to egg white omelettes, since all the cholesterol is in the yolks.

Umpteen studies attempted to define the number of eggs possible to eat each week without losing cholesterol control. Some studies, however, didn't find an association of egg consumption with either cholesterol levels or cardiovascular disease (CVD)<sup>1</sup>. Study after study of (usually) men of various ages found differing results, especially in cases in which there was no control of the entire diet. In a well-controlled study of healthy 18-19 year-old South African men, three, seven or fourteen eggs per week had no effect on cholesterol levels<sup>2</sup>.

Scientists veered away from the dietary cholesterol focus, leaving behind an assumption that we should all limit dietary cholesterol. Research moved on to dietary saturated fat's major contribution to CVD.

This was good news for seniors, for whom eggs are an easily-prepared and inexpensive protein option. Eggs are a rich source of nutrition, providing protein (about 7 grams per egg), lutein, zeaxanthine, iodine, selenium, molybdenum, choline, biotin and vitamins A, B2, B5, B12, folate, E & D. Lutein and zeaxanthine are carotenoids that protect against macular degeneration blindness.

As early as the 1970s, we knew that our livers *make* cholesterol when we don't consume it, since it is essential for building the body's cells and hormones. The more cholesterol we eat, the less the liver makes,

and vice versa. At least that's the way it's supposed to work, but physiology is neither simple nor uniform.

For a sizable number of people, eating high cholesterol foods does not turn off the liver's cholesterol synthesis. Extra dietary cholesterol bumps up their total and LDL-cholesterol, putting them at risk for CVD. People whose cholesterol level paralleled their dietary cholesterol were called hyper-responders, as opposed to those whose egg intake had no effect on the cholesterol level<sup>3</sup>. I saw hyper-response first-hand in a young man with cholesterol levels in the 250-300 mg/dl range (even while on medication), whose egg consumption of a dozen daily at Easter time transiently catapulted his cholesterol over 500 mg/dl. Unfortunately, we can't predict which people are hyper- and hypo-responders.

The Kuopio Ischaemic Heart Disease risk factor study<sup>4</sup>, observed the risk of Finnish middle-aged men developing diabetes over a 20-year time-span. Those who ate about 7 eggs per week were 38% **less** likely to become diabetic than those who ate fewer eggs. It's unclear why eggs would prevent diabetes, unless eggs contain unidentified protective bio-active compounds, or people who eat more eggs eat less of something else, like perhaps gooey pastries.

The Kuopio study also noted that those who ate more cholesterol did not have higher blood cholesterol levels. The Australian Diabetes and Egg study also found no impact on blood cholesterol, in spite of greater total dietary cholesterol ingestion by men who ate more eggs<sup>5</sup>.

It seems that non-American studies show less of a dietary to blood cholesterol link. Scientists might do better to figure out why Americans fare worse with eggs.

Recent upset: A March 2019 *Journal of the American Medical Association* article lays blame for diet-induced CVD and all-cause death on eggs and dietary cholesterol<sup>6</sup>. The authors pooled data from 6 prior American studies of racially and ethnically diverse populations, using five different diet analysis methods. They applied some assumptions and extensive statistical manipulation to put those studies' data in a consistent format and analyze the various diet factors and confounders using a number of models. Total animal

protein and cholesterol from all sources were significant co-culprits.

They concluded that someone eating 600 mg cholesterol per day incurred a 37% increased risk of CVD and death. That's an average risk, comprised of people who didn't die and those who did. Extrapolating *averages* of dietary consumption and health to *individuals* ignores the fact that each subject contributed a data point falling anywhere from far below to far above the mean. Conclusions based on averages don't apply to outliers, so they don't necessarily apply to you.

Should this one study negate the preceding body of work, which was extensive and convincing enough for the American College of Cardiology and American Heart Association's 2014 Lifestyle Guidelines and the 2015-2020 Dietary Guidelines for Americans to minimize dietary cholesterol's impact on CVD. Is this study truly superior?

The investigators or all six groups collected diet data using self-reported food frequency questionnaires at the beginning of the study, then observed their subjects' health outcomes for up to 31 years. The nutrition community recognizes that these questionnaires are inherently flawed, since people under-report foods they believe to be unhealthy and have imperfect memories for what they eat. Plus, dietary intake at one point in time doesn't truly represent what people *consistently eat* for the next 31 years: Some folk change their diet over time in response to public health recommendations, some choose whatever is on sale at Costco and others zig-zag from one foodie fad to another.

A study of 29,615 people is a lot, but this was no 'study' in a scientific sense. It merely pooled data from others who had just watched these people. There was no randomized, controlled trial, and as such it cannot establish cause and effect. A lot of people who ate eggs didn't suffer from CVD and die, and vice versa.

Public health agencies lump together data to issue guidelines for desirable diets and lifestyles. Those decrees morph over time, depending on new data. On the other hand, current medical thinking advises us to move to "individualized medicine." We are hyper- or hypo-responders to dietary cholesterol and we have widely varying risks of CVD, cancer, diabetes, malnutrition and macular degeneration. Some have access to varied diets, money to pay for them and the wherewithal to prepare them, and some don't.

To truly practice personalized care, we should consider an individual's circumstances and risks and advise accordingly. We could even 'test' the egg hypothesis with the Easter Egg test my patient did: Do one blood lipid panel on a cholesterol-restricted diet and another at least a month after dramatically increasing plain egg consumption, while keeping all other dietary content, exercise, stress levels, sleep, alcohol consumption, tobacco use and weight absolutely the same. If levels soar, temper egg intake. If not, do you prefer over-easy or scrambled?

- 1) Dawber TR, et al. Am J Clin Nutr 1982;36:617-25
- 2) Vorster HS et al. Am J Clin Nutr 1992;55:400
- 3) Beynen AC & Katan M. Atherosclerosis 1985;57:19-31
- 4) Salonen JT, et al. Ann Med 1989;21:227-9
- 5) Fuller NR, et al. Am J Clin Nutr 2018;107:921-31
- 6) Zhong VW et al. JAMA 2019;321:1081-98