

Nutrition Close-Up

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EDITORIAL

Recent anthropologic and clinical research raises questions about egg/cholesterol relationship

Dr. David Katz, MD

Director, Yale-Griffin
Prevention Research center

Medical Correspondent,
ABC News



“Eggsoneration”

Overall, the nutritional properties of eggs are terrific. They are concentrated bundles of high quality protein. They are relatively low in calories, and very low in fat. They can even be enriched with omega-3 fatty acids, depending on what the hens are fed. And, of course, most of us agree they taste pretty darn good.

But, eggs are also a concentrated source of cholesterol. Because of concerns that cholesterol in the diet raises the risk of heart disease, eggs have generally been excluded from heart-healthy diets.

However, two very compelling arguments challenge the need for that approach: science and anthropology.

Let's start with anthropology. From a historical perspective, it just doesn't make sense that dietary cholesterol would be harmful to us, because it has always been a part of our diet. Our ancestors, so the experts tell us, ate eggs, bone marrow, organ meats, and at times seafood (Eaton SB, Eaton SB 3rd, Konner MJ). Paleolithic nutrition revisited: a twelve-year retrospective on its nature and implications. *Eur J Clin Nutr.* 1997 Apr;51(4):207-16). The effects of natural selection would tend to align our metabolism with the nutrient sources on which we relied. So we should be well suited to metabolize dietary cholesterol (Katz DL. Culture, Evolutionary Biology, and the Determinants of Dietary Preference. In: Katz DL with Friedman RSC. *Nutrition in Clinical Practice*, 2nd Edition. Lippincott Williams & Wilkins. Philadelphia, PA. 2008. Pp. 423-433).

“We saw no harmful effects of egg ingestion. Neither endothelial function nor blood cholesterol changed after 6 weeks of daily egg intake.”

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Cholesterol:

A Case of Confusion

By
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 Nutrition Consultant
 and Writer

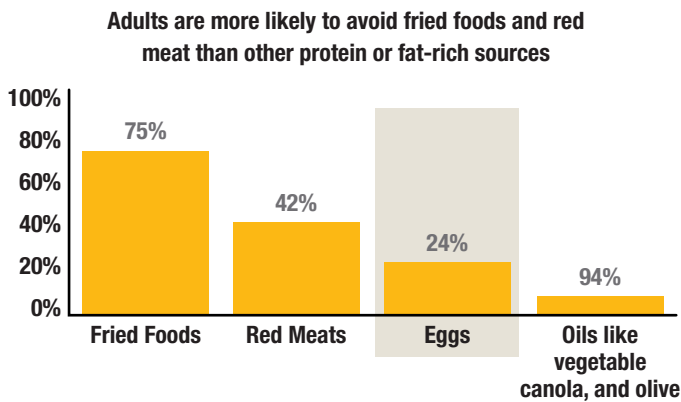


Twenty-five years ago, the National Heart, Lung and Blood Institute launched the National Cholesterol Education Program (NCEP). The goal of the program is to reduce illness and death associated with coronary heart disease by reducing the percentage of Americans with high blood cholesterol.

However, despite long-standing efforts to educate clinicians and the public, qualitative and quantitative research indicates that confusion about cholesterol still exists.

HDL + LDL = Alphabet Soup

While the American public is increasingly familiar with various cholesterol-related terms, many are left scratching their heads about what the terms mean and how to apply them, particularly LDL-cholesterol and HDL-cholesterol.



According to a qualitative study published in the *Annals of Family Medicine*, many focus group participants were perplexed by how something that was generally recognized as unhealthy (total-serum cholesterol) could have aspects that were both “good” (HDL) and “bad” (LDL), with goals for high and low numbers.⁽¹⁾

Research also indicates that people are confused about how to apply those numbers to assess risk. According to a national survey of 500 adults ages 45 and older, nearly half (45 percent) responded that they were “uncertain” which cholesterol numbers best indicate cardiovascular disease, even when given options in a multiple choice format.⁽²⁾ Thirty-two percent of respondents selected the LDL to HDL ratio as the preferred indicator, while 14 percent chose total cholesterol, 7 percent identified LDL-cholesterol and 2 percent identified HDL-cholesterol.

Interestingly, these findings are not in synch with what most health care professionals use when assessing an adult’s risk for heart disease. Based on a quantitative survey of 250 health care professionals, including primary care physicians, obstetricians/

gynecologists and registered dietitians, LDL-cholesterol and HDL-cholesterol were identified as the leading factors used by 77 percent and 71 percent of respondents, respectively.⁽³⁾ Other leading factors used include triglycerides (63 percent), total cholesterol (58 percent) and the LDL to HDL ratio (54 percent).

A Better Understanding of Lifestyle & Dietary Factors

Despite the public’s confusion about what the various lipoprotein numbers indicate, health care professionals and the public seem to be more aligned on the dietary and lifestyle modifications that can best reduce the risk of heart disease. For example, eighty-five percent of clinicians surveyed say their leading recommendations for someone at risk for or diagnosed with heart disease are losing weight and exercising daily, while 77 percent recommend limiting saturated fats.⁽³⁾ Similarly, when given a list of foods, 75 percent of adults identified “fried foods” as the number one food to limit.⁽²⁾

Only 17 percent of clinicians recommend limiting eggs for patients at risk for heart disease, while 24 percent of adults say they would limit them.^(2,3) So despite old nutrition dogma recommending limits on eggs due to dietary cholesterol, both health care professionals and the public seem to be getting the message that eggs aren’t a major culprit when it comes to heart disease. ✨

References:

1. Goldman RE, et al. Patients’ Perceptions of Cholesterol, Cardiovascular Disease Risk, and Risk Communications Strategies. *Ann Fam Med* 2006; 4:205-212
2. *Not All Americans are Clear About the Relationship between Cholesterol and Eggs: Conducted by StrategyOne, on behalf of the American Egg Board.* January, 2006.
3. *2009 Health Care Professional Tracking Study. Conducted by StrategyOne, on behalf of the American Egg Board and Egg Nutrition Center.* January, 2009.

MESSAGES

- Considerable confusion exists amongst the public and clinicians regarding which are the correct surrogate markers that truly assess heart disease risk.
- A majority of adults (45%) are not sure which cholesterol numbers best indicate heart or cardiovascular disease.

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Eggsoneration

The story is quite different for saturated fat and trans fat. There is very little saturated fat in nature, and almost no trans fat. Consequently, there is no evolutionary reason our bodies should be favorably disposed to these nutrients. It thus makes sense that they could exert adverse effects, raising levels of cholesterol in the blood and damaging our blood vessels. The evidence is strong that they do so.

Often, foods high in cholesterol are also high in saturated fat; this is true of both red meat and dairy products. We thus got the impression from examining the effects of such foods on blood cholesterol and heart disease risk that both saturated fat and cholesterol in food were bad actors.

But eggs enable us to separate the impact of these nutrients, because they contain so little saturated fat. Large, epidemiologic studies have shown no association between egg ingestion and heart disease risk (Hu FB, Stampfer MJ, Rimm EB, Manson JE, Ascherio A, Colditz GA, Rosner BA, Spiegelman D, Speizer FE, Sacks FM, Hennekens CH, Willett WC. A prospective study of egg consumption and risk of cardiovascular disease in men and women. *JAMA*. 1999 Apr 21;281(15):1387-94). Short term intervention studies have shown no appreciable effect of daily egg ingestion on blood cholesterol levels either.

And, recently my colleagues and I made our own contribution to this literature. We assigned 50 healthy adults to two eggs daily for 6 weeks, or a bowl of oatmeal daily for 6 weeks, in random sequence with a ‘washout’ period in between. We used an ultrasound technique to evaluate their blood vessels before and after, measuring endothelial function—a measure of blood vessel function. We also measured blood cholesterol levels.

We saw no harmful effects of egg ingestion. Neither endothelial function nor blood cholesterol changed after 6 weeks of daily egg intake. The blood vessel responses were the same following 6 weeks of eggs and oatmeal, although the oatmeal lowered blood cholesterol and eggs did not. (Katz DL, Evans MA, Nawaz H, Njike VY, Chan W, Comerford BP, Hoxley ML. Egg consumption and endothelial function: a randomized controlled crossover trial. *Int J Cardiol*. 2005 Mar 10;99(1):65-70).

You should know our study was funded by the American Egg Board, which is interested in promoting the sale of eggs. But they exerted no influence over the study, its interpretation, or its publication. They supported our work; the rest was up to us. And we were only interested in the truth. We have recently completed a follow-up study of daily egg intake by adults with high blood cholesterol, and found no adverse effects in this group either; a paper reporting these results is currently in press at the *Nutrition Journal*.

Science has not yet fully ‘eggsonerated’ dietary cholesterol, but that’s the general trend. For now, adults with heart disease or risk factors for it should proceed with caution. But I believe healthy adults can reasonably consume up to 6 eggs a week. After a hiatus of more than 20 years, I have re-introduced eggs into my own diet. ✨

Dr. David Katz, Director of the Yale-Griffin Prevention Research Center, is now a Medical Correspondent for ABC News. He is the author of ‘The Way to Eat.’

MESSAGES

- Eggs contain little saturated fat and no trans-fat and unlike foods that have higher levels of these substances, most studies indicate that eggs contribute little to the heart disease risk.
- Studies of Paleolithic nutrition indicate that eggs have always been a staple of the human diet.

Recent research supports the need for this essential amino acid in muscle strength and recovery

By Dave Ellis,
RD, CSCS
Sports Nutrition Consultant
and Writer



Leucine and Tissue Remodeling

The role of protein in supporting growth and gains in lean mass is highly valued by athletes. The “protein-muscle” connection with athletes is as well established as the “you sweat-your drink” paradigm. However the challenge of getting athletes to properly distribute and diversify their protein sources to optimize recovery is not easy. What is emerging in the scientific literature are amino acid profiles of protein sources that seem to impact muscle protein synthesis rate (MPS) post activity and over the course of a day which may have the potential to impact metabolism and body composition outcomes.

“Maybe we need to start looking at net leucine yield from our protein sources at meals as a feeding objective”

One amino acid that has gotten a lot of the attention during the past decade is leucine⁽¹⁾. Leucine-rich peptide sources like whey, egg and soy isolates pack the strongest leucine punch per gram. The richer the leucine content of these protein sources in recovery beverages and foods, the more pronounced the MPS signaling. And that’s good for athletes who routinely endure a great deal of eccentric muscle damage during daily bouts of training or competition.

While data indicating the value of leucine in resolving muscle soreness has been accumulating for almost a decade, there is still plenty of debate regarding the best sources of leucine from intact protein sources as compared to amino acid supplementation, and how much leucine is required post workout and at meals to optimize the process. This is a hot topic in the high level athletic community because NCAA rules dictate “intact” peptides must be used versus amino acids in post workout recovery beverages. There is some evidence that peptide blends that vary from low molecular weight to larger and more complex offer some time-release advantages when formulating post activity recovery beverages^(2,3). While human data as yet fails to provide all the

definitive answers we seek, there is some new animal data that was recently presented at the Experimental Biology Meetings in Anaheim in late April that offers some additional insight on this issue.

In one study⁽⁴⁾, the goal of the research was to determine (in rats) if long-term feeding of protein sources with concentrations of leucine sufficient to stimulate meal responses of MPS would positively influence body composition and muscle mass. The researchers used isocaloric/isonitrogenous whey, egg, soy and wheat protein isolates. For 84 days, rats were fed diets containing 54% carbohydrate, 16% protein and 30% fat with a protein distribution of 4 g breakfast, 4 g lunch and 6 g dinner. The leucine content of the whey protein isolate was 259 mg per day, the egg protein isolate was 210 mg of leucine, the soy protein isolate was 189 mg per day and the wheat protein isolate was 161 mg per day.

The results at week 11 showed protein synthesis and lean mass gains that were consistent with the concentration of leucine between the four protein sources, suggesting that we might need to reevaluate how we rank protein quality if muscle protein synthesis is the desired outcome. Maybe we need to start looking at net leucine yield from our protein sources at meals as a feeding objective in populations experiencing growth, repeated eccentric damage or sarcopenia?

So how much leucine at a meal would be enough in humans? Moulton et al. suggested leucine feed rates at meals appear to be key in the signaling required to accrue lean mass while minimizing fat mass accumulation.⁽⁵⁾

The researchers extrapolated human requirements at each meal to achieve similar anabolic outcomes based on the aforementioned animal data:

Per Meal Leucine Recommendations By Body Weight:

1. 77 lbs = 1 g leucine
2. 154 lbs = 2 g leucine
3. 231 lbs = 3 g leucine
4. 308 lbs = 4 g leucine

While we wait for cross validation of this work, it is apparent that data indicating the need for leucine in the diet to stimulate muscle growth and repair is sound. Further, for most Americans leucine intake at the breakfast meal is poor, and could be improved with better meal choices.

To see how difficult meal planning would be for a 225 pound NFL running back needing at least 3 g of leucine at each meal, visit: www.nal.usda.gov/fnic/foodcomp/search. *

Dave Ellis, RD, CSCS, 2010 Egg Ambassador (www.daveellisbio.com)

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1. Anthony TG, Anthony JC, Yoshizawa F, Kimball SR and Jefferson LS. Oral Administration of Leucine Stimulates Ribosomal Protein mRNA Translation but Not Global Rates of Protein Synthesis in the Liver of Rats. *Journal of Nutrition*. 2001;131:1171-1176.
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3. Kerksick CM, Rasmussen CJ, Lancaster SL, Magu B, Smith P, Melton C, Greenwood M, Almada AL, Earnest CP, and Kreider RB. The effects of protein and amino acid supplementation on performance and training adaptations during ten weeks of resistance training. *J Strength Cond Res* 20(3):643-653, 2006. www.fasebj.org/content/vol24/1_MeetingAbstracts/
4. Eisman L, Norton D, Layman D, Wilson G, Moulton C, Rupassara SI, Garlick P. Leucine contents of isonitrogenous protein sources predict changes in body composition and muscle mass in rats. *FASB J* 2010 24:97.5
5. Moulton C, Norton L, Wilson G, Layman D. When a calorie isn't just a calorie: Isocaloric isonitrogenous diets containing different protein sources produce differential body composition outcomes in rats. *FASB J* 2010 24:220.6

 **MESSAGES**

- Evidence is mounting that shows the value of the essential amino acid leucine in resolving muscle soreness and promoting muscle protein synthesis especially during exercise recovery. Identifying optimal quantities and best sources of leucine is still underway. Rich food sources of leucine include whey, egg and soy isolates.
- Planning for the leucine needs of athletes is especially challenging when one considers the lack of adequate protein sources in the typical American breakfast. Including adequate high quality protein throughout the day helps to meet the challenge of getting enough leucine to support muscle protein synthesis needs.

In recent weeks ENC staff has been monitoring the following nutrition related developments:

April 9, 2010 Institute of Medicine of the National Academies meeting regarding:

Committee on Examination of Front of Package Nutrition Rating Systems and Symbols.

This open session meeting was a look into the variety of front of package labeling approaches currently in the marketplace. Speakers discussed perspectives on international nutrition rating systems and symbols, domestic nutrition rating systems and symbols, concerns about nutrition rating systems and symbols and FDA sponsor perspectives. Following the panel discussions there was time of public comments. The committee met again May 17th, in a closed door session.

April 13-14, 2010 5th meeting of the US Dietary Guidelines Advisory Committee:

Topics discussed included:

- Carbohydrates and Protein
- Fatty Acids
- Energy Balance and Weight Management
- Nutrient Adequacy
- Sodium, Potassium and Water
- Alcohol
- Food Safety and Technology
- Dietary Patterns Discussion

May 12, 2010 6th and final meeting of the US Dietary Guidelines Advisory Committee:

Topics discussed included:

- Energy Balance and Weight Management
- Nutrient Adequacy
- Fatty Acids and Cholesterol
- Protein
- Carbohydrates
- Sodium, Potassium, and Water
- Alcohol Food
- Safety and Technology

A Scientific Report from the committee was issued June 15, 2010 and submitted to USDA for development of the policy statement expected to be released at the end of 2010.

Recent Publications of interest:

- Leidy HJ, Racki EM. The addition of a protein-rich breakfast and its effect on acute appetite control and food intake in 'breakfast skipping' adolescents. *Int J Obs* 2010
- Krebs NF, Gao D, Gralla J, et al. Efficacy and safety of a high protein, low carbohydrate diet for weight loss in severely obese adolescents. *J Pediatr* 2010
- Ratliff J, Leite JO, et al. Consuming eggs for breakfast influences plasma glucose and ghrelin, while reducing energy intake during the next 24 hours in adult men. *Nutrition Research* 30 (2010) 96-103
- Djousse L, Kamineni A et al. Egg consumption and risk of type 2 diabetes in older adults *AJCN*. June 9, 2010, doi:10.3945/ajcn. 2010.29406
- Caudill, M. Pre and Post Natal Health: Evidence of Increased Choline Needs, *JADA*, Aug 2010.

A new trend begins to take shape

Eat Well Eat Clean

By Diane Welland
M.S., R.D.

Nutrition Consultant
and Writer



Teaching people how to eat a healthful and nutritious diet is more than just telling them what to eat and not to eat. It requires a good understanding of each individual's personal dietary preferences, health status, budget, commitment, culinary skill level and lifestyle.

"Clean" eating is a unique approach to nutrition education because it addresses all these issues, plus it has built-in flexibility making it easy to tailor to any kind of client. Furthermore, unlike other types of eating plans which people go on and off of, clean eating is a lifestyle emphasizing regular physical activity and the pleasures of the table along with healthy eating.

- **Don't Drink Your Calories.** Today most of us drink about 21 percent of our total calories, on a 2,000 calorie diet that's more than 400 calories. Health experts say we should be getting about half that amount. Clean eaters zero in on zero calorie drinks, making water their drink of choice. Next in line comes unsweetened tea, low fat or skim milk, 100 percent fruit juices diluted with water or sparkling water.

What are the rewards of eating clean? Aside from keeping you energized, clean eating reduces your risk of heart disease, diabetes and cancer, promotes weight loss, helps control blood

“Clean eating is a lifestyle emphasizing regular physical activity... along with healthy eating.”

The basic core nutrition principles of the diet include:

- **Choosing whole, natural foods and minimizing processed foods.** This means limiting foods out of a box, bag, can or package. Not only does this reduce salt, sugar, fat and calories, it also increases fiber, vitamins and minerals by upping fruit and vegetable intake. The goal here is to start with fresh first.
- **Choosing unrefined over refined foods,** such as adding more whole grains to the diet like millet, brown rice and whole wheat breads and avoiding foods high in added sugars. Natural sugars like honey, maple syrup, date sugar and agave are your "cleanest" options.
- **Striving for naturally balanced meals,** which consist of all three macro nutrients -- protein, fat and carbohydrate. This is particularly important for protein since it is often lacking in most American morning meals and snacks. Eggs are ideal because they are high in protein (approximately 6 grams each), portable, (especially if hard cooked) and easy to eat and digest. "Clean" meals are also naturally low in fat, sugar, salt and calories.
- **Eating small portions** throughout the day amounting to 5 or 6 mini-meals or 3 main meals and 2 or 3 substantial snacks. This prevents people from skipping meals and overeating. It also helps stabilize blood sugar levels keeping energy levels high throughout the day.

sugar levels, blood cholesterol and blood pressure, boosts your immune system, leads to better sleep and cognitive function. Switching from a typical American diet to eating clean rarely happens overnight, it takes time, commitment and patience but the closer you get to achieving this goal the more benefits you will reap. ✨

Diane Welland M.S., R.D. is a freelance writer, teacher and author of "The Complete Idiot's Guide to Eating Clean" © 2009 by Alpha Books.



MESSAGES

- Clean eating is both a diet and lifestyle plan that includes a balanced approach to eating, exercise and environmental concern.
- To receive the health benefits of a clean eating plan, one must strive for inclusion of all three energy yielding nutrients; protein, fat and carbohydrates in small portions throughout the day.

Thanks for your patience, the wait is over!

You can now visit the NEW ENC-online.org website

A detailed re-design for the Egg Nutrition Center website was professionally prepared based on a growing need to host a site for health professionals that presents current scientific research findings related to health and nutrition as they relate to egg intake and the contributions of the egg industry to the advancement of science. The new ENC-online.org website redesign presents this information in a more organized and professional format that allows for better communication.

This updated website design includes new colors, graphics, and logos with improved navigation and search capabilities, making it easier to locate authoritative information. In order to accommodate the latest technologies available, the website was converted to a cold fusion (CFM) format. This programming code is needed to take full advantage of the database technology that enhances the ability to make a more functional and appealing website and enables ENC staff to update content seamlessly through a content management system (CMS).

The Egg Nutrition Center website now includes the following:

- **Archive database for research studies:** a module was built to archive research studies. Data can be searched through the site search tool.
- **Ability to upload images:** provided through the content management system, graphics can be resized and placed on any page of the website.
- **Ability to upload PDFs:** through a document upload module, PDF files can be added as well as other common document files (DOC,RTF...).
- **Ability to upload videos and presentations:** Power Point Presentations (PPT files) can be uploaded through the document upload module and can be linked to from any page. The website allows the ENC staff to upload video files and/or embed files onto the webpage through a third party such as YouTube.
- **Ability to upload audio:** common file extensions (mp3 files, etc...) will be uploaded through the same module as the video files and can be linked to and from any page using the content manager.
- **Internal links:** all internal and external links are managed through the content manager.
- **Events calendar:** the website hosts a calendar tool that lists upcoming events on the homepage. As event dates pass, events will become automatically and dynamically archived.
- **Site search:** an internal search engine can be used to produce results from all documents on the ENC-online.org website including HTML/CFM content pages and all uploaded files (doc, pdf, ppt, etc...).
- **Online form generator:** The ENC-online.org website will offer visitors the ability to subscribe to the Nutrition CloseUp quarterly newsletter as well as order or download ENC educational materials.



We encourage you to take a look at the new and improved www.enc-online.org website and let us know what you think. Let us hear from you if there is information you were unable to locate or if you would like more information on a relevant topic. We welcome your subscription to the quarterly Nutrition CloseUp newsletter (online version available soon) and by next year we hope to have two way communication with you when the ENC blog is launched. We are working hard to be the credible source of health and nutrition information for the incredible egg. ✨



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Check out our **NEW** **ENC-online.org** website!

See our article on page 7.

Credible Science Incredible Egg



Coming Events

Please come meet ENC staff at the following health professional conferences:

Institute of Food Technologists

June 17 - 20, 2010
Chicago, Illinois

Recommended sessions:

IFT Pre-session:
July 16 - 17, 2010
Time: 8 am - 5 pm
Location: Chicago Hilton

Nutrition for the Food Scientist

Sunday, July 18, 2010
Time: 10:30 am - 12:00 pm
Session: #017, Session Room: S501ab

Breakfast is more than timing:

Research shows the importance of high-quality protein in the breakfast meal.

American College of Nurse Practitioners National Clinical Conference

October 22 - 23, 2010
Tampa, Florida

American Dietetic Association Food and Nutrition Conference and Exposition

November 6 - 9, 2010
Boston, Massachusetts

ENC Mission Statement:

ENC is a credible source of nutrition and health science information and the acknowledged leader in research and education related to eggs.

Nutrition Close-Up is a quarterly publication written and produced by the Egg Nutrition Center.

Nutrition Close-Up presents up-to-date reviews, summaries and commentaries focused on the role of diet in health promotion and disease prevention, including the contributions of eggs to a nutritious and healthful diet.

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