

Nutrition Close-Up

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ENC

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EDITORIAL

Mitch Kanter, Ph.D.
Executive Director



Welcome to the “New” Egg Nutrition Center

Okay, I admit that the title of this column may be overstating things just a bit. The Egg Nutrition Center (ENC) is far from new. In fact, it has been in existence since 1984. And over these past 26 years ENC has funded millions of dollars of clinical research, produced countless articles, and supported numerous symposia on many nutritionally relevant topics.

The problem is that very few folks in the health professional community (our primary audience) have been aware of our efforts, and we're aiming to change that. Hence, our claim as the “New” Egg Nutrition Center.

I joined ENC about six months ago. Prior to that time I was vaguely aware of the Center's efforts; I was on the mailing list and received some of ENC's newsletters and publications, but I really didn't know the extent to which ENC supported nutrition science efforts. And, apparently, I wasn't alone. In a recent survey that we commissioned through a public relations agency, we discovered that only 17% of the health professionals we queried (mainly dietitians and physicians) were actually aware that ENC existed. Of those who did know about us, over 70% found the information that we produced to be credible. Not surprisingly, that number dropped among folks who were not as aware of us.

So, to us, this indicated that we were not suffering so much from a credibility problem as we were from a visibility problem. And we realized that this needed to change. Based on these findings, we've decided to go about our business a little differently than we did in the past. We've changed our mission a bit

(you can find our new mission statement elsewhere in this edition of *Nutrition Close-Up*) to reflect the fact that we'd not only like to be seen as leaders in the health and nutrition arena but, more importantly, as acknowledged experts in the science of egg nutrition. We've changed the look and the

“We've got a seasoned, talented, and technically astute staff”

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How Science and Public Health Policy Influence The Way Americans Eat

Amy M. Brownawell, Ph.D.

Senior Staff Scientist, Life Sciences Research Office

US daily dietary recommendations for cholesterol are at odds with international guidelines that provide no specific numerical recommendation, but instead recommend reducing total fat intake and shifting fat consumption away from saturated and trans fats to unsaturated fats. The guidelines of Canada¹; Australia²; the Department of Health, London³; the Scottish Office⁴; and the World Health Organization⁵ place no limit on dietary cholesterol. The rationale provided by the European Heart Network⁶ is typical of countries that have chosen to omit a specific goal for dietary cholesterol:

- *Cholesterol in the diet increases LDL-C levels in the blood, but to a much lesser extent than saturated fat, and the response varies widely among individuals;*
- *Foods high in cholesterol are usually also high in saturated fat, so that reducing intakes of saturated fat should lead to an accompanying fall in cholesterol intakes; and*
- *Although there is some evidence of a specific relationship between cholesterol consumption and cardiovascular disease⁷, no population goal is included because dietary cholesterol intakes in Europe tend to be within the usual population goal of less than 300 mg/d specified by expert groups and consensus documents.*

Conference on Cholesterol

On December 3, 2008 a conference was held in Bethesda, MD to evaluate the scientific data supporting current US nutrition policy recommendations to limit dietary cholesterol and to analyze the consequences of this policy on the eating patterns and health of the US population. *The Conference on Cholesterol: Where Science and Public Health Policy Intersect* was sponsored by the Egg Nutrition Center and cosponsored by the USDA Agricultural Research Service and the American Society for Nutrition. This conference followed the 2006 publication of the Life Sciences Research Organization (LSRO) report *The Scientific Evidence and Approach Taken to Establish Guidelines for Cholesterol Intake in Australia, Canada, the United Kingdom, and the United States*⁸ that served as an organizing principle for the conference.

US Cholesterol Guidelines

Elevated blood total cholesterol and low-density lipoprotein cholesterol (LDL-C) levels negatively impact cardiovascular health. What remains to be proven is the independent effect that dietary cholesterol has on serum cholesterol levels and whether dietary cholesterol can be independently associated

with disease risk. Current US dietary policy is centered on the tenet that dietary cholesterol intake can alter coronary heart disease (CHD) risk, despite the fact that individual response to dietary manipulation is variable. There are 3 primary US authoritative guidelines for the intake of cholesterol: the % Daily Value required by the Food and Drug Administration (FDA) for food labels⁹; *Nutrition and Your Health: Dietary Guidelines for Americans* issued jointly by the Department of Health and Human Services (DHHS) and the US Department of Agriculture (USDA)¹⁰; and The Institute of Medicine's (IOM) Dietary Reference Intake¹¹.

The National Health and Nutrition Examination Survey (NHANES) 2005–2006 reported a mean intakes of 278 mg cholesterol/d in the US; adult females averaged 237 mg cholesterol/d compared to 358 mg cholesterol/d for adult males¹². US guidelines for cholesterol recommend limiting intake of cholesterol to <300 mg/d for the general population and <200 mg/d for individuals with elevated low-density lipoprotein cholesterol. US recommendations to limit intake of cholesterol to <300 mg/d are based on:

- *Studies that show inter-individual response to changes in cholesterol*
- *Early feeding studies that added (not removed) cholesterol to the diet*
- *A majority of studies that examined very high cholesterol intake (>500mg/d)*
- *Meta-analyses that linked blood cholesterol levels and CHD based on changes not only in diet, but also due to smoking cessation and lipid-lowering drugs.*

In the years since US dietary cholesterol guidelines were initiated, research has demonstrated that the dynamics of cholesterol homeostasis and of the development of CHD are extremely complex and multifactorial¹³. In addition to cholesterol and saturated fat, other dietary components affect blood cholesterol levels and CHD risk. These include trans fatty acid and omega-3 and omega-6 polyunsaturated fatty acid (PUFA) intakes, as well as, fruits, vegetables, legumes, and sources of soluble dietary fiber. Increased consumption of omega-3 PUFAs may reduce triglyceride levels; substitution of polyunsaturated fats for saturated fats may reduce total cholesterol levels; and reduced consumption of *trans* fats may help to increase high-density lipoprotein cholesterol levels. Despite the different approaches taken by the US and other countries to reduce cholesterol and saturated fat consumption,

it isn't clear which approach has been most effective in promoting improved public health outcomes.

Towards More Impactful Dietary Guidance

The 2008 *Conference on Cholesterol* attendees suggested that it is perhaps most effective to recommend broader dietary patterns where the evidence for an effect on health outcomes is more direct. Dietary recommendations stated in scientific language are potentially confusing to the general US population. Numerical recommendations (e.g., ≤ 300 mg cholesterol/d) can also cause individuals to focus intently on one component leading to the strict limitation or exclusion of certain foods and the under-consumption of particular nutrients (e.g., choline). Messages based on FDA, USDA/DHHS, and/or IOM recommendations but expressed instead as eat a greater variety of foods (i.e., 'a rainbow on your plate' or 'eat a rainbow every day'), increase fruit and vegetable consumption (e.g., '5 a day'), eat two servings of fish (preferably fatty fish) a week, choose polyunsaturated fats for cooking and food preparation, and eat fewer processed foods may be more tangible for the US population. Improved access to healthy foods (i.e., ability to use SNAP and WIC benefits at farmers' markets), and more choices for those receiving food assistance may also improve food quality. Further education may also inform US consumers that benefits often accompany better eating habits: greater satiety and perhaps, weight loss; improvement of medical conditions, such as diabetes and high blood pressure; and greater energy levels with potential quality of life improvements. *



MESSAGES

- Current US guidelines recommend limiting intake of cholesterol to <300 mg/d for the general population and <200 mg/d for individuals with elevated low-density lipoprotein cholesterol.
- US cholesterol recommendations are at odds with many international guidelines that provide no specific numerical recommendation, but instead recommend reducing total fat intake and shifting fat consumption away from saturated and trans fats to unsaturated fats.
- Dietary recommendations stated in scientific language or as numerical recommendations are potentially confusing to the general US population, and may lead to the strict limitation or exclusion of certain foods and the under-consumption of particular nutrients (e.g., choline).
- Messages based on FDA, USDA/DHHS, and/or IOM recommendations but expressed as:
 - eat a greater variety of foods
 - increase fruit and vegetable consumption
 - eat two servings of fish a week
 - choose polyunsaturated fats for cooking and food preparation
 - and eat fewer processed foods may be more tangible for the US population.

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The Need for

High Quality Protein at Each Meal

by Donald K. Layman, Ph.D.,
Director of Research, ENC

Professor Emeritus
University of Illinois, Champaign Urbana



Protein and amino acids contribute to multiple metabolic roles beyond simple building blocks for new proteins. Dietary protein influences cell signaling, satiety, thermogenesis, and glycemic regulation. Mechanisms for these metabolic outcomes are being unraveled and the true benefits of protein appear to relate to the amount and quality of protein at each meal^{1,2}.

Perhaps the most unexpected of these metabolic roles for amino acids is the role of the amino acid leucine in cell signaling. Cell signaling plays a central role in how cells communicate; how cells regulate critical processes; and how cells interpret their environment. Leucine has been well characterized as a unique regulator of the insulin-mTOR signal pathway controlling synthesis of muscle proteins³.

Nutritionists have long understood that dietary protein provides the amino acids that serve as building blocks for new proteins in the body. This traditional role of protein can be viewed as a “substrate” need for amino acids. Amino acids become the individual beads or links for building a new protein chain. The DNA code is read and translated into a blueprint for assembling amino acids into a new protein. Dietary protein provides a constant supply of new amino acids and once the substrate need is met, the dietary need for protein is satisfied. This concept of minimum substrate need for amino acids is the basis for the current RDA.

“Amino acids become the individual beads or links for building a new protein chain”

During the past decade new research revealed that dietary protein intakes above the RDA are beneficial in maintaining muscle mass and function and in treatment of diseases including obesity, osteoporosis, and sarcopenia. The most recent discovery is the importance of leucine to muscle health and body composition⁴.

Leucine along with valine and isoleucine are essential amino acids that make up the family of branched-chain amino acids (BCAA). These BCAA play important roles in muscle in controlling synthesis of new proteins, regulating glucose use, and providing energy. BCAA are particularly rich in proteins

of animal origin including dairy, eggs and meats. The BCAA are unusual because the body evolved to metabolize them in muscle. The other 17 amino acids in protein are metabolized in the liver, but the liver does not have the enzymes to degrade the BCAA, so they are directed to muscle.

After a meal containing adequate protein, leucine levels increase in the blood 2- to 3-times above fasting blood levels. This increase in blood leucine is recognized by muscles as a signal that the meal contains adequate dietary protein to support synthesis of new muscle proteins. Leucine evolved to serve as an indicator of diet quality.

Current dietary guidelines focus on protein as a percentage of energy intake (ie. 15% total of kcal) and minimize the importance of protein as a central part of every meal. These guidelines have resulted in meal patterns in which adults typically consume over 65% of their daily protein in a single large meal after 6:30 pm⁵. Most adults consume less than 12 g of protein at breakfast⁶ added yet research suggests they require nearly 30 g of total protein or 2.5 grams of leucine to fully stimulate skeletal muscle protein synthesis². This eating pattern with this low-protein-breakfast eating pattern may minimize the impact of dietary protein on muscle health and contributes to chronic loss of muscle mass.

When you wake up your body is in a catabolic state and breaking down lean tissues to release amino acids to be used as fuels. This catabolic condition means that the competing processes of protein synthesis and protein breakdown have shifted to greater breakdown. The catabolic condition continues until the body receives adequate protein and adequate leucine to stimulate synthesis and shift the balance away from breakdown. The shift between anabolic and catabolic periods is a cycling process dependent on protein intake at each meal.

The most unequivocal evidence for the benefit of increased dietary protein at breakfast is derived from studies of weight management^{7,8,9}. Diets with increased protein have been shown to be highly beneficial during weight loss because of their ability to affect body composition. Higher protein diets contribute to an increased loss of body weight and body fat and attenuate loss of lean tissue when compared with commonly recommended high carbohydrate, low fat, low protein diets.

The new understanding about the role of leucine as a regulator of muscle protein synthesis has placed increased importance on the need for high-quality proteins at breakfast. Breakfast is a difficult

meal to balance because of low calorie content. Most breakfast meals contain less than 400 calories which presents a challenge to getting 20 to 30 grams of protein with 2.5 grams of leucine.

To achieve adequate protein at breakfast requires selection of foods with high protein density and high leucine content such as dairy, eggs, and meats. ✨

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MESSAGES

- Leucine is an important amino acid for muscle mass and function.
- Leucine and the other two branched-chain amino acids (isoleucine and valine) are the only amino acids metabolized primarily in skeletal muscle. All other amino acids are mainly metabolized in the liver.
- Animal proteins such as dairy, eggs and meat are high quality proteins and the richest food sources of leucine.
- New research emphasizes the importance of adequate protein at each meal, contrary to the American eating pattern with over 65% of protein in the dinner meal.
- Breakfast may be the most important meal to consume high quality protein. A typical cereal and milk breakfast delivers less than 12 grams of protein of mixed quality. Research demonstrates the need for nearly 30 grams of high quality proteins rich in leucine to protect muscle health.

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Welcome to the “New” Egg Nutrition Center

content of our *Nutrition Close-Up* quarterly newsletter- we plan to have the majority of our articles written by acknowledged, objective health and nutrition experts. And we've become more public and transparent about the types of research that we fund, and the mechanism by which we select projects to fund. We've begun an RFP process that targets all of the top nutrition researchers and research institutions in the country, and we've adopted an NIH-style review process that fully utilizes our Scientific Advisory Panel, a group of content experts from numerous academic and clinical institutions around the U.S.

Egg Nutrition Center



We're proud of the changes we've instituted to-date, but we feel that this is just a beginning. In the future, through vehicles such as social networking, questionnaires, focus groups, etc. we plan to develop more of a dialogue with health professionals, and to learn from folks like you about the sorts of activities ENC should engage in to be seen as more relevant and credible to the health professional community.

We're aware of the fact that many food companies and industry groups have developed their own health institutes, and that a majority of these entities are viewed by health professionals with a bit of a jaundiced eye. Nevertheless, we hope that by creating a dialogue with health professionals, by continuing to produce credible science done by credible researchers, and through our ongoing educational efforts we can continue to garner support for our efforts. As stated above, once folks know about us they tend to believe in our message; now it's incumbent upon us to cast our net a little wider, and to speak a little more loudly about our programs.

We've got a seasoned, talented, and technically astute staff lead by Don Layman, Ph.D., our Director of Research, and Marcia Greenblum, MS, RD, our Senior Director of Education, and we'd welcome your thoughts on how we can improve the programs and materials we produce at any time. Please don't hesitate to contact us via phone or e-mail to provide input or feedback.

Thanks for your ongoing support. I hope you enjoy this quarter's issue of *Nutrition Close-Up*. ✨

Happening at ENC

ENC had a successful exhibit at Primed South February 11-14 where 118 new health professionals were added to the *Nutrition Close-Up* mailing list. Attendees included MDs, RNs, DOs, NPs, RDs and PAs, many of whom stopped by our booth to learn more about the health benefits of including high quality protein sources in the breakfast meal and all the valuable nutrients egg yolks supply. Most attendees were not aware that ENC sponsors over \$1 million per year of scientific research at US academic institutions and were interested in seeing the list of fellowships and grants awarded in 2009. ✨

Menu Modeling to Assess Realistic Diets: A Choline Case-Study

Betsy Hornick,
MS, RD, LDN
Nutrition Consultant
and Writer



As nutritional and health professionals, we often instruct our clients to follow a recommended meal pattern, such as the MyPyramid food patterns, which provide guidance on daily amounts to consume from each food group based on gender, age, and activity level. However, individual choices within each food group will affect overall nutrient adequacy. This is especially important for at-risk populations, such as women of child-bearing age and pregnant women. In these instances more specific guidance in menu planning becomes even more critical to ensure adequate intakes of certain essential nutrients.

Menu modeling is a method for developing and evaluating proposed meal patterns. It can be used to assess meal patterns to ensure they are realistic and practical while also meeting recommended intakes of nutrients. It involves starting with a proposed meal pattern, plugging in realistic food choices, and assessing nutrient adequacy. It can then be used to demonstrate the nutritional impact of changes in food selections. Various modeling exercises were performed to develop the current MyPyramid food patterns and to determine the effects of potential Dietary Guidelines recommendations on overall dietary adequacy.

Menu Modeling for Choline Adequacy

Menu modeling was recently used to assess the adequacy of choline in modeled diets of pregnant women and women of childbearing age to determine whether MyPyramid food patterns meet choline requirements (425 mg/day for adult women; 450 mg/day for pregnant women) for this at-risk population. Emerging evidence has revealed that choline plays a critical role in human health and development throughout the lifecycle, beginning with fetal brain development. One egg supplies 115-125 mg of choline, about one-third to one-half of the daily recommendation. Other foods rich in choline include beef, pork, poultry, milk, and some types of fish.

“Menu modeling was recently used to assess the adequacy of choline”

Menu Development and Analysis

- A total of nine days of menus were developed; three each at calorie levels of 2,000, 2,200, and 2,400 calories per day based the changing calorie needs of women, pre-pregnancy and during pregnancy, using MyPyramid for Moms. See chart on the right for ‘Sample Menu Model.
- A variety of foods were included in the menus to model actual intakes of women. Eggs were included based on typical intakes of 2-3 eggs per week.
- Menus were analyzed using the most recent data from USDA National Nutrient Database for Standard Reference (Release 21). Average choline provided by the menus:
 1. 2,000 calories: 317 mg
 2. 2,200 calories: 381 mg
 3. 2,400 calories: 461 mg

Implications for Practice

Average choline provided by the 2,000 and 2,200-calorie menus were below Adequate Intake (AI) levels for pregnant women, despite including 2 eggs over the 3 days of menus. Choline was also below the AI for women of child-bearing age. This demonstrates that current dietary guidance does not promote adequate daily intakes of choline, especially at the lower calorie intakes for women. However, at the higher calorie level, when 1 egg per day was included in the menus, choline requirements for women and pregnant women were met. The addition of 1 egg to the 2,000-calorie and 2,200-calorie menus would raise average choline in the menus to 360 mg and 423 mg choline respectively.

The calorie, fat, and saturated fat contribution of eggs is relatively small and did not interfere with meeting average nutrient goals in this menu modeling. Average cholesterol in the menus was above the recommended 300 mg per day in the 2,400-calorie menu, but this was also contributed by other foods selected in these menus. An egg substitute product is not an appropriate alternative as choline is found primarily in the yolk.

This menu modeling analysis demonstrated that dietary guidance allowing up to 1 egg per day as part of MyPyramid's Meat & Beans food group would help to promote intakes of choline closer to meeting daily recommendations for this essential nutrient. This is supported by the American Heart Association statement that it possible to include 1 egg per day as part of a heart-healthy diet. ✨

Sample Menu Model:

Choline (mg)

Breakfast:

Scrambled egg, 1 lg	116
1 English muffin	8
2 tsp apricot fruit spread	—
1 cup cantaloupe cubes	12
1 cup latte w/½ cup non-fat milk	19

Lunch:

Grilled ham & cheese sandwich:

1 ½ oz Swiss cheese	7
2 slices 100% whole wheat bread	15
1 oz sliced ham	18
1 tbsp soft margarine	—
1 cup tomato soup	15
1 pear, medium	9

Water

Dinner:

3 oz broiled top sirloin steak	96
1 baked sweet potato, medium	24
1/2 cup green beans	11

Spinach salad:

1 cup baby spinach	5
¼ cup sliced mushrooms	3
1/2 cup mandarin oranges	6
1/2 oz sliced almonds	7
2 tbsp balsamic vinaigrette	—
1 dinner roll, whole wheat	8
2 tsp soft margarine	—
1 cup non-fat milk	38

Snack:

½ cup low-fat fruit yogurt	17
3 graham cracker squares	5

Nutrient totals:

Choline:	438 mg
Calories:	1990
Total fat:	64 g
Saturated fat:	19 g
Cholesterol:	335 mg
Sodium:	2830 mg
Total carbohydrate:	264 g
Dietary fiber:	28 g
Protein:	96 g

Nutrition News

Saturated fats not linked to heart disease:

Research published in the *American Journal of Clinical Nutrition* (Published online ahead of print, doi:10.3945/ajcn.2009.27725) challenges the widely supported theory that saturated fats are detrimental to heart health.

Data collected from almost 350,000 subjects involved in 21 studies over a 5-23 year period indicates that an association between dietary intakes of saturated fat and the risk of either coronary heart disease (CHD), stroke or cardiovascular disease (CVD) cannot be made.

“Our meta-analysis showed that there is insufficient evidence from prospective epidemiologic studies to conclude that dietary saturated fat is associated with an increased risk of CHD, stroke, or CVD,” concluded the researchers, led by Dr. Ronald Krauss from the Children’s Hospital Oakland Research Institute.

Dr. Krauss and his colleagues Drs. Frank Hu, Patty Siri-Tarino and Qi Sun employed MEDLINE and EMBASE databases to identify 21 prospective epidemiologic studies with data to estimate the risk of CHD, stroke, and CVD that could be associated with dietary intakes of saturated fat. The authors make the point that in large prospective studies such as these researchers can adjust for covariates that allow for an evaluation of the effects of a specific nutrient on disease risk. However, factors such as variability in diet patterns over time, nutrition assessment methods and investigator statistical analysis should be considered.

Data from the 347,747 people showed the development of 11,006 cases of CHD or stroke. No link between saturated fat intake and CHD, stroke, or CVD risk was observed, and this did not change when the researchers focused their analysis to consider age or sex, or the quality of the study. Additionally, the researchers make the observation that “existing epidemiological studies and clinical trials support that substituting polyunsaturated fat for saturated fat is more beneficial for CHD risk than exchanging carbohydrates for saturated fats in the diet”. Of note, the researchers also found “publication bias such that significant associations tended to be received more favorably for publication” which may explain why the association between saturated fat and disease risk has been so widely accepted for so long. ✨

The study was funded by the US National Dairy Council, Unilever, and the National Institutes of Health.



MESSAGES

- A large meta-analysis of 21 prospective cohort studies has determined that there is insufficient evidence to associate saturated fat intake with risk of coronary heart disease, stroke or cardiovascular disease regardless of age or sex of the subjects or quality of the study.
- Substituting polyunsaturated fat for saturated fat is more beneficial for reducing coronary heart disease risk than exchanging carbohydrates for saturated fats in the diet.
- Past publication bias that found positive associations between disease and saturated fat tended to be more often accepted for publication.



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serve you better.*
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Credible Science Incredible Egg



Coming Events

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

American Academy of Physician Assistants Annual Conference

May 31-June 2, 2010
Atlanta, Georgia

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 staff will be monitoring scientific developments at the following scientific conferences:

American Heart Association Industry Nutrition Advisory Panel

March 1-2, San Francisco CA

Experimental Biology Conference of American Society for Nutrition

April 23-28, Anaheim, CA

Institute of Food Technology

July 17-20, Chicago, IL

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.

*Writer/Editor:
Marcia Greenblum MS, RD*

Egg Nutrition Center



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