

# Nutrition Close-Up

Egg Nutrition Center



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## EDITORIAL

### Eggs and Evidence-Based Nutrition in the

# Dietary Guidelines for Americans 2010

by Selena Ahmed, PhD  
and Jeffrey Blumberg, PhD  
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The application of evidence-based nutrition to public policy is beginning to result in a positive change with regard to recommendations for egg consumption. Now, based on more than a dozen research studies published in the last decade, the report of the Advisory Committee for the Dietary Guidelines for Americans 2010 (DGAC) states that “overall, the evidence shows that consumption of dietary cholesterol in the amount of one egg per day is not harmful and does not result in negative changes in serum lipoprotein cholesterol and triglyceride levels” and highlights eggs as good sources of high-quality protein and nutrients like vitamin D, choline, selenium, and lutein<sup>[1]</sup>. Nonetheless, based on emerging research from the field of nutrigenomics, there appears to be a marked variation in some persons as hyper- or hypo-responders to cholesterol intake dependent on genetic polymorphisms involved in lipid metabolism and storage. However, no one has yet tried to establish individual dietary or nutrient recommendations based on this type of personalized nutrition information.

Approaches to evidence-based nutrition require a thoughtful consideration of the totality of the research and the coherence of the available results, particularly when the data are limited or inconsistent<sup>[2]</sup>. The DGAC makes a distinction in its recommendation about egg consumption between a healthy population and patients with type 2 diabetes based largely on three observational studies<sup>[3,4,5]</sup> suggesting that a high weekly consumption of eggs is associated with an increase in cardiovascular disease and death. However, potentially confounding these results are the dietary context in which the eggs were consumed, e.g., together with fried bacon or sausage, and the lower prevalence of physical activity found among those eating the most eggs<sup>[6]</sup>. Conclusions from these studies may also be based partly on incorrect assumptions of a linear relation between cholesterol intake and risk of cardiovascular disease<sup>[7]</sup>. Caution is always warranted when data contrasting with observational studies are available from clinical trials. For example, two randomized clinical trials found no untoward effect of eggs in subjects with insulin resistance or diabetes. Knopp et al.<sup>[8]</sup> found feeding four eggs daily for four weeks to healthy subjects who were insulin-sensitive, insulin-resistant, and obese insulin-resistant produced similar effects on lipid profiles and concluded that the dietary management of insulin resistance and obesity should focus more on calories less on restricting fat. Pearce et al.<sup>[9]</sup> found that a high-protein energy-restricted diet high in cholesterol, including two eggs daily for 12 weeks, actually improved glycemic and lipid profiles, apolipoprotein-B concentration, and blood pressure.

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Nutrition Close-Up

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**Consensus of Scientific Opinion on Dietary Cholesterol:**

# Point, Counterpoint

A recent article by Spence et al. (Can J Cardiol. 26:e336-e339) discussed dietary cholesterol and its purported impact on patients with vascular disease. In particular the article singled out eggs as a cholesterol-containing food that patients with CVD should eat sparingly. In response to the article, which primarily cited older references as its sources of information, Dr. Maria Luz Fernandez, a researcher from the University of Connecticut who has published a number of recent papers on the effects of cholesterol and eggs on CVD risk and disease wrote a rebuttal letter to the editors of the journal. Dr. Fernandez's letter will appear in the upcoming issue of the Canadian Journal of Cardiology. A truncated version of her letter follows:

Spence et al. sent a strong message against eggs as the "target food" for dietary cholesterol (DC). The purpose of my letter is to draw attention to the published and well established facts regarding the effects of eggs on health.

A review of the current dietary guidelines for DC reports that the European Union, Canada, India, Korea, New Zealand, etc have no guidelines regarding DC (1). In contrast, there is a consensus worldwide of limiting saturated fat intake. Further, recent epidemiological studies (1) have demonstrated that there is no correlation between egg consumption and coronary heart disease risk, which is not surprising given that:

- 1) Eggs consistently increase HDL maintaining the LDL/HDL ratio (2) even under conditions where LDL is not raised (1);
- 2) Eggs contain lutein, a carotenoid known to protect against macular degeneration (2), oxidative stress, inflammation and atherosclerosis (1);
- 3) Eggs are a good source of choline, a key nutrient for normal fetal development (3), which may also protect against Alzheimer's disease (3);
- 4) Eggs suppress appetite and decrease caloric intake during the next 24 h (1).
- 5) Eggs are nutrient dense and an affordable source of high quality protein (4).
- 6) Decreased egg consumption has been correlated with protein malnutrition in underdeveloped countries.

Spence et al cite a study where the equivalent to 9,500 mg/d of DC (1.25% of diet) increases endothelial dysfunction in mice. Other cited animal studies also used DC challenges not related to human intake. In contrast, egg consumption in humans is not related to detrimental endothelial function.

Dietary recommendations should not be based on eliminating eggs, an excellent source of nutrients and other components that provide benefits that extend beyond nutrition.

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**MESSAGES**

- Most countries around the globe have no guidelines restricting dietary cholesterol intake.
- Research continues to show that eggs supply nutrients needed for health without increasing the risk for coronary heart disease.

## Nutrition News in Brief

Several important nutrition-related events have occurred since the beginning of 2011 and the beginning of 2011 that may influence the definition of a healthy diet:

**January 13, 2011** was when the Department of Agriculture released its proposed rule for Nutrition Standards in the National School Lunch and School Breakfast Programs. This action was based on the October 2009 IOM report “*School Meals: Building Blocks for Healthy Children*” where the committee recommended that the USDA adopt standards for menu planning including:

- Increasing the amount and variety of fruits, vegetables, and whole grains.
- Setting a minimum and maximum level of calories.
- Focusing more on reducing saturated fat and sodium.

While under the current standards school meals must meet standards established in 1995, the proposed nutrition standards for National School Lunch and School Breakfast Programs will attempt to adopt some nutrition recommendations made in the 2000 and 2005 Dietary Guidelines for Americans. The USDA is required to update these standards as part of the *Healthy, Hunger-Free Kids Act of 2010*, which was signed into law by President Obama in December. If approved the proposed USDA rule would:

- Establish the first calorie maximum per day for school meals.
  - For breakfast:**
    - 350-500 calories for kindergarten - 5th grade;
    - 400-550 calories for grades 6th - 8th grade;
    - 450-600 calories for grades 9th -12th grade.
  - For lunch:**
    - 550 to 650 calories for kindergarten - 5th grade;
    - 600 to 700 calories for grades 6th - 8th grade;
    - 750 to 850 calories for grades 9th -12th grade.
- Gradually reduce the amount of sodium in the meals over 10 years, with the eventual goal of reducing sodium by more than half. A high school lunch now has about 1,600 milligrams of sodium. Through incremental changes, that amount should be lowered over the next decade to:
  - 740 milligrams or less of sodium for grades 9th - 12th grade;
  - 710 milligrams or less for grades 6th - 8th grade;
  - 640 milligrams or less for kindergarten - 5th grade.
- Ban most trans-fats, using products where the nutrition label says zero grams of trans fat per serving.
- Increase fruit and vegetable servings; all meals selected by the students would include at least a fruit or vegetable.
- Require all milk served to be low fat or nonfat, and require all flavored milks to be nonfat.
- Incrementally increase the amount of whole grains required — beginning with the goal of making 50% of grain servings

whole and eventually requiring most grains to be whole grains by the school year 2014-2015.

- Improve school breakfasts by requiring schools to serve a grain and a protein, instead of one or the other.

**January 31, 2011** was the day when the US Department of Agriculture jointly with the US Department of Health and Human Services released the 2010 Dietary Guidelines for Americans. The Dietary Guidelines for Americans Policy Document is the federal government’s evidence-based nutritional guidance to promote health, reduce the risk of chronic diseases, and reduce prevalence of overweight and obesity through improved nutrition and physical activity. The new edition of the dietary guidelines sets the following daily limits or targets:

- **Fat intake:** 20% to 35% of total calories
- **Saturated fat:** less than 10% of total calories (mono- and polyunsaturated fats may be substituted)
- **Trans-fats:** less than 1% of calories
- **Cholesterol:** less than 300 mg
- **Fiber:** 14 g per 1,000 calories
- **Potassium:** 4,700 mg
- **Sodium:** less than 1,500 mg for all African Americans and those with hypertension, diabetes, and chronic kidney disease (including children), as well as persons older than 51; everyone else is advised to consume under 2,300 mg of sodium a day.
- **Fruits and vegetables:** at least 2.5 cups
- **Refined grains:** less than 3 oz

Although most of these goals have not changed since the 2005 dietary guidelines, the 2010 guidelines do attempt to interpret these recommendations:

For example, the new guidelines make numerous references to “*solid fats*” – such as butter and trans-fats – as fat sources to be avoided or minimized. It also recommends substituting mono- and polyunsaturated oils for solid fats when possible.

The sodium numbers hardly vary from the 2005 version. The major difference is that the 1,500-mg/day sodium limit for individuals with hypertension or its risk factors was an “*aim*” in 2005 – but has now been promoted to a full-fledged recommendation that the document notes “*applies to about half of the U.S. population, including children, and the majority of adults.*”

Also, the new revision adds diabetes and chronic kidney disease to the list of populations for whom the 1500mg a day lower limit applies. Additionally, the 2010 guidelines appear to raise the age limit for which the lower figure applies. ✨

# The multiple metabolic Roles of Protein for Weight Loss

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With the start of a new year comes everyone's favorite resolution: eat healthier and lose weight. However, this is rarely a one-time resolution. Why does motivation to lose weight dwindle? Often the culprit is use of a fad diet that produces quick results but is not sustainable, or the use of a nutritionally unbalanced diet that leads to frustration or boredom. In either case, the problem is the concept of a "diet". Healthy eating for weight loss and long-term maintenance must become a lifestyle rather than a quick fix. This suggestion can become a reality if you learn one key concept for weight loss: protein.

It's true in order to lose weight there is the simple math of energy balance - consume fewer calories than you burn<sup>[1]</sup>. Naturally your body will rely on its own stores to fill the energy deficit, however in addition to burning fat you will also burn precious muscle tissue. Skeletal muscle is the calorie burning powerhouse of your body; therefore relying on drastic caloric reduction will greatly reduce calorie burning potential. It's a catch 22. Crash dieting is not sustainable and will likely be followed by weight re-gain - all in the form of fat. The path to success lies in a moderate caloric reduction combined with a greater percentage of calories consumed as high quality protein<sup>[2]</sup>.

The quality of a protein is determined by the amount of the amino acid leucine present. Under this qualification, high quality protein sources are of animal origin such as eggs, meats, and dairy. The importance of this lies in leucine's effect on triggering muscle protein synthesis, an essential process for repairing and remodeling muscle and preventing muscle loss. Maintaining muscle can be achieved by consuming 20-30g of high quality protein in at least two meals per day<sup>[3,4]</sup>.

An example may be a three egg omelet with vegetables, a slice of cheese, and toast (400 kcal/29g protein) for breakfast, and a 6oz lean steak with steamed vegetables and small roll (440 kcal/45g protein) for dinner. Eating protein for weight loss doesn't necessitate radical changes. However, it requires a shift in the focus of your meals to the protein source first, and achieving that 25-30g, followed by selecting healthy carbohydrates and fats as peripheral components.

The added benefit of evolving toward protein-focused meals is the satiety and thermogenic effects of high quality proteins. Many studies report that subjects feel fuller, longer with less food following a high protein meal (>30g) than those eating low protein, high carbohydrate meals<sup>[5]</sup>. This effect is most consistently observed when a high protein meal is consumed at breakfast resulting in lower caloric intake throughout the day<sup>[5,6]</sup>.

Recent evidence suggests this effect is due to the leucine content of the protein. In addition to stimulating muscle protein synthesis, leucine has been found to stimulate the hypothalamus- the energy sensing center of the brain- resulting in decreased food intake<sup>[7]</sup>. A further beneficial outcome is increased diet-induced thermogenesis (DIT). Traditionally, DIT is thought to be associated with extra energy required to digest, absorb and metabolize proteins<sup>[8]</sup> but current research suggests it may be due to post-meal stimulation of protein synthesis. Protein is a potent stimulator of DIT accounting for up to 15% of total daily energy expenditure, more than either lipids or carbohydrates<sup>[9]</sup>.

The above principles were put to the test in three human weight loss trials conducted in our weight loss facility. Treatments included 30g high quality protein at each meal and utilized weighed food records and plasma leucine levels to test the effect of protein-based diets on body composition. In the first study, after 10 weeks subjects consuming higher protein diets lost less muscle mass and more fat tissue than those on lower protein, higher carbohydrate diet. The second and third study tested longer-term effects of protein-based diets for 16 weeks and 12 months respectively. In all three cases, the protein diets showed significant improvement in body composition with added improvement in the presence of exercise<sup>[10,11]</sup>.

Numerous methods will always exist for weight loss, but for effective long-term success a great deal of evidence supports adopting a high quality protein-based diet. Protein's effects on muscle health, satiety and thermogenesis are unparalleled by other macronutrients. Incorporating this into a weight management program does not require major overhaul, but rather taking small steps to correct each meal. Most importantly, begin with breakfast to reap the maximal benefits of leucine. ✨

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## MESSAGES

- The path to effective long term weight loss lies in moderate caloric restriction combined with 20-30 grams of high quality protein at breakfast and dinner.
- Leucine, an essential amino acid stimulates muscle synthesis, satiety and increases thermogenesis.

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## Dietary Guidelines for Americans 2010

While finding an egg a day is not harmful and provides important nutrients to most people, the DGAC continues to recommend limiting daily intake of dietary cholesterol to less than 300 mg, the same value originally promulgated by the American Heart Association. For patients with type 2 diabetes or at high risk for heart disease, the DGAC recommends limiting dietary cholesterol to 200 mg per day and egg consumption to two weekly. However, these recommendations do not appear to be based on the available evidence described above or in several critical analyses<sup>[7,10,11]</sup>.

The Dietary Guidelines for Americans 2010 recommend the consumption of satiating, natural whole foods low in calories and dense in nutrients. They also encourage people to do more cooking at home. This advice would appear to point to consuming eggs as part of a healthful diet due to their nutritional attributes, ease of preparation, and affordability. While more research is necessary to identify individuals with genetic profiles or established diseases that might contribute to some untoward outcome from a high egg intake, the scientific evidence available today suggests a high benefit to risk ratio in most all Americans consuming eggs. ✨

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# Differences and Similarities: The DASH Diet vs Mediterranean Diet

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It's almost too good to be true – foods like whole grain pasta, seafood, nuts, fruits, beans and olive oil are not only nutritious and delicious but about as healthy as it gets.

Some experts consider the “Mediterranean diet” – rich in plant foods and monounsaturated fats – to be the poster child for a healthy diet. The Mediterranean diet has long been associated with heart health, longevity and more benefits. Beyond that, it can also be an excellent weight loss plan, as long as you eat in moderation.

The DASH diet – Dietary Approaches to Stop Hypertension— is also considered by experts to be among the healthiest meal plans. In fact, it is the only other specified diet plan used as an example in the Dietary Guidelines as a model for healthy eating for everyone. It was conceived after a research study demonstrated that a diet rich in primarily plant foods could lower blood pressure. Following a DASH plan can lower blood pressure within two weeks and can also be an excellent weight loss plan.

Following either a DASH or Mediterranean diet is an investment in good health. “*The Dash and Mediterranean diets provide similar recommendations with their strong base of fruits, vegetables, whole grains and healthier fats from oils and nuts*” says Connie Diekman, MED, RD and author of *The Everything Mediterranean Diet Book*.

## Contrasting the Plans

The macronutrient content of both diets plans were compared along with Omni Heart, Zone, Atkins, South Beach and Ornish in a 2008 study in the *American Journal of Clinical Nutrition*<sup>[2]</sup>. Researchers analyzed seven day meal plans to assess macronutrient composition.

The table presents their findings which includes the macronutrient differences between the DASH and Med diets.

Nutrient	DASH Diet	Med Diet	IOM
Carbohydrates	53%	38%	45-65%
Protein	20%	16%	10-35%
Total Fat	28%	46%	20-35%
Saturated fat	<6%	7%	AHA 7%
Polyunsaturated fat	7%	7%	5-10%
Monounsaturated fat	12-13%	28%	No recommendation
Cholesterol	136 mg/ 2000 calories	337 mg	AHA 300 mg

Source: AJCN 2008

In general, the DASH diet is closer to a high carb, low fat plan whereas the Med diet is more like a low carb, high fat plan.

“Both plans are nutrient rich yet there are striking differences, specifically in types and amounts of carbs, fat, alcohol and protein sources” says Columbia University researcher, Wahida Karmally, DrPH, RD.

## DASH Diet Plan

The DASH diet eating plan lowers blood pressure, cholesterol and promotes weight loss when consumed in combination with physical activity.<sup>[6]</sup>

One of the primary features of the DASH diet is consuming less sodium (1500-2400 mg/day) and fat (of all kinds) while eating more plant based foods, less poultry, fish, nuts and very small amounts of red meat, sweets and sweetened beverages.

Most DASH plans are based on the standard reference 2000 calorie diet (<http://www.dashdiet.org/default.asp>) including:

- 4-5 servings fruits
- 4-5 servings vegetables
- 2-3 servings low fat or non fat dairy
- 7-8 servings grains
- 2 or less servings of lean meat, poultry or fish
- 4-5 servings nuts, seeds, beans per week
- 2-3 servings fats and oils
- <5 servings of sweets per week

Eggs are not typically eaten on the DASH diet but Karmaly says there is room at the table for them. “Eggs have lots of good nutrition; excellent source of protein, lutein, iron, vitamin D and low in saturated fat” she says. It is noteworthy that eggs are now lower in cholesterol from 220 mg down to 185 mg per large egg. According to the AHA, an egg a day is OK for healthy adults.

## Mediterranean Diet Plan

There is no one Med diet, instead it is a dietary pattern of fresh, seasonal, less processed and healthy foods – dependent on the country of origin. Generally, most plans emphasize a plant based diet with moderate amounts of dairy (not necessarily low fat), a broader selection of protein sources, plenty of heart healthy monounsaturated fats and alcohol. Portion sizes and number of servings are provided in general terms.

The basic Mediterranean diet pattern as defined by the nonprofit organization, Oldways in conjunction with the Harvard School of Public Health scientists (<http://www.oldwayspt.org/mediterraneandiet>).

**Eat sparingly:** meats and sweets

**Small portions:** poultry, eggs, and dairy (daily-weekly)

**Twice weekly:** fish and seafood

**Daily:** fruits, vegetables, grains (preferably whole), beans, seeds, nuts, legumes, herbs, spices, and olive oil

**Alcohol:** moderation

Evidence is compelling for both plans says Harvard's Eric Rimm, ScD, "People are driven by what they like to eat and some may find the broader range of foods, flavors and availability of the Med diet preferred over the DASH plan."

A recent study in the *British Medical Journal* <sup>[4]</sup> suggests the health benefits of the Med diet come primarily from moderate consumption of alcohol, low consumption of meat and meat products and high consumption of vegetables, fruits, nuts, olive oil and legumes. The overall dietary pattern and lifestyle were also credited.

Additionally, the Mediterranean lifestyle includes leisurely dining, family enjoyment and regular physical activity.

### Research on the Health Benefits of DASH and Mediterranean Diets

Both plans have been extensively researched and are highly recommended. Emerging research suggests the benefits go beyond heart health and longevity and include reduced risk of chronic diseases such as diabetes, cancer, dementia and Alzheimers.<sup>[7]</sup>

Studies show that calorie-controlled diets rich in plant foods, healthy fats, and lean protein – like the Mediterranean diet – are a nutritious formula for weight loss. A study in the *New England Journal of Medicine* found that a Mediterranean diet was as effective as a low-fat diet for losing weight and also offered some metabolic benefits.

Two different studies showed that both plans can improve cognitive function when combined with exercise. A 2010 study in the journal *Hypertension* shows the DASH diet improved brain function by 30% as well as lowered blood pressure and weight loss in overweight adults. And a study in the August 2009 *Journal of the American Medical Association*, suggests people who follow a Med diet have slower age-related mental decline.

Recent studies show both diets reduce the risk of colorectal cancer with the DASH diet plan being more effective. The DASH plan with a higher intake of whole grains, fruit, and vegetables; moderate amounts of low fat dairy and lower amounts of red or processed meats, desserts, and sweetened beverages was associated with a lower risk of colorectal cancer.<sup>[1]</sup>

A study in the January 2011 *Diabetes Care* found Med diets without calorie restriction were effective in the prevention of diabetes in people at high cardiovascular risk.<sup>[3]</sup>

### Bottom Line

Both diets come highly recommended by nutrition experts because of the health benefits associated with plans that are based on a wide variety of nutrient rich healthy foods. Nutrient rich eggs can fit nicely within the guidelines of both diets and provide an excellent source of high quality protein, vitamin D, vitamins, minerals, lutein and a lower dose of cholesterol.

Each offers an exciting and adventurous plan due to the many wonderful flavors from plants. But it takes time and effort in the kitchen and careful portion control says Karmally, "adding more of the foods from either plan is an excellent way to improve diet quality but be careful to control portions to avoid weight gain and undermine the healthfulness of the plan."

Beyond the healthy profile of each diet is compliance – diets need to be tailored to the individual so they are an enjoyable and sustainable way of eating. ✨

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### MESSAGES

- Both the DASH and Mediterranean diets provide health benefits based on including a wide variety of nutrient rich foods.



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American Egg Board

## Credible Science Incredible Egg



### Coming Events

ENC staff will be speaking at the following health professional conferences:

#### Experimental Biology

April 9 - 13, 2011  
Washington, DC

*Mitch Kanter PhD, George Rothblat PhD,  
Penny Kris-Etherton PhD, David Katz PhD,  
and Maria Luz Fernandez PhD*

#### Ohio Dietetic Association

April 7 - 8, 2011  
Columbus, OH

*Mitch Kanter PhD*

#### Texas Dietetic Association

April 7 - 9, 2011  
Houston, TX

*Marcia Greenblum MS, RD and  
Neva Cochran MS, RD*

#### South Carolina Dietetic Association

April 15, 2011  
Greensboro, SC

*Mitch Kanter PhD and  
Marcia Greenblum MS, RD*

ENC staff will be exhibiting at the following health professional conferences:

#### American Academy of Physician Assistants-Impact 2011

May 30 - June 4, 2011  
Las Vegas, NV

#### Primed New York

June 16 - 18  
New York, NY

#### American Academy of Family Practitioners

September 14 - 17, 2011  
Orlando, FL

#### Food and Nutrition Exhibition and Conference (ADA)

September 24 - 27, 2011  
San Diego, CA

#### American College of Nurse Practitioners: 2011 National Clinical Conference

October 5 - 9, 2011  
Denver, CO

### 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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