

Nutrition Close-Up

Egg Nutrition Center



Fall 2015

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SPECIAL FEATURE

Should people with diabetes eat eggs?

By Jill Weisenberger, MS, RDN, CDE, FAND



The egg is one of those nutrient-dense foods that generates a lot of debate about its healthfulness. Because eggs are high in cholesterol, which has historically been linked to cardiovascular disease (CVD), healthcare professionals have long discouraged their patients from eating too many eggs. The warning to limit them, especially the cholesterol-rich yolk, is frequently delivered louder and stronger to people with diabetes because their risk of developing heart disease is quite high.

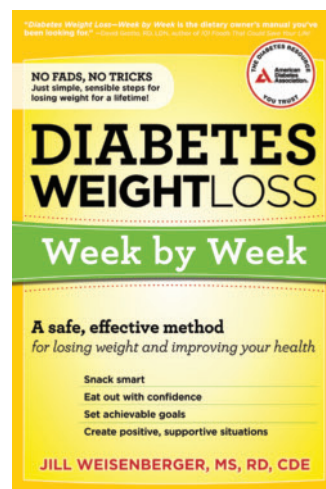
Recently the American Heart Association (AHA) and the American College of Cardiology stated that there was not enough evidence to confirm that dietary cholesterol increases low-density lipoprotein (LDL) cholesterol and CVD risk.¹ On the heels of that acknowledgement, the Dietary Guidelines for Americans Committee recommended removing cholesterol as a nutrient of concern.² These actions have registered dietitian nutritionists, diabetes educators and other healthcare professionals wondering if they can now fully embrace regular egg consumption for their patients with diabetes. To answer this question, I delved into the research. This is what I've learned.

Epidemiological studies

Perhaps the earliest association between egg consumption and increased CVD risk among people with diabetes was found by Hu et al. and published in 1999.³ They looked at nearly 120,000 men and women

enrolled in the Nurses' Health Study or the Health Professionals Follow-up Study. Using food frequency questionnaires at baseline and every two years, they classified egg consumption into five groups: less than 1, 1, 2-4, 5-6, 7 or more eggs per week. They found no association of egg intake and coronary heart disease (CHD) or stroke, except among the 5,309 subjects with diabetes. The researchers' subgroup analysis showed that the consumption of at least seven eggs weekly doubled the risk of CHD among people with diabetes compared to those eating less than one egg weekly. Other researchers have addressed the link between eggs and CVD among people with diabetes. Some, but not all, have found an association.

In general, a limitation of population-based studies is the inability to determine cause and effect. Would the results differ if the researchers could account for more dietary factors? For example, on some plates, eggs keep company with wholesome fruit and whole-grain toast or oats. On other plates, eggs sit atop buttery biscuits and sausage



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Underfueling: are we taking weight loss too far?

By Pamela Hernandez, CPT

The *Female Athlete Triad* is most often associated with high school or collegiate athletes, but its symptoms can affect women of any age who engage in high levels of physical activity and eat a very low-calorie diet in an attempt to lose weight. The triad is defined by the combination of three conditions, according to the American College of Sports Medicine:¹

- A pattern of disordered eating
- Amenorrhea or oligomenorrhea
- Decreased bone mineral density

Women who are not competitive athletes may not even be aware that they are at risk for these conditions when pursuing weight loss with popular dieting methods and extreme exercise programs. Undereating with or without high levels of intense physical activity can potentially lead to *Female Athlete Triad* as well as nutritional deficiencies, muscle loss, and other health risks.² They can also undermine the intended long-term goals of weight maintenance and good health.

For example, one popular dieting technique is to eliminate certain food groups, like grains, dairy or fruit. However, these foods provide necessary vitamins, calcium, fiber and phytonutrients to the diet. Juicing is also another popular weight-loss trend that can leave the female fitness enthusiast without the necessary protein and fat to repair muscles, support hormone production, and utilize fat-soluble vitamins like vitamin D. All diets that limit caloric intake under the resting metabolic rate risk sacrificing lean muscle tissue.²

Personal trainers, group fitness instructors, and other fitness professionals need to be on alert for these conditions and behaviors in their clients. While nutrition may not be within the scope of practice for all fitness professionals, health professionals can comfortably encourage several behaviors to help prevent the undesirable effects of overtraining and underfeeding in female athletes.

- **Highlight all the benefits of exercise, not just the calories burned.** For overall wellness, activity should be seen not as a means to an end but the goal itself. By turning the focus away from earning food (i.e., burning the calories in a coveted food) or reaching a certain number of calories burned, we can start to redefine the relationship many women have with food and exercise. Fitness professionals should emphasize the benefits of gaining strength or stamina, increasing energy, and mood improvements that come from regular physical activity. They should also explain the benefits of rest and recovery as part of a balanced fitness program.
- **Focus on the types of foods clients should eat instead of those to avoid.** Creating a list of “off limits” foods creates a good/bad food dichotomy and encourages a reward or punishment relationship with exercise. Clients may also start to skip meals entirely when faced with a “bad choice.” Instead, help her develop strategies to make choices that align with her health goals.
- **Promote a balance of macronutrients at each meal with an emphasis on colorful and natural foods.** Fruits and vegetables are a very important part of a healthy diet but so are protein and fat. The Dietary Guidelines for Americans 2010³ recommends 35 to 55% of daily caloric intake from a combination of protein and fat. Asking clients to create a plate that is roughly two-thirds fiber-rich carbohydrates (like vegetables, fruits and beans) and one third lean protein (like eggs, Greek yogurt and tuna) coupled with healthy fats (like avocado, almonds and olive oil) can help them reach energy needs while providing essential nutrients.

Whether she is training for a sport or not, every female who engages in physical activity is an athlete. In helping her train for life and create a healthy balance between food and exercise, fitness professionals must listen for the signs of undereating and overtraining. We should make it clear that short-term results at any cost are not part of the path to a healthy and fit life.

Pamela Hernandez is an ACSM Certified Personal Trainer and ACE Health Coach. She runs Thrive Personal Fitness in Springfield, MO and is the author of the book “The 4 Keys to Real Fitness.” Her goal is to empower women with fitness and help them take control of their lives by taking control of their health.

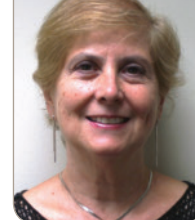
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- Undereating with or without high levels of intense physical activity can lead to *Female Athlete Triad*, as well as muscle loss and other health risks, which undermine the intended goals of good health.
- Physical activity should be seen not as a means to an end but the goal itself. Fitness professionals should emphasize the benefits of gaining strength, stamina, and increasing energy



Eggs and diabetes: perspectives from clinical studies

By Maria Luz Fernandez, PhD

There is a consensus, derived from clinical interventions and epidemiological data over the last 10 years, that eggs do not increase the risk for heart disease in healthy populations.¹ It has been demonstrated that eggs: 1) increase both LDL cholesterol (LDL-C) and HDL cholesterol (HDL-C), therefore the LDL/HDL ratio, a key marker of coronary heart disease risk, is maintained; 2) increase the large, less atherogenic LDL particle, known to transport additional antioxidants, in addition to being preferentially removed by the liver; 3) increase the large HDL, a particle that plays a major protective role by removing accumulated cholesterol from macrophages and transporting it back to the liver to be targeted for elimination from the body.² Thus these established facts support the consensus of the lack of effect of eggs in increasing heart disease risk in non-compromised subjects.

However, uncertainty exists regarding the effects of egg consumption on heart disease in diseased populations with a major emphasis in individuals diagnosed with type 2 diabetes (T2D). While the evidence derived from epidemiological data is controversial,¹ there are very few controlled clinical interventions that have been carried out to date to evaluate a cause and effect relationship.

Randomized clinical trials, the gold standard for dietary or drug interventions, can provide a more comprehensive

picture on the effects of daily egg consumption on plasma lipids, glucose metabolism, and inflammation in people with T2D. Preliminary studies support the fact that egg intake can reduce inflammation in subjects with metabolic syndrome who are at great risk for diabetes. When compared to egg substitute (lipid-free eggs), whole egg intake resulted in significant decreases in serum amyloid A, an acute phase inflammatory factor associated with HDL, and tumor necrosis factor- alpha (TNF- α), suggesting that eggs have protective effects against inflammation.³

Three trials conducted in diabetic patients have been reported in the last three years.⁴⁻⁶ One of the trials was a randomized crossover study in which two different breakfasts, either 1 egg/day or 1 cup of oatmeal/day, were consumed for 5 weeks each with a 3-week washout before allocation to the alternate treatment.⁴ When plasma lipids and parameters of glucose metabolism were compared between breakfasts, no changes in LDL-C, triglycerides, glucose, glycosylated hemoglobin or number of small LDL particles were different between groups. In contrast, TNF- α and AST (a liver enzyme) were reduced during the egg period.⁴ Another study following a randomized parallel design in which either 2 eggs or lean meat (equivalent in calories) within the context of a high protein-energy restricted diet were fed to T2D patients for 12 weeks, significant decreases were observed in plasma total cholesterol in all subjects, possibly related to weight loss.⁵ However, only the subjects eating the eggs had significant increases in HDL cholesterol.⁵ Finally, in a third study involving T2D patients, subjects were divided into two groups consuming either 12 eggs or 2 eggs/week for 3 months.⁶ No differences in plasma lipids were observed between these two groups, confirming that increased egg consumption does not unfavorably alter plasma lipids in subjects with diabetes.⁶

A summary of the findings from these studies is presented in Table 1.

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- It has been demonstrated that eggs increase both LDL cholesterol and HDL cholesterol, therefore maintaining the LDL/HDL ratio, a key marker of coronary heart disease risk.
- Preliminary studies support the fact that egg intake can reduce inflammation in subjects with metabolic syndrome, who are at great risk for diabetes. When compared to egg substitute (lipid-free eggs), whole egg intake resulted in significant decreases in serum amyloid A, and tumor necrosis factor- alpha, suggesting that eggs have protective effects against inflammation.

Table 1

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Experimental Design	# of Subjects eating eggs	# Eggs per week	Duration	Plasma Lipids	Glucose Parameters	Inflammation	Ref.
Randomized Crossover with <i>oatmeal</i>	29	7	5 weeks	↔	↔	↓ TNF- α AST	4
Randomized Parallel with <i>lean meat</i>	31	14	12 weeks	↔	↔	ND	5
Randomized Parallel with <i>variations in number of eggs</i>	66	12	12 weeks	↔	↔	ND	6

For patients with renal disease, egg yolk is gold

By Bev Benda, RDN, BCC



While working as a Registered Dietitian in outpatient renal dialysis, I overheard a nephrologist advise a patient: “We need to get that albumin up. Eat lots of eggs. Just make sure you don’t eat the yolk!”

When I arrived, the patient met me with a scowl: “I’m confused! You told me I could eat the entire egg, and the doc just told me I have to toss the yolk! Who am I supposed to listen to?”



What to do when the dietitian’s advice conflicts with that of the physician? Before I tell you how I handled it, let us review the role of eggs as a food for patients, especially those with renal disease:

- A large egg has about 6 grams of protein, 40% being in the yolk. The protein in an egg is complete—it contains all of the essential amino acids—and is highly utilized by the body due to its high biological value.
- Eggs are among the top foods recommended to increase serum albumin, one of the key markers of nutrition status. Patients with renal disease often struggle to achieve a normal serum albumin level, which is also associated with increased morbidity and mortality of these patients.¹
- Eggs continue to be one of the least expensive sources of protein despite recent price increases. August 2015 USDA data showed egg prices at \$0.49 per two-egg serving, compared to \$0.85 for a 4 oz. boneless chicken breast, and much less expensive than lean ground beef at \$1.91 per 4 oz. cooked serving.²

- Eggs are versatile and easy to prepare, making them a practical menu choice.

Although eggs are high in protein, their yolks are high in cholesterol, which many may think would be of concern to patients with renal disease, as they often are comorbid with heart disease. However, research shows little evidence of adverse effects of daily egg intake on cardiac risk factors for adults with coronary artery disease.^{3,4} We must also be reminded that saturated fat—not dietary cholesterol—has the greatest dietary impact on raising blood cholesterol.⁵ One large yolk contains 1.5 grams of saturated fat. More salient factors that influence elevated cholesterol are family history, age, gender, weight, physical activity, and stress.⁶

Additional benefits of the egg yolk for renal patients include the antioxidants lutein and zeaxanthin, which play a role in preserving eye health.⁷ This is relevant for renal patients affected by retinopathy, macular degeneration, and other eye disorders. Other valuable nutrients in the yolk are vitamins A, D, and E, choline, and riboflavin.

Science aside, the perspective of the patient is also a consideration of paramount importance. When patients are told not to eat something, they may perceive it as one more “loss” renal disease inflicts upon them. I have heard patients, particularly the elderly, say, “If I can’t eat the yolk, why bother buying eggs at all?” They do not wish to waste food, nor do they want the deprivation of losing the great taste of the yolk.

If you are wondering how I handled the conflicting information given by the nephrologist:

1. I caught up with the nephrologist to discuss my earlier conversation with the patient. I offered to share research backing my nutrition advice. The nephrologist reviewed the patient’s labs and agreed with my assessment.
2. I informed the patient that I had discussed the value of egg yolks with the nephrologist, and yes, due to the patient’s low albumin, we agreed he could eat yolks without restriction. I also showed the patient his cholesterol level, which was within normal limits, for additional reassurance.

What would you have done if you had been faced with this situation? I urge you to stand by the research and share updates with your health care team. “Tossing the yolks” is not a valid recommendation based on current research. Furthermore, keep in mind that any nutrition advice we give patients needs to be practical as well as evidence-based. After all, using the entire egg is not only nutritious, it is a

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- Egg yolks provide multiple benefits for patients with renal disease.
- Current research on cholesterol supports use of the entire egg for patients with coronary artery disease, which is a common comorbidity of renal disease.
- The health care team shares a common obligation to keep its members abreast of current egg research. This promotes consistent and accurate messaging to patients.

Experts still searching for solution to obesity crisis

By Dave Madsen



Overweight and obesity (OW/OB) now present a major global health problem and challenge—a “pandemic.”¹⁻⁴ The CDC estimates that 35% of adults in the U.S. are OW or OB,⁵ while 17% of children are affected.⁶ The global picture is similar: 37% for adults (mean, both genders); for children 13% and 23% in developing and developed countries, respectively.²

The problem, of course, has multiple causes and multiple consequences, all of them negative. The health burdens are alarming: in 2010 OW/OB was estimated to have caused 3.4 million deaths globally, 3.9% years of life lost, and 3.8% of Disability-Adjusted-Life-Years (DALY – a measure of quality of life).² The financial costs are staggering; the estimated annual medical cost of obesity in the U.S. was \$147 billion in 2008 U.S. dollars.⁵

- The causes of OW/OB continue to be heatedly debated at all levels and in many ways. Some of the more prominent proposed and purported causes include: sugared foods and beverages, processed foods, sedentary lifestyles, altered intestinal flora, environmental toxins, genes, caloric imbalance, and declining rates of breastfeeding (“breastfeeding protects against obesity,” some say). The sum total of these may be referred to as our “obesogenic environment.”³

Those in the field have called for urgent action and leadership, expressing such notable concerns as:

- “There are no exemplary populations in which the obesity epidemic has been reversed by public health measures.”³
- “Little progress has been made beyond acknowledging that there is a worldwide problem with far-reaching consequences for health and wellbeing.”⁸

This all sounds dire. What is being done in response, and to what extent? International organizations have issued recommendations for policies to turn things around.



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- An estimated 35% of adults and 17% of children in the U.S. are overweight or obese, which accounted for obesity-related medical costs of approximately \$147 billion in just one year.
- A thorough review of recently enacted programs designed to reverse obesity trends showed that restricting or banning certain foods can be effective; while adding health information to menus, or opening a new supermarket in the community, proved ineffective.
- Assuming personal responsibility for weight management is basic and critical, but difficult and challenging in America where high-calorie foods are widely available and heavily marketed.

“There are no exemplary populations in which the obesity epidemic has been reversed by public health measures.”

- The World Health Organization has published a Global Action Plan.⁴
- Lobstein et al.⁹ recommended policies to promote healthy growth and household nutrition security, more physical activity, consumption of nutrient-dense foods, and to restrict marketing to children.
- Swinburn et al.¹⁰ proposed that an improved food environment requires strengthened “accountability systems.” The authors go on further to suggest, “several non-regulatory mechanisms (e.g., quasiregulatory, political, market-based, and public and private communications) are underutilized; these mechanisms will help strength the difficult step of holding private sector to account for performance.”
- Gortmaker et al.¹ assessed that “the empirical evidence base for effective interventions is limited but growing.” The authors call for involvement of all sectors: government, international organizations, private sector, and civil society. Their proposed policies include improving the food environment and the built environment, securing more funds for prevention and monitoring, and embedding actions into both health and non-health sectors.

In order to implement policies, what specific programs should be implemented at the local and national levels? Mayne et al.¹¹ reviewed more than 1,000 abstracts and 115 papers, arriving at 37 papers as part of their systematic review of studies of the impact of policy and built environment changes on obesity-related outcomes in what they termed “natural experiments.” Measures included nutrition and diet (intake), physical activity, and effects on BMI or weight.

Results were instructive. For nutrition-related outcomes, improvements in the food environment were positive (bans/restrictions on certain foods; altering purchase/payment rules for food stamps). On the other hand, menu labeling with health information, or new supermarkets, were ineffective. Regarding physical activity, positive impacts were seen with improvements in transportation infrastructure

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Should people with diabetes eat eggs?

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gravy. Does the company eggs keep influence cardiovascular health? I would have to think so.

Intervention studies

Several clinical trials show a different view of the health effects of eggs among people with diabetes or prediabetes. For example, researchers in Australia compared the effects of a weight maintenance diet containing two eggs daily for six days per week to a low-egg weight maintenance diet of similar protein content.⁴ Subjects in both groups replaced foods rich in saturated fats with those rich in unsaturated fats. After three months, there were no between-group differences for total cholesterol, LDL-cholesterol, triglycerides, glycemic control, waist circumference or blood pressure. The results of the 12-month data should be available within several months.

In a randomized crossover study, researchers compared the effects of an egg breakfast to an oatmeal breakfast.⁵ People with well-controlled type 2 diabetes consumed either one egg or ½-cup oatmeal as part of a balanced breakfast daily for five weeks. After a 3-week wash-out period, subjects switched to the other breakfast, which was similar in calorie and protein content. The researchers found no meal effect on glucose control, insulin levels or insulin resistance. Similarly, there were no significant differences in body weight, body fat, blood pressure, triglycerides, total cholesterol, LDL cholesterol, high-density lipoprotein (HDL) cholesterol, oxidized cholesterol or apolipoprotein B. However, tumor necrosis factor-alpha, a marker of inflammation, was significantly reduced following the egg period only. Interleukin-6 was borderline significant following the egg period, but there were no between-group differences in C-reactive protein.

Eggs offer solutions

Many of my patients present with several concerns that make eggs an ideal choice. Eggs are affordable and easy to prepare. Even my most cooking-challenged clients can scramble an egg. My older patients, especially, benefit from eggs' lutein because the carotenoid may help protect their vision. Eggs are also easy to eat for those with chewing problems. They are nutrient-dense and a high quality

protein, and low in saturated fat. Most of my clients with diabetes are trying to manage their weight alongside their blood glucose. I encourage moderate amounts of protein at each of their three meals to help minimize muscle loss during weight loss.

There is much to learn about individual differences, how-

“In general, a limitation of population-based studies is the inability to determine cause and effect. Would the results differ if the researchers could account for more dietary factors?”

ever, including those with familial hypercholesterolemia. The prudent course is to closely monitor all CVD risk factors and make dietary changes as warranted.

In August, the American Diabetes Association and the AHA jointly released a scientific statement on the prevention of CVD among people with type 2 diabetes. These two organizations recommend any of several dietary patterns including the Dietary Approaches to Stop Hypertension (DASH) eating plan and a Mediterranean-style diet. They emphasize the importance of consuming a variety of wholesome foods. Given this scientific statement, my review of the research and my professional experience, I am very comfortable recommending eggs as part of a balanced diet rich in fruits, vegetables and other wholesome foods for my patients with diabetes.

*Jill Weisenberger, MS, RDN, CDE, FAND is a registered dietitian nutritionist and certified diabetes educator with a master's of science degree in food science and human nutrition. Her latest book, **The Overworked Person's Guide to Better Nutrition**, offers solutions to everyday food and nutrition problems. Learn more at Jill's website: www.jillweisenberger.com*

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MESSAGES

- In the context of a balanced, wholesome diet among people with type 2 diabetes, egg consumption may reduce inflammatory markers and have little or no effect on lipid levels.
- Eggs are affordable, versatile, easy to prepare, and offer quality nutrition.

Eggs and diabetes

Continued from page 3.

Although it is clear that more clinical trials need to be conducted, evidence from these three dietary interventions is consistent with the fact that egg intake does not alter glucose metabolism or increase the risk for heart disease in patients with diabetes when compared to other foods (lean meat or oatmeal) or with less egg consumption (2 eggs versus 12 eggs/week), supporting the fact that eggs can be part of a healthy diet for individuals with T2D. Further, the additional findings of decreased inflammation in patients with metabolic syndrome³ and diabetic individuals⁴ supports the fact that eggs are a good choice for patients with diabetes.

Maria Luz Fernandez, PhD, is a Professor in the Department of Nutritional Sciences at the University of Connecticut in Storrs, CT.

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Egg yolk is gold

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sensible and healthful solution for patients who need a versatile and affordable meal option. So let us encourage our patients to crack those eggs, and go for the gold!

Bev Benda, RDN, BCC is owner of My Coach Bev, a private nutrition and health coaching business based in Grand Forks, ND. She is also a motivational wellness speaker, blogger, and consultant. Visit Bev at www.mycoachbev.com or email her at bev@mycoachbev.com

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Solution to the obesity crisis

Continued from page 5.

(promotion of cycling, walking). Only one of three studies that directly measured impact on BMI or weight produced a positive effect.

Mayne et al.¹¹ devoted ample discussion to evaluate the quality of reviewed research and how it might be improved. The study designs varied greatly in strength and quality. One serious limitation of most of the studies is that they measured process outcomes, but did not assess ultimate effects on obesity or BMI.

The above deal with higher-level policies? There are numerous proposals for preventing or treating OW/OB: "wonder" products, elaborate diet plans, physical activity promotions, and environmental modifications among them. Some are undoubtedly ineffective, while others may be worthwhile, if we're willing to make the effort. Roberto et al.¹² note that while personal responsibility is basic and critical in the current setting, it is difficult and wearying to fight an unhelpful (obesogenic) environment.

I am heartened by many examples of local and community efforts to address OW/OB. Of great interest is a recent report¹³ on an elementary school district in California that has shown a 5% decrease in overweight children since 2010. A collaboration of policy makers, parents and educators devised a comprehensive health and wellness program to increase physical activity (throughout the school day) and add more fruits and vegetables to lunch menus, leading to tangible results that went well beyond school hours.

David Madsen, PhD, has worked in the nutrition, food and pharmaceutical industries for more than three decades, and occasionally writes on topics of interest in those areas.

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ENC 2015 Fall Calendar

Health Professional Events

Food and Nutrition Conference & Expo (FNCE)

October 3-6, Nashville, TN

Educational Breakfast: *Muscle vs. Fat: The Sarcopenic Obesity Puzzle*

Sponsored by ENC with the Weight Management Dietetic Practice Group on Oct. 4, 6:45-8:00 am

Speaker: Douglas Paddon-Jones, Ph.D., FACSM. The University of Texas Medical Branch.

Osteopathic Medical Conference & Expo (OMED)

October 17-21, Orlando, FL

"Changing Perspectives on Dietary Fat, Cholesterol, and Health: It's Taken a Village,"

Monday, Oct. 19 12:30 - 1:00 pm

Presenter: Tia Rains, PhD, Egg Nutrition Center

American Heart Association Scientific Sessions 2015

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eggnutritioncenter.org

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 produced by the Egg Nutrition Center that presents up-to-date reviews, summaries and commentaries on nutrition for health promotion and disease prevention, including the role of eggs as part of a nutritious and healthful diet.

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We welcome your ideas!

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