



Egg Nutrition Center P.O. Box 738 • Park Ridge, IL 60068

# Credible Science Incredible Egg

## Speaking Events

### Industry Nutrition Advisory Panel, American Heart Association

March 12, 2012 • San Diego, CA

Speaker: M.L. Fernandez, PhD

### American College of Sports Medicine

March 27, 2012 • Las Vegas, NV

Speakers: N. Nichols, CPT and W. Campbell, PhD

### University of Alberta

March 28, 2012 • Banff, Canada

Speaker: M. Kanter, PhD

### VA Family and Consumer Science Association

March 27, 2012 • Roanoke, VA

Speaker: M. Greenblum, MS, RD

### Illinois Dietetic Association Spring Congress

April 20, and May 1, 2012 • Chicago, IL

Speakers: D. Layman, PhD and A. Shlachter, MS, RD, LDN

### New York State Dietetic Association

May 5, 2012 • Chicago, IL

Speaker: M. Greenblum, MS, RD

### American Association of Family and Consumer Science Teachers

June 25, 2012 • Indianapolis, IN

Speaker: M. Kanter, PhD

### IDEA World of Fitness

July 6, 2012 • San Diego, CA

Speaker: M. Kanter, PhD

### School Nutrition Association

July 15, 2012 • Denver, CO

Speakers: A. Shlachter MS, RD, LDN and  
D. Martin, EdS, RD, LD, SNS



## 2012 Coming Events

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

### American College of Sports Medicine

March 27-29, 2012 • Las Vegas, NV

### Collegiate and Professional Sports Dietitians Dietetic Association

May 16-19, 2012 • St. Petersburg, FL

### American Academy of Nurse Practitioners

June 21-23, 2012 • Orlando, FL

### American Association of Family and Consumer Science Teachers

June 25-26, 2012 • Indianapolis, IN

### IDEA World of Fitness

July 5-8, 2012 • San Diego, California

### Food and Nutrition Conference and Exhibit

October 6-9, 2012 • Philadelphia, PA

### American Academy of Family Physicians

October 17-20, 2012 • Philadelphia, PA

## 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.

### ENC Editorial Staff:

*Mitch Kanter, PhD*

*Marcia Greenblum, MS, RD*

*Anna Shlachter, MS, RD, LDN*

Egg Nutrition Center



[eggnutritioncenter.org](http://eggnutritioncenter.org)

# Nutrition Close-Up

Egg Nutrition Center



Winter 2012



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## SPECIAL FEATURE

### Helping Customers Shop for Health: The Emerging Role of the Supermarket Dietitian

By Karen Buch, RD, LDN  
Director, Lifestyle Initiatives,  
Weis Markets



An emerging role for the Registered Dietitian (RD) is to work for a supermarket. *What better place to educate Americans about how to make healthful choices than right at the point of purchase?* RDs can help customers make sense of food labels and health claims, shop on a budget, learn healthful cooking skills and shop for foods that meet specific dietary needs such as gluten-free, heart-healthy, vegetarian, organic, diabetes-friendly or allergen-free. As healthcare costs continue to rise, more shoppers want to maintain their health and are seeking advice to adopt healthier eating habits in an effort to avoid the costs associated with illness.

Staff-size and worksite location can have an impact on the best methods to reach the customer. Speaking as an RD with a limited staff working from the corporate office, I've structured my nutrition programming efforts to maximize outreach to more than 160 stores spanning a five-state region. Since 2003, I've taken a multimedia approach which includes using television, radio, in-store radio, web content, bi-monthly magazines, in-store displays, YouTube, Facebook and Twitter to reach the customer. I also plan community and in-store events, manage a children's nutrition education store tour program, manage associate wellness programming and act as a media spokesperson in the areas of food and nutrition.

There is no standard work setting for the supermarket RD. Beyond the corporate office, some RDs may be dedicated to providing services to a single store or a defined region of stores. A supermarket RD with regional responsibilities may provide nutrition-related services to numerous grocery stores within a particular territory. Duties vary but may include conducting store tours, demonstrating and sampling healthful recipes, meeting with customers individually or in group classes, offering kitchen coaching, conducting trainings for store associates, answering customer questions, developing nutrition education materials and attending local or in-store events, health fairs or screenings. A supermarket RD with an in-store role will provide many of the same services, but his or her time is dedicated to a particular store.

Some supermarket chains employ one, dozens or more than 200 RDs to help their customers make healthier food choices. The Academy of Nutrition and Dietetics (formerly known as the American Dietetic Association) offers a Supermarket sub-group within the Dietetic Practice Group of Food and Culinary Professionals to allow networking and information sharing among the growing number of Supermarket RDs. Membership in this practice group is open to both members of the Academy of Nutrition and Dietetics and "friends" of the organization that simply have an interest in food and culinary pursuits. For more information, visit: [www.foodculinaryprofs.org](http://www.foodculinaryprofs.org).

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By Ann Nowak-Wegrzyn, MD  
 Jaffee Food Allergy Institute, Division of allergy and Immunology, Department of Pediatrics, Mount Sinai School of Medicine, New York, NY

# Baked Egg Improves Egg Tolerance in Egg Allergic Children

Allergy to hen’s egg is the second most common food allergy (after cow’s milk) in young children, estimated to affect 0.5 to 9%.<sup>[1; 2]</sup> Egg allergy is more common in children with atopic dermatitis<sup>[3]</sup> and egg-allergic children have higher risks of allergy to inhalants (e.g., pollen) and asthma. The prognosis is generally favorable, with the majority of mild cases resolving spontaneously by school age. However, in children with multiple food allergies, egg allergy may persist into teenage years.<sup>[4]</sup>

Egg white is the major source of allergens in the hen’s egg and contains more than 20 different glycoproteins; ovomucoid and ovalbumin being the most important allergens in childhood. (Table 1) Ovomucoid, the dominant allergen in egg white,<sup>[3]</sup> is a highly glycosylated protein containing 186 amino acid residues that exhibit trypsin inhibitor activity. In different studies, children with persistent egg allergy had significantly higher specific IgE levels to ovomucoid than children who outgrew their egg allergy. Favorable prognosis was associated with lack or a decline in ovomucoid-specific IgE levels. The importance of ovomucoid in egg allergy may be due to its relative resistance against heat and digestion by proteinases, conferred by strong disulfide bonds that stabilize the protein.

## Effect of temperature on allergenicity of egg white proteins

High temperatures can decrease the allergenicity of some proteins in egg white, cow’s milk, fruits (e.g., apple) and vegetables (e.g., carrot, celery) but not in peanut, tree nuts, fish or shellfish.<sup>[5]</sup>

Children with more persistent egg allergy generate allergic IgE antibodies directed against both the sequential and

conformational epitopes (binding regions) of egg white ovomucoid, whereas children with transient egg allergy generate IgE antibodies predominantly against the conformational epitopes that are susceptible to heating and enzymatic digestion.<sup>[6]</sup>

## Clinical trial of baked egg diet

Currently, the standard therapy for egg allergy is based on strict avoidance.<sup>[2]</sup> However, a hen’s egg is nutritionally valuable and a versatile ingredient used in the cooking of many cultures, including a wide range of manufactured food products. Thus, egg avoidance is difficult and affects the quality of nutrition and life style. We hypothesized that some children might tolerate extensively heated egg products while remaining reactive to regular egg (lightly cooked such as scrambled egg or French toast).

We challenged subjects with suspected egg allergy with a muffin and waffle, each containing 1.3 gm of egg white protein during a physician-supervised oral food challenge.<sup>[7]</sup> The challenge started from a muffin baked at 350°F for 30 minutes, served in 4 doses over 60 minutes. If no reaction developed, the waffle (less than 0.625 inches thick to ensure thorough heating), cooked in a waffle maker at approximately 500° F for 3 minutes was served two hours later. Results showed that sixty four of 117 subjects, mean age of 6.9 years (range; 1.6 – 18.6) tolerated baked egg, 23 tolerated regular egg, and 27 reacted to baked egg. Thus 70% (64 of 91) of children with egg allergy were tolerant to baked egg. Baked egg-reactive subjects had larger skin test wheals and greater egg white, ovalbumin- and ovomucoid-IgE antibody levels as compared with baked-egg-and regular egg-tolerant subjects. Continued ingestion of baked-egg was associated with decreased skin test wheal diameters

**Table 1.** Sensitivity of hen’s egg proteins to high temperature

Allergenic Protein	Clinical Relevance	High Temperature	
		Effect on Molecule	Effect on Molecule
<b>Egg white</b>			
Ovomucoid (Gal d 1)	Major allergen in children	Heat labile	↓
Ovalbumin (Gal d 2)	Most abundant	Relatively heat resistant	↓
Ovotransferin (conalbumin; Gal d 3)		Heat labile	↓
Lysozyme (Gal d 4)	Important allergen in the occupational asthma in the food industry workers (e.g. bakers)	Relatively heat resistant	No effect
<b>Egg yolk</b>			
a-livetin (Gal d 5)	Bird-egg syndrome rhinitis, asthma and egg allergy in bird breeders	Partially heat-labile	↓

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## Helping Customers Shop for Health

Select supermarkets have adopted shelf-tag nutrition navigation programs intended to make it easier for customers to find healthful foods while they shop. One such program, called NuVal, ranks foods based on nutrition quality using a scale of 1 to 100. Another program, called Guiding Stars, uses a system of one, two or three stars to identify foods that qualify as good, better or best nutritional choices. Supermarket RDs teach customers how to use these types of programs effectively as well as train other supermarket staff about the programs.

It is my hope that Supermarket RDs will continue to multiply across the country so that it will become commonplace for Americans to be able to access nutritional expertise in a grocery store setting. To assure that these services continue, it is important to show effectiveness. However, measuring return on investment (ROI) to justify expansion of RD services continues to be a challenge. Developing analytics to prove impact on shopping basket and food choice, cost effectiveness and lasting health benefit is an area of continued focus.

Building partnerships between supermarket RDs and local healthcare providers is an important step. Customers seeking health and wellness advice from a supermarket RD should still maintain regular contact with their entire health care team including physician, physician's assistant, nurse practitioner, pharmacist and specialists for the best continuity of care. Local healthcare providers can also direct patients in their care to take advantage of some of the services being offered by a supermarket RD in a nearby community.

Today, supermarkets are among the best places to learn how to make healthful food choices, get recipe and meal solutions that fit your busy lifestyle, take a healthy cooking class, tour the aisles guided by a nutrition expert to learn the very best food choices in every category or even sit down, one-on-one, for personal nutrition assessment and counseling sessions. These health-related services are becoming a reality in select supermarkets across the country. *Look for them in a grocery store near you!* ✨

and ovalbumin-IgE levels, and increased ovalbumin- and ovomucoid-IgG4 (protective, blocking antibody) levels. Baked egg diet was well tolerated, safe and had no adverse impact on growth and intestinal permeability. Follow up data showed that children ingesting baked egg were more likely (89%) to introduce regular (lightly heated) egg into their diet over a shorter median time compared to children strictly avoiding egg (28%). Children who initially reacted to baked egg also had excellent progress with 60% progressing to baked egg tolerance.<sup>[8]</sup>

### Conclusions

The results of baked egg diet trial indicate that the majority of egg-allergic children can tolerate baked egg and that regular ingestion of baked egg products is well-tolerated and safe. Ingestion of baked-egg by tolerant children is associated with immunologic changes that may accelerate the development of permanent oral tolerance to regular egg. Reactions to baked egg may be severe and tolerance of baked egg does not predict milder reactions to regular egg. ✨

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### MESSAGES

- High temperatures can decrease the allergenicity of some proteins in egg white, cow's milk, fruits and vegetables but not in peanuts, tree nuts fish or shellfish.
- Children who initially reacted to baked egg had excellent progress with 60% progressing to baked egg tolerance.



### MESSAGES

- A supermarket RD's duties may include conducting store tours, demonstrating and sampling healthful recipes, meeting with customers individually or in group classes, offering kitchen coaching, conducting trainings for store associates, answering consumer questions, developing nutrition education materials and attending local education materials and attending local health fairs.

# New Research: Lean Beef in DASH-Style Diet Improves Heart Health

By Shalene McNeill PhD, RD  
 Executive Director, Human Nutrition Research  
 National Cattlemen's Beef Association



The 2010 Dietary Guidelines for Americans highlights the Dietary Approaches to Stop Hypertension (DASH) eating plan as an evidence-based template for a healthy dietary pattern.<sup>[1]</sup> Based on landmark research more than a decade ago<sup>[2]</sup>, the DASH eating plan emphasizes vegetables, fruits, and low-fat milk and milk products; includes whole grains, poultry, seafood, and nuts; and is lower in sodium, red and processed meats, sweets, and sugar-containing beverages than typical intakes in the United States.<sup>[3]</sup> Although initially demonstrated to be effective for lowering blood pressure, the DASH dietary pattern has now been shown to have a beneficial effect on other cardiometabolic risk factors<sup>[4,5]</sup> and cancer risk factors<sup>[6,7]</sup> and as such is recognized as a “gold standard” dietary pattern for an overall healthy lifestyle.

Based on the strength of the evidence, health professionals consistently reference the DASH Eating Plan when counseling clients and providing recommendations for healthy daily diets. Now, a new study published in the January 2012 edition of American Journal of Clinical Nutrition offers evidence for increasing the flexibility of the DASH eating plan by including more frequent servings of lean beef<sup>[8]</sup> and demonstrates that eating lean beef every day, as part of a heart-healthy diet, can improve serum cholesterol levels.

## Research Methodology

“The Beef in an Optimal Lean Diet (BOLD) study: Effects on Lipids, Lipoproteins and Apolipoprotein” conducted by Pennsylvania State University researchers, utilized a randomized, crossover, controlled feeding design to measure the impact of healthy dietary patterns on total and LDL cholesterol levels. Adults with moderately elevated cholesterol levels consumed diets including varying amounts of lean beef in a low saturated fat diet (<7%).

Thirty-six participants (ages 30-65y) were assigned to a treatment order and consumed a total of four diets for five weeks each. The crossover design allowed each participant to serve as his or her own control, reducing any errors associated with biological variation.

The four diets tested in the study were: Healthy American Diet (HAD) as control; DASH; BOLD; and Beef in an Optimal Lean Diet Plus (BOLD-PLUS). The BOLD and DASH diets were both rich in fruits, vegetables, whole grains and low-fat dairy products, however, they differed in their primary protein. The BOLD and BOLD-PLUS diet’s primary protein source was lean beef, such as 95% lean ground beef, top round, and chuck shoulder pot roast, while DASH and HAD also included white meat and plant protein sources. The BOLD diet included an average of 4.0 oz./day of lean beef and the BOLD-PLUS diet included 5.4 oz./day of lean beef. The HAD and DASH diets included 0.7 and 1.0 oz./day of lean beef, respectively.

Details on each of the dietary interventions are as follows:

	HAD	DASH	BOLD	BOLD-PLUS
<b>Calories</b>	2,097 kcals	2,106 kcals	2,100 kcals	2,104 kcals
<b>Protein</b> (% of total calories)	17%	18%	19%	27%
<b>Carbohydrate</b> (% of total calories)	50%	55%	54%	45%
<b>Fat</b> (% of total calories)	33%	27%	28%	28%
<b>Saturated Fat</b> (% of total calories)	12%	6%	6%	6%
<b>Lean Beef</b> (oz./day) (weight before cooking)	0.7	0.7	4.0	5.4

## Research Findings

After following each treatment diet for five weeks, participant's total and LDL cholesterol levels were significantly reduced with the BOLD, BOLD-PLUS and DASH diets compared to the HAD diet. In addition, participants following the BOLD, BOLD-PLUS and DASH diets experienced a 10 percent decrease in LDL cholesterol from the start of the study. The improvements in heart health risk factors seen from the BOLD diets were as effective as those from the DASH and other heart-healthy dietary patterns such as OmniHeart which emphasized plant proteins.<sup>[2, 9]</sup>

Lean beef also uniquely and favorably affected apolipoprotein concentrations; the BOLD and BOLD-PLUS diets significantly reduced apolipoproteins A1 and C-III concentrations compared to the HAD. And, the BOLD-PLUS diet was the only diet that resulted in the favorable response of significantly decreasing apolipoprotein B compared to the HAD.

## Implications

It is well accepted that practical strategies are needed to help people follow and enjoy healthier diets. At a time when most people don't meet the recommendations set forth in the Dietary Guidelines for Americans, it's increasingly important for practitioners to consider dietary preferences, customs and habits to improve compliance with dietary recommendations. Ninety-six percent of American adults report eating beef, so dietary advice that encourages consumption of leaner cuts of beef as part of an overall healthful diet may be more likely to promote positive, sustainable dietary change. The results from the BOLD trial, when considered in the context of the total body of research, provide convincing evidence that nutrient-rich lean beef can be enjoyed every day as part of a diet recommended for improved heart health.

A free full text version of the BOLD study, which was funded in part by America's Beef Farmers and Ranchers through their Beef Checkoff Program, is available at: [www.ajcn.org/content/early/2011/12/13/ajcn.111.016261](http://www.ajcn.org/content/early/2011/12/13/ajcn.111.016261). \*

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## MESSAGES

- Improvements in heart health risk factors seen from the BOLD diets were as effective as those from the DASH and other heart healthy diet patterns.
- The BOLD-PLUS diet, including lean beef, was the only diet that significantly decreased apolipoprotein B compared to the Healthy American Diet (HAD).

# Understanding Cholesterol Metabolism, Eggs and Type 2 Diabetes

*By Professor Peter Clifton MBBS,  
B Med Sci, PhD, FRACP*

*Affiliate Professor of Medicine,  
University of Adelaide Director,  
CSIRO Human Nutrition Clinical Research Unit*



Clinical research on dietary cholesterol and diabetes management is very limited and surprisingly there are only a few clinical intervention trials that have investigated the role of egg consumption in people with Type 2 (T2D) or Type 1 diabetes. A summary of findings include:

## **Efforts to understand a link for diabetes with cholesterol metabolism**

A cellular link of cholesterol to risk of diabetes remains unknown and largely not studied. Two recent studies begin to elucidate differences in cholesterol metabolism in individuals with diabetes, reduced insulin sensitivity, and/or obesity.<sup>[1,2]</sup> In 761 men of varying degrees of glucose tolerance and using blood markers of cholesterol synthesis (ie. blood lathosterol) and cholesterol absorption (ie blood level of the plant sterol sitosterol which we all consume in our diet), investigators found that cholesterol absorption was highest and the body's synthesis of new cholesterol was lowest in adults with normal blood glucose. These findings suggest, that in normal individuals, dietary cholesterol is rapidly absorbed resulting in reduced de novo synthesis of cholesterol in the liver. However, individual with T2D exhibited reduced cholesterol absorption (lower sitosterol amounts in the blood) and greater synthesis (more lathosterol). These findings suggest a link between abnormal insulin metabolism and abnormal cholesterol metabolism. Opposite of T2D, individuals with type 1 diabetes and normal insulin sensitivity appear to have higher absorption and lower synthesis.<sup>[3]</sup>

Obesity appears to further reduce cholesterol absorption with the effects again greater in individuals with T2D or reduced insulin sensitivity.<sup>[1,2]</sup> Obese diabetic individual only absorb about 29% of dietary cholesterol, while obese individuals with normal insulin sensitivity absorb about 48% of dietary cholesterol. Further, obese diabetic subjects with reduced absorption also demonstrate greater cholesterol synthesis. In a small study with 16 obese diabetic subjects, weight reduction of 6 kg increased (or "normalized") cholesterol absorption and reduced blood glucose with no change in total cholesterol.

## **Impact of changes in cholesterol metabolism on CVD biomarkers**

In a study of overweight post-menopausal women, dietary cholesterol had little effect on LDL-C or on total cholesterol (TC) in either insulin-resistant or insulin sensitive women.<sup>[4]</sup> In contrast a 4-week study in insulin-sensitive individuals consuming four eggs per day showed a small increase in non-HDL-cholesterol and inflammatory markers that was not observed in lean or obese insulin-resistant individuals.

However, the differences in CVD biomarkers were not statistically different between groups.<sup>[5]</sup>

The data on cholesterol absorption suggest that obese subjects with T2D should be less sensitive to dietary cholesterol and less sensitive to dietary plant sterols. However, a meta analysis of 5 clinical trials<sup>[6]</sup> involving 7 groups with T2D found the use of sterols significantly reduced LDL cholesterol. These results are exactly the same as those seen in meta analyses of non-diabetic subjects.<sup>[7]</sup> Thus, although people with T2D have lower cholesterol absorption their response of CVD biomarkers to dietary cholesterol appears to be the same as people without diabetes.

Further, our research shows that a high protein energy restricted diet high in cholesterol from eggs improved glycemic and lipid profiles, blood pressure and apo-B in individuals with type 2 diabetes. In total, the statistical association of eggs with risk of CVD in people with T2D derived from epidemiology studies is not evident in intervention trials and suggests that other lifestyle factors may underlie this association.

## **Egg intake during weight loss had no adverse effects on lipids in people with T2D**

We performed a 12 week high protein weight loss study<sup>[8]</sup> in 65 people with T2D or impaired glucose tolerance in which one group was given 2 eggs/day as a source of protein while the other group used 100g lean animal protein in place of the eggs producing a difference of 300mg/d in dietary cholesterol between the two groups. LDL cholesterol did not change in either group despite a 6kg weight loss but HDL cholesterol increased in the egg group by a small (0.36 mg/dl) but significant difference from the non-egg group. ApoB and non HDL cholesterol were reduced in both groups by 4-6% with no significant difference between the groups. Thus in the context of weight loss, dietary cholesterol has no adverse effects on lipids in people with impaired glucose tolerance. Studies still need to be performed in people at a stable weight and also in those with poor glycemic control considering blood sugar was under good control in our study with the average HbA1c of 7%.

## **The epidemiology association of eggs with T2D**

Despite the limited effect of dietary cholesterol on fasting lipids, epidemiology studies have reported that egg consumption of 1 per day is associated with a doubling of the risk of CHD in women and all cause mortality in men with T2D compared with 1 egg per week.<sup>[9,10]</sup> The incidence of diabetes has also been associated with increased egg

consumption.<sup>[11, 12]</sup> These data have not been confirmed in non-American studies and may be confounded by lifestyle and dietary choices of frequent egg consumers. ✨

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#### MESSAGES

- Individuals with T2D exhibit reduced cholesterol absorption and greater synthesis.
- A high protein energy restricted diet, high in cholesterol from eggs, improved glycemic and lipid profiles in individuals with T2D.

## Inform:

Joslin Diabetes Center and the Egg Nutrition Center are discussing collaboration opportunities to develop consumer education materials and professional tools and programs. The focus of the discussion is the promotion of healthy eating for people with diabetes, as well as the promotion of good nutrition and diabetes prevention for children and adolescents. ✨

## Research:

More than 35 letters of intent from university researchers throughout the country were submitted for Egg Nutrition Center's 2012 research grant program. The ENC Scientific Advisory Panel will meet in June to discuss and approve research projects for 2012. In addition, Egg Nutrition Center fellowship program is open to graduate students working on thesis or dissertation research and will be accepting research proposals until March 16, 2012. For more information: [www.eggnutritioncenter.org/docs/fellowship2012.pdf](http://www.eggnutritioncenter.org/docs/fellowship2012.pdf). ✨

## Communicate:

ENC is blogging! Visit Nutrition Unscrambled blog for interesting discussions of up-to-the-moment topics in nutrition at: [www.eggnutritioncenter.org/blog](http://www.eggnutritioncenter.org/blog). ✨

## RESEARCH CORNER

### Are obese individuals more sensitive to high calorie foods?

Circulating glucose levels interact with external food cues to stimulate reward-related brain activity and motivation for food. Obese individuals appear to lack the prefrontal brain activity seen in non-obese subjects. Small reductions in circulating glucose decrease the brain's inhibitory control and could promote overeating. Suggested strategies include minimizing drops in circulating glucose by planning small frequent meals, which may be helpful in reducing the risk of overeating high-calorie foods, particularly in obese individuals. ✨

Page K.A. et al., *The J Clin Invest*, 2011,121(10): 4161-9.

### Is choline intake related to memory loss in aging adults?

This is the first study to look at the association between choline intake and cognitive impairment over time, in a dementia free population. The population included 1391 men and women age 36-83y who completed food frequency questionnaires, neuropsychological tests and brain MRI.

Dietary choline intake is neuro-protective over time and promotes improved cognitive function. Increases in dietary choline intake, ensures adequate acetylcholine concentrations for cholinergic neurotransmission and prevents cell breakdown by preserving phosphatidylcholine within the cell membrane. ✨

Poly, C.et al., *Am J Clin Nutr*,2011,94:1584–91.