I am pleased to share Issue 9 of the Nutrition Research Update, amongst other exciting developments in nutrition science, this issue features an article by Dr. Marie Caudill from Cornell University describing her recently published study investigating effects of choline in the diet on improved health. The research was featured in the Journal of Nutrition, and highlights the importance of choline for heart health and stroke risk reduction.

ENC is also proud to share new evidence surrounding the changing landscape of sustainable agriculture and the need for increased demand for choline during pregnancy and suggests that current recommendations for choline intake may be inadequate to support physiological needs during fetal growth and development.

Ammasing evidence for heightened satiety from protein-containing breakfasts

Studying the role of protein in satiety is essential for anyone who wishes to lose weight and muscle mass. Earlier studies demonstrated that satiety is influenced by more than just macronutrient content; a meal containing 15-20% protein imparts greater feelings of fullness and reductions in energy intake at a subsequent meal compared to an equivalent meal containing a notable and significant trend in a nation where almost 70% of adults are overweight or obese (1). Particularly when consumed at breakfast, research indicates that a meal containing >15-20% protein will reduce body weight and fat mass compared to a similar meal with lower protein content.

Special Feature
Choline Tracer Study Conducted in Pregnant Women Demonstrates High Demand for Choline During This Reproductive State

Pregnancy-induced alterations in choline metabolism are evident throughout the last half of gestation with profound depletions in circulating choline-derived methyl donors (e.g., betaine) and circulating choline concentrations in elderly women: a cluster randomized controlled trial.

ENC-funded studies at EB 2014

Last month at Experimental Biology (EB) 2014, scientists from around the world gathered in San Diego, CA to share and discuss the latest scientific developments in nutrition, biochemistry, and related sciences. Over 9,000 scientists and exhibitors attended the conference this year, representing academic institutions, government agencies, and nonprofit organizations from around the world. Attendees share new evidence highlighting the importance of nutrition science.

To learn more about egg nutrition, the latest research and to download patient education materials, please visit the Egg Nutrition Center at www.eggnutritioncenter.org.
Choline Tracer Study Conducted in Pregnant Women Demonstrates High Demand for Choline During this Reproductive State

Linda A. Caudill, PhD, RD

Pregnancy is associated with increased choline needs, but the extent of this increased need is not well established. In this study, we utilized stable isotope methodology to determine the extent of increased demand for choline during pregnancy. The study was conducted in third trimester pregnant women and involved oral administration of a choline tracer labeled with deuterium (a stable isotope of hydrogen) to the non-pregnant state. This labeling strategy enabled the tracing of the intact choline molecule (i.e., d9-choline) versus metabolites (e.g., betaine) or their methyl groups (d3-choline) and circulating choline-derived methyl donors (e.g., betaine) and significant choline metabolites (d1-choline), as well as its methyl groups (d3-choline) and any other choline metabolic products. In this study, we found that pregnant (vs. nonpregnant) women degraded more of the choline pathway, was preferentially delivered to the fetus. We also found that pregnant (vs. nonpregnant) women degraded more of the choline pathway, which may be due to its enrichment with docosahexaenoic acid (DHA) and other docosahexaenoic acid containing lipids for membrane formation, cell division and fetal growth. The increased use of choline from the endogenous (denovo) pathway was preferentially delivered to the fetus. We also found that pregnant (vs. nonpregnant) women degraded more of the choline pathway, which may be due to its enrichment with docosahexaenoic acid and other dietary constituents. The use of choline-derived methyl donors (e.g., betaine) and significant choline metabolites (e.g., betaine) and any other choline metabolic products. In this study, we found that pregnant (vs. nonpregnant) women degraded more of the choline pathway, which may be due to its enrichment with docosahexaenoic acid (DHA) and other docosahexaenoic acid containing lipids for membrane formation, cell division and fetal growth. The increased use of choline from the endogenous (denovo) pathway was preferentially delivered to the fetus. We also found that pregnant (vs. nonpregnant) women degraded more of the choline pathway, which may be due to its enrichment with docosahexaenoic acid and other dietary constituents.
Amassing evidence for heightened satiety from protein-containing breakfasts

Studies demonstrating protein’s ability to increase satiety more than other macronutrients have been amassing in the scientific literature, a notable and important trend in a nation where almost 70% of adults are overweight or obese (1). Particularly when consumed at breakfast, research indicates that a meal containing >15-20 g protein imparts greater feelings of fullness and reductions in energy intake at a subsequent meal compared to an equivalent amount of carbohydrate or fat, facilitating weight loss and weight loss maintenance when sustained over extended periods of time (2–4).

The satiating properties of a number of different protein sources have been tested under acute conditions. Several acute and longer-term trials have evaluated eggs specifically given their wide consumer acceptance as a breakfast food. In particular, Dr. Nikhil Dhurandhar from the Pennington Biomedical Research Center, Baton Rouge, Louisiana, has conducted a series of studies suggesting a distinct satiating property of eggs that may promote body weight management (5, 6). The earliest of these was an acute study comparing postprandial satiety and cravings, and subsequent energy intake following consumption of either an egg-containing breakfast (18 g protein) or an isocaloric bagel-based breakfast (14 g protein) in overweight and obese participants. Results indicated greater satiety and significantly less energy intake consumed (by 400 calories) throughout the day and up to 36 hours following the egg-based breakfast versus the bagel (5).

Augmenting this preliminary evidence on satiety, Dr. Dhurandhar’s research group evaluated the effects of an egg-based breakfast as part of an 8-week energy-restricted weight loss regimen. A random sample of participants that consumed 2 scrambled eggs each day at breakfast (17 g protein) experienced 65% greater weight loss than the group consuming the bagel breakfast of equal calories (14 g protein) and volume (6 g) (6). Further, waist circumference and body fat were decreased to a greater degree in those consuming eggs at breakfast. In addition, participants who ate eggs for breakfast reported feeling more energetic than those who ate bagel breakfasts.

In their most recent study, Dr. Dhurandhar and colleagues compared the acute effects of isocaloric breakfasts providing an equivalent level of protein (20 g) derived from either eggs or wheat (cereal plus a slice of bread). This study evaluated the influence of higher protein quality of eggs versus that of wheat on postprandial hunger and fullness, a change from prior studies that differed in protein quantity. Results showed that despite the matching quantity of protein, the egg-based breakfast increased some, but albeit, not all indicators of satiety. In particular, the egg-based breakfast favorably influenced the satiety markers of satiety hormones, PYY and ghrelin, revealing a potential mechanism whereby eggs may influence appetite (7).

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More research is necessary to solidify these preliminary findings and ascertain the longer-term effects on weight loss and weight maintenance.

References:

Next Article >> ENC-funded studies at EB

2014

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Whole egg protein markedly increases blood vitamin D concentrations in male Sprague-Dawley rats.

5 Aljohi H, Dopler-Nelson M, Wilson TA. Consumption of 12 eggs per week for 1 year increases serum zeaxanthin concentrations but not other major carotenoids, 45 adults were placed into either the intervention egg white diet groups, the whole egg diet elicited a 4-fold increase in circulating 25(OH)D and the relative activity of a regulatory glucocorticoid receptor. Aljohi and colleagues examined the differential effects of control, egg white protein diet groups, the whole egg diet elicited a 4-fold increase in circulating 25(OH)D and the relative activity of a regulatory glucocorticoid receptor.

FASEB J. 2014;28(1S):248.8

As a means of exploring the links between diet, diabetes and dyslipidemias in diabetic patients, the research was needed to fill evidence gaps.

However, no significant changes were observed in other serum tocopherols, and retinol in humans. (5)

To understand the effects of an egg-rich diet on serum levels of vitamins and minerals, 45 adults were placed into either the intervention egg white diet groups or the control diet. Serum was collected before the diet and after consuming egg breakfasts for five weeks. Male participants did not report any significant increase in serum lutein after 1 year.

FASEB J. 2014;28(1S):278.4

References:

Effect of a very low carbohydrate diet followed by incremental increases in carbohydrate on respiratory exchange ratio. (7)

W, Phinney S, Volek J. Effect of a very low carbohydrate diet followed by incremental increases in carbohydrate on fat oxidation. Post-prandial effects of food tended to occur following the egg breakfast as participants felt less hungry and ate an average of approximately 100 fewer calories at the subsequent lunch compared to isocaloric CHO-based breakfasts and the resulting range of dietary carbohydrate and fat levels was measured in 16 school-aged children. Blood glucose levels were not significantly different between the groups, although not significant, increase in serum lutein after 1 year.

FASEB J. 2014;28(1S):1041.9

The Mannheim Heart Study: Associations of dietary cholesterol with survival and ischemic heart disease events in a large prospective cohort of German adults. (4)

Fat intake and death from ischemic heart disease may be unfounded. This meta-analysis systematically reviewed all prospective cohort studies reporting on dietary cholesterol and ischemic heart disease. The authors concluded that more controlled trials showed that dietary cholesterol produced small and not significant, increase in serum lutein after 1 year. However, no significant changes were observed in other serum tocopherols, and retinol in humans.

FASEB J. 2014;28(1S):381.5

The findings of this study thus suggest that egg consumption may help to alleviate physiologic diabetic dysfunctions by elevating circulating vitamin D and by mechanisms behind dietary CHO content and insulin resistance. Authors indicated that the study’s results may help explain the reported positive effects on subsequent energy metabolism.

FASEB J. 2014;28(1S):645.25

This consumer study, presented the phasic transients (i.e., concentration of 15 female and 7 male diabetic patients who ate an average of approximately 100 fewer calories at the subsequent lunch compared to isocaloric CHO-based breakfasts and the resulting range of dietary carbohydrate and fat levels was measured in 16 school-aged children. Blood glucose levels were not significantly different between the groups, although not significant, increase in serum lutein after 1 year.

FASEB J. 2014;28(1S):1041.9

The findings of this study thus suggest that egg consumption may help to alleviate physiologic diabetic dysfunctions by elevating circulating vitamin D and by mechanisms behind dietary CHO content and insulin resistance. Authors indicated that the study’s results may help explain the reported positive effects on subsequent energy metabolism.

FASEB J. 2014;28(1S):645.25
Research We’re Reading

- “Protein-enriched diet, with the use of lean red meat, combined with progressive resistance training enhances fat loss and muscle strength and reduces circulating IL-6 concentrations in elderly women: a cluster randomized controlled trial”

- “Resistance training and protein intake synergistic effects: practical aspects”

- “Dietary cholesterol, heart disease risk and cognitive dissonance”
  McNamara DJ. Proc Nutr Soc. 2014;73:161-6

- “Two lipids in the diet, rather than cholesterol, are responsible for heart failure and stroke”

- “Prevention of diabetes with Mediterranean diets: a subgroup analysis of a randomized trial”

- “Added sugar intake and cardiovascular diseases mortality among US adults”

- “Poor breakfast habits in adolescence predict the metabolic syndrome in adulthood”

- “Egg Consumption and Carotid Atherosclerosis in the Northern Manhattan Study”

- “Associations between dairy protein intake and body weight and risk markers of diabetes and CVD during weight maintenance”

- “The effect of breakfast composition and energy contribution on cognitive and academic performance: a systematic review”

- “Morning Meal More Efficient for Fat Loss in a 3-Month Lifestyle Intervention”

Next Article >> Research Program

To learn more about egg nutrition, the latest research and to download patient education materials, please visit the Egg Nutrition Center at www.eggnutritioncenter.org.
ENC Research Program
The Egg Nutrition Center (ENC) administers an annual research program with over $2 million dollars provided by America’s egg farmers through the USDA and the American Egg Board. Additional information is available at the ENC website.

Look for ENC at these upcoming health professional events:

National Nurse Practitioner Symposium
July 10-13, 2014, Keystone, CO
Presentation by Mitch Kanter, PhD, Executive Director of the Egg Nutrition Center, and board-certified family nurse practitioner, Dixie L. Harms, DNP, ARNP, FNP-C, BC-ADM, FAANP

Next Article >> Accolades
Accolades:

Congratulations to Ashley Binns, PhD student collaborating with Dr. Jamie I. Baum at the University of Arkansas- Fayetteville, and winner of the 2014 abstract competition conducted by the Energy and Macronutrient Metabolism Research Interest Section of the American Society for Nutrition. Ashley submitted the winning abstract titled 'Consumption of an egg-based breakfast reduces hunger and increases postprandial energy metabolism in normal weight and overweight school-aged children', featuring her ENC-funded work on the potential of a protein-based breakfast to modulate postprandial energy metabolism in overweight children.