The Nurses’ Health Study II, a prospective cohort of female nurses, was initiated in 1989 by Dr. Walter Willett to explore diet and lifestyle risk factors. At the beginning of the study, 18,555 women stated that they wanted to get pregnant and had no prior fertility issues. Over the course of eight years of follow-up, most of these nurses were able to conceive, although 13% had difficulty. By examining detailed data on their diets and lifestyles, it appears that certain dietary behaviors may improve a woman’s chances of conceiving. These dietary behaviors were also found to benefit women with Ovulatory Infertility (OI), the most common cause of female infertility.

Polycystic ovarian syndrome (PCOS) affects 5-10% of women of childbearing age and is one of the leading causes of OI. A strong attribute of PCOS is insulin insensitivity. Insulin insensitivity produces a build-up of insulin and insulin-like growth factor (IGF-1) in the bloodstream. This, in turn, depresses the liver’s production of sex hormone-binding globulin, leading to an increase in the production of free androgens. The result is an overabundance of circulating free testosterone, which inhibits the release of an egg from the ovary.

To increase insulin sensitivity, it is best to consume fiber-rich sources of carbohydrates that are slowly metabolized, as well as eat less rapidly-digestible carbohydrates. Choosing carbohydrates such as vegetables, select fruits, legumes and whole grains can improve hormone cycles that guide ovulation. Additionally, it is important to pair these slow carbohydrates with protein. According to Donald Layman, PhD, eating 25-30 g of protein per meal, especially at breakfast, can enhance satiety, appetite control, and possibly reduce peak insulin response after a meal. Practically, that is substituting a bagel or pastry at breakfast for omelets or yogurt; or including 3-4 ounces of chicken or fish at lunch and dinner.

Fats and fertility

Artificial fats, such as trans fats, can disrupt fertility by increasing insulin insensitivity and inflammation in the body, interfering with ovulation, conception, and early embryonic development. Results from the Nurses’ Health Study II demonstrated that a diet high in trans fat was associated with a greater risk of OI. Even 4 g/day of trans fat, considered to be modest compared to the 6 g/day average intake by Americans, has been shown to have this effect. Putting this into perspective, 4 g of trans fat is equivalent to two tablespoons of margarine, one medium order of French fries, or one doughnut.

Replacing trans fats with monounsaturated and polyunsaturated fats has the opposite effect by maintaining healthy cholesterol levels, easing inflammation, improving insulin insensitivity, and promoting fertility. Foods rich in monounsaturated fats include avocados, eggs, olive oil, and almonds. Polyunsaturated fats, specifically omega-3 fatty acids found in salmon and walnuts, are also beneficial for fertility.

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Nutrition advice is a lot like the stock market. One day our perceptions about a particular nutrient might be “up,” then a new piece of research challenges our understanding about that nutrient and its stock with consumers and health professionals tanks. For example, at various times over the years vitamin E has been hailed as a cure for cardiovascular disease by some experts, but as a causative factor in the potentiation of strokes by others. The inexact nature of nutrition research has a lot to do with the apparent contradictions that often appear in the literature. Because scientists can’t control everything a person eats, the amount of activity they do, what they think, or how they feel, our ability to conduct long-term nutrition research studies is limited. Consequently, we have a less-than-complete understanding of the true benefits and detriments of most nutrients.

And so it goes with macronutrients, the carbohydrates, proteins, and fats that provide us with energy to live and thrive. For the past 50 years or more we have been told that carbohydrates should form the foundation of our diets; that breads, rice, pastas and even simple sugars should comprise at least 60% of total daily caloric intake. Simultaneously, we were told to limit fat consumption, largely because of its relationship with cardiovascular disease; and to “stay the course” with dietary protein even though, as Americans, we were probably consuming too much protein anyway.

To a certain extent, most Americans complied with these recommendations. We cut red meat, dairy, and egg consumption, and increased our intake of starches, fruit juices, and other high carbohydrate fare. Since the early 1950’s our daily cholesterol intake has dropped from about 400 mg/day to the present intake of around 250 mg/day, and total fat intake dropped from around 40% of daily calories to 33% of calories today. On the surface, many would suggest that our dietary patterns have moved in the appropriate direction but, as health and nutrition professionals, most of us know “the rest of the story.” Over the past 40 years, while we’ve cut fat intake and increased carbohydrate consumption, we as a nation have grown much more overweight and obese; the rate of type 2 diabetes has skyrocketed; and overall cardiovascular disease (CVD) risk has not improved much.

So where did we go wrong? Certainly there is plenty of blame to go around. Our ever-more-sedentary lifestyle is surely a factor, as has been the proliferation of fast food restaurants. Then there are food manufacturers who, through technology, can provide tastier high-calorie food options more conveniently.

Further, researchers today are beginning to uncover other factors that will challenge our present beliefs about the foods we eat, and threaten to turn current perceptions of nutrition upside down. For one thing, our understanding about carbohydrates as a main staple of the diet is evolving. Twenty years ago we were encouraged to eat carbs almost with impunity. We lived in a “carbohydrate loading world” in which carbs were not just the domain of the highly physically active, but a health “savior” that was used to replace fats in many processed food applications as well. In hindsight, that didn’t work out so well.

We know now that excessive carbohydrate consumption can not only lead to weight gain, but can also transiently raise insulin levels that may over time lead to insulin insensitivity, metabolic syndrome, obesity, and ultimately to type 2 diabetes. Carb intake can raise triglyceride levels and promote a serum lipid profile consistent with increased CVD risk. And research indicates that carbs are not as satiating as proteins, so our desire to eat again may be greater after a high-carb meal than after a high-protein meal. Further, recent studies suggest that relatively inactive folks of average size may get along just fine metabolically on as little as 30 g/day of carbohydrate (roughly the carb level in one can of soda), a far cry from the recommended intake levels over the past half century. A recent meta-analysis indicating that the relationship between saturated fat intake and heart disease may not be as ironclad as once thought, and newer work indicating that protein needs may be greater than current recommendations (some studies indicate protein requirements of 25-30 g per meal for proper muscle growth and repair) raise additional questions about macronutrient needs.

To be sure, these are exciting times to be involved in nutrition research, particularly as it pertains to the macronutrients. It will be interesting to see how the literature evolves in coming years. One crystal ball prediction that doesn’t require a PhD in nutrition to make: the diets recommended to our children and grandchildren will look far different than the diets recommended to our parents.

Mitch Kanter, PhD, has been Executive Director of Egg Nutrition Center since 2009.
Unintended consequences of eating by headlines

by Neva Cochran, MS, RDN, LD

Alarming headlines about food and nutrition not only confuse consumers, but may also result in the exclusion of nutrient-rich foods from the diet. As health professionals we know that nutrition and health recommendations must be based on a preponderance of scientific evidence, not results of a single study trumpeted in the news. This can be a daunting task, especially for topics that evoke strongly-held beliefs that often defy scientific reality. One problem of omitting a particular food or group is missing out on essential nutrients that food provides, which may not be easily replaced with other foods. The following five examples illustrate unintended consequences that can occur when eliminating these foods.

**Flavored milk**

Chocolate and other flavored milks have become a popular target for purportedly contributing to childhood obesity, especially in school meals. Yet studies show that drinking flavored milk does not promote weight gain compared to children who drink plain milk\(^1\). And research demonstrates that when schools eliminate flavored milk, both milk consumption and nutrient intake decline\(^1,2\). Replacing the essential nutrients from a 35% decline in milk consumption requires three to four additional foods on the menu resulting in 16-141 more calories and 2-20 g more fat\(^2\). The extra 20 calories and 10 g of sugar in a cup of fat-free chocolate milk vs. 1% low-fat plain milk is inconsequential when compared to the many nutrients present: calcium, riboflavin, potassium, phosphorus, protein and vitamins A and D.

“*Eggs not only provide high-quality protein, but also supply more than a dozen vitamins and minerals, most of which are found in the yolk.*”

**Eggs**

Eggs have been unfairly implicated for raising blood cholesterol, despite numerous recent studies showing that the majority of us can eat an egg a day without elevating cholesterol levels\(^3\). Eggs not only provide high-quality protein, but also supply more than a dozen vitamins and minerals, most of which are found in the yolk including vitamins A, D, E, B12, and B6, plus iron, zinc, choline, folic acid, phosphorus, selenium, and protein. In particular, eggs are one of the few natural sources of vitamin D, a “nutrient of concern” highlighted in the 2010 Dietary Guidelines for Americans. Eggs also provide small amounts of lutein and zeaxanthin, two nutrients which are part of the carotenoid family (like beta-carotene in carrots) that contribute to eye health and help prevent age-related macular degeneration, one of the leading causes of blindness.

**Potatoes**

White potatoes, long a part of the typical American dinner plate, have recently been maligned as “fattening” or lacking nutritional value. A 2012 Purdue University Roundtable, “White Vegetables: A Forgotten Source of Nutrients,” addressed the role of potatoes and other white vegetables in health and wellness. Evidence revealed that white vegetables like potatoes can increase intakes of shortfall nutrients, particularly fiber, potassium and magnesium, as well as increase overall vegetable consumption\(^4\). NHANES 2009-2010 data confirmed that white potatoes and French fries provide only 4% and 2% of total energy, respectively, but significantly increase total vegetable and potassium intakes. Among 14-18 year olds who eat them, white potatoes provide 23% of dietary fiber and 20% of potassium, but only 11% of total calories in the diet\(^4\).

**Bread and pasta**

Wheat bread and pasta have taken a hit over the last decade as the gluten-free craze has taken hold. Yet only about 1% of the U.S. population actually has gluten sensitivity or a gluten intolerance (celiac disease) requiring a gluten-free diet. Wheat, the predominant gluten-containing grain in the U.S., contributes significant fiber, trace minerals, B vitamins, antioxidants and phytonutrients to the diet. The resistant starches and gluten in wheat have health benefits related to gastrointestinal health, blood pressure control and immune function\(^5\). Fortified with folic acid, wheat foods also help

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We know the majority of Americans are overweight and, paradoxically, often undernourished. As health professionals, we can encourage clients to manage their weight and eat a nutrient-rich diet by using free online tools. This article provides a primer on helpful resources to help motivate healthful changes.

Most people welcome the suggestion by their clinician to eat more! This is, of course, a nuanced message, intended to encourage everyone to choose from a wide variety of different foods, with the caveat that many of them should include the following healthful nutrients:

- Potassium
- Dietary fiber
- Calcium
- Vitamin D
- Iron – for women who are pregnant, capable of becoming pregnant, or breastfeeding
- Folic acid/folate – for women capable of becoming pregnant
- Vitamin B12 – for everyone 50 years of age and older

These particular nutrients are listed as “nutrients of concern” in the 2010 Dietary Guidelines, which notes that Americans are not achieving recommended intakes of vegetables, fruits, whole grains, milk and milk products, and healthy oils. Intake is so low, in fact, as to rank a “public health concern” for both adults and children. The government’s MyPlate program addresses these “nutrients of concern” with helpful recipes and meal-planning tools, making it a good place to start for most everyone.

MyPlate recipe box

Begin at the “ChooseMyPlate.gov” site and click on the “Sample Menus and Recipes” topic under the “Popular Topics” heading to find “FNCS Recipe Box.” This is where you’ll find nutrient-rich recipes to cook. The word “cook” is used loosely; most MyPlate recipes take less than 30 minutes to prepare and some require little more than assembling ingredients without actually heating anything. The Recipe Box contains hundreds of healthy MyPlate recipes from “Potato Skins with Buffalo Chicken” to “Ham and Swiss Breakfast Casserole.” There is even a “Build A Cookbook” feature in the Recipe Box that allows users to print an entire (pre-assembled) cookbook of recipes that are especially suited to the tastes (and nutritional needs) of audiences in the following categories: children, older adults, cook it fast, Hispanic/Latino, and fruits & veggie recipes.

To find a recipe using a particular ingredient or nutrient, go to the “Recipe Finder” section of the Recipe Box. For example, typing in the ingredient “asparagus” yields two recipes. Clients who need to get more potassium and dietary fiber could be directed to choose recipes under the “Topic” area of “Eat More Fruits and Vegetables” where this search yields 260 recipes. Other “Topics” include: “Reduce Sodium Intake;” “Eat Low-Fat Dairy;” “Eat Less Saturated Fat;” and “Eat Whole Grains.”

More MyPlate recipes

Through a unique partnership with some of the nation’s top food magazines, MyPlate has a board on Pinterest.com showcasing healthful recipes. Publications such as Cooking Light and Real Simple pin healthful recipes to the “MyPlate Recipes” board every day. This is an excellent resource for people who wish to see what the final product looks like before cooking a recipe.

“People eat food, not nutrients, so it’s often difficult to convey to them the best ways to consume more potassium, dietary fiber, calcium, vitamin D, etc.”

MyPlate meal planning tools

On “ChooseMyPlate.gov,” the Supertracker topic under “Popular Topics” contains helpful tools for tracking health goals, including identifying foods that contain “nutrients of concern.” Anyone using the “Food-A-Pedia” can enter a food to see all nutrients contained in that food, which is helpful for viewing the nutrient profile of foods without nutrition labels such as fruits, vegetables and meats. The “Food-A-Pedia” can also be used to see nutrients contained in prepared foods, such as scrambled eggs prepared with butter and milk.

Using the Supertracker “Food Tracker,” clients can track their daily food intake to learn if they are eating according to the daily recommendations of MyPlate, which for an adult is 6 ounces of grains, 2½ cups of vegetables, and 2 cups of fruit, 3 cups of dairy and 5½ ounces of protein.

Continued on page 6.
In July, I enthusiastically joined the team at the Egg Nutrition Center (ENC). Many of my friends and colleagues offered their congratulations, wishing me success in my new role. Others were quick to share their excitement around the research program and respected staff at ENC. But one person’s comment intrigued me and continues to do so: “What’s not to like about eggs?”

Like any good scientist, I did my homework prior to joining ENC. I found numerous peer-reviewed papers in the scientific literature showing favorable health outcomes from consuming eggs. In fact, the research base was much deeper and broader than I realized, covering everything from satiety to heart disease to eye health. Particularly with respect to cardiovascular health, my assessment of the literature was that prior research with eggs has led to a greater overall understanding of the relationships between dietary sources of cholesterol and blood cholesterol concentrations, lipoprotein particle size and number. In fact, after reading all of the available published evidence, my conclusions were that the research not only extended our knowledge of egg nutrition, but advanced the thinking about diet and disease risk markers in general. Needless to say, I was impressed!

What I failed to appreciate prior to actually starting my position was the number of ENC-funded research projects in progress. At present, there are 25 active projects at some of the best institutions in the U.S. under the direction of top nutrition scientists and other health professionals. Over the next several years, there will be exciting new data to add to our current understanding of the associations between nutrition—and specifically egg nutrition—and a variety of health outcomes in people of all ages. What’s “to like” about eggs today may be different in 5, 10, or 15 years. New studies will be added to the research pipeline following our 2014 competitive grant process, which kicks off this fall.

However, nutrition research is not always predictable. Any study has the potential to produce positive, neutral, or negative findings. It is entirely possible that a research project will answer the question, “What’s not to like about eggs?” And knowing that there is that level of uncertainty is one of main reasons I joined ENC. The organization is committed to advancing the science of nutrition through credible research, accepting the risk that we may learn something unfavorable about eggs. ENC’s mission is consistent with my philosophy as a scientist: if we knew the answers ahead of time, we wouldn’t need to conduct the studies. And it is consistent with why I decided to pursue a career in nutrition: to optimize human health through the study of diet-disease relationships.

As is always the case in science, we are limited by our lack of knowledge. There continues to be a need to conduct well-designed, practical studies that contribute to our understanding of dietary approaches that not only reduce disease risk, but optimize health at all ages of life. Identifying what factors contribute to individual differences in responsiveness to dietary interventions is ongoing, and merits further inquiry to get past the one-size-fits-all approach to health. And cross-talk between nutrition and other relevant fields is imperative to making scientific leaps versus baby steps. Saying it's an exciting time in nutrition is an understatement, and I could not be more delighted to be part of an organization that contributes to the process of nutrition discovery.

Tia M. Rains, PhD, joined Egg Nutrition Center in July, 2013 as Senior Director, Nutrition Research & Communications.

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**ENC Executive Director Mitch Kanter addresses audiences in 2 African nations**

Dr. Mitch Kanter, Executive Director of Egg Nutrition Center, spoke in September at a conference in Lusaka, Zambia sponsored by the International Egg Commission (IEC) in partnership with the Food and Agricultural Organization (FAO). The conference brought together government staff from Ministries of Agriculture of various African nations, as well as veterinarians and agronomists, among others. Dr. Kanter was invited to speak about the potential impact of dietary protein in Third World countries.

Afterward, Dr. Kanter flew to Cape Town, South Africa to participate in the IEC’s annual conference, where he gave a presentation citing progress on the development of the International Egg Nutrition Consortium.
MyPlate meal planning
Continued from page 4.

**Helpful tips for eating “nutrient-rich”**

People eat food, not nutrients, so it’s often difficult to convey to them the best ways to consume more potassium, dietary fiber, calcium, vitamin D, etc.

**Here are tips that target nutrient-rich foods using tools from MyPlate:**

- **Eat breakfast:** Click on the Supertracker “Food Tracker” to compare how much easier it is to reach MyPlate daily recommendations for dairy and fruit when folks eat breakfast instead of skip it. Dairy and fruit are rich in potassium, calcium, vitamin D and fiber.

- **Eat more high-fiber foods:** Plug into MyPlate’s “Recipe Finder” the words “beans,” “lentils,” or any vegetable to select foods with more potassium, fiber or folate.

- **Eat more protein, fewer carbohydrates:** Since all recipes in the Recipe Finder are low-fat and contain nutrition information, use this tool to compare the protein and carbohydrate content of recipes. This advice is especially helpful for folks who wish to shed pounds.

Serena Ball, MS, RD, helps people eat healthy daily through her blog TeaspoonOfSpice.com.

**References**


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**Unintended consequences**

Continued from page 3.

women meet their requirement for this key vitamin during pregnancy. By eating enriched grain products, researchers found that 77% of low-income women could consume adequate amounts of folic acid, which is often not taken as a supplement due to costs.

**Beef**

Another staple of the U.S. diet, beef has garnered its share of bad press over the years. With 29 cuts of beef meeting government guidelines for “lean,” beef can promote health and provide a rich source of nutrients. More than 50 studies substantiate that lean beef does not increase cholesterol levels or cardiovascular disease risk when consumed as part of a low saturated fat diet.

Compared to non-beef eaters, those who eat lean beef consume significantly more vitamins B6 and B12, iron, zinc, and potassium. Beef is also a major source of protein, vitamins B6 and B12, zinc, iron, niacin, phosphorus and potassium in the diets of children and teens. With twice the iron and five times the B12 as in chicken, and 10 times the iron in fish, lean beef helps increase “nutrients of concern” for pre-menopausal women and those over 50.

Neva Cochran, MS, RDN, LD, is a nutrition communications consultant, appearing regularly in national and local media to discuss nutrition topics.

**References**


**Messages**

- Avoiding certain foods in the diet may reduce intakes of key nutrients that are not easily replaced with other foods.
- Certain nutrient-rich foods, such as chocolate milk, eggs, potatoes, fortified grains, and beef, have been unjustly avoided in the past, which may negatively affect diet quality.
One interesting finding from the Nurses’ Health Study II was that consumption of dairy products derived from whole milk were correlated with a lower risk of OI, especially when compared to low-fat and fat-free dairy products. The reason for this association is unclear. It may be that a substance in the fat-soluble fraction of milk exerts this effect, suggesting that removing fat as part of the skimming process does not favor ovulation. Willett et al. suggest that half-cup servings of ice cream a week is enough to decrease the risk of OI.

**Multivitamins**

When trying to become pregnant, women and men should consider taking a multivitamin. The amount of folic acid (700 mcg) and iron (40-80 mg) needed for improved ovulation and conception is about twice the daily recommendations for healthy women. Researchers in Hungary studied women taking a multivitamin containing 800 mcg folic acid and 60 mg iron and found that they were more likely to get pregnant, give birth to twins, and half as likely to have babies with congenital birth defects compared to women taking a trace element pill.

**Maintaining a healthy weight**

Being overweight or underweight can greatly disrupt menstrual cycles and ovulation. Excess weight decreases the probability of successful in vitro fertilization and also increases the odds of miscarriage, preeclampsia, diabetes, and Cesarean section. Statistically, the optimum fertility zone is a body mass index (BMI) of 20-24. Overweight women can significantly increase their chances of becoming pregnant by losing 5-10% percent of their weight, even if after that weight loss, they are still considered to be overweight.

**References**


**Evidence suggests that certain dietary behaviors may improve a woman’s chances of conceiving, particularly women with Ovulatory Infertility (OI), the most common cause of female infertility.**

**Foods containing slowly digested carbohydrates (vegetables, select fruits, legumes, whole grains) and monounsaturated and polyunsaturated fats (avocados, eggs, olive oil, salmon, nuts), as well as dairy products derived from whole milk, are positively associated with fertility.**

**Normal body weight and increased intakes of folic acid and iron have also been associated with improved ovulation and conception.**
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ENC 2013 Fall Calendar
Upcoming Health Professional Events

Food and Nutrition Conference and Expo
October 19-22, 2013 – Houston, TX
Educational Breakfast: Changing Paradigms on Weight Management and Macronutrient Intake (RSVP required)
Sponsored by ENC with the Weight Management, Diabetes Care and Education, Women’s Health, and Healthy Aging Dietetic Practice Groups on October 20th, 6:45-8:00 am
Speaker: Tia Rains, PhD
Speaker: Heather Leidy, PhD, University of Missouri

Upcoming Webinars
Evolving Views on a Healthy Breakfast:
High Quality Protein Paired with Fruits & Veggies Has Much to Offer
November 20, 2013 – 2 pm ET – Sponsored by Produce for Better Health Foundation and ENC
Speaker: Neva Cochran MS, RDN, LD
Approved for 1 CPE through CDR, watch our website for registration information

Dietary Approaches to Diabetes:
Resources from the Joslin Diabetes Center
November 21, 2013 – 4 pm ET – Sponsored by American Association of Family and Consumer Sciences and ENC
Speaker: Gillian Arathuzik, RD, LDN, CDE

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.