

Nutrition Close-Up

Egg Nutrition Center



Summer 2014

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SPECIAL FEATURE

The role of the brain, 'food cues,' in overeating

By Kerri Boutelle, PhD



Obesity is a serious and refractory problem that is associated with multiple medical and psychological comorbidities and risks. Recent data suggest that in the United States, two out of every three adults are overweight or obese, and one out of three children is overweight or obese. Obesity is associated with cardiovascular disease, type 2 diabetes, cancer, osteoarthritis, psychological impairment, poor quality of life, and all-cause mortality.

Excessive intake of highly palatable calorically dense foods is one of the most proximal causes of rising obesity rates during the past three decades ¹. As food availability has increased, people consume additional calories, resulting in weight gain over time. On average, Americans have gained 0.5-1.0 kg per year during this time frame ², which can be attributed to only 30 extra calories per day ³. Rates of overeating, or eating beyond energy requirements, are especially high in overweight samples, with up to 80% of overweight adults regularly overeating ⁴. Although physical activity appears to be a critical component of weight loss maintenance, exercise alone is not adequate to achieve meaningful weight loss ⁵. Recent estimates suggest that a moderate reduction of only 220 calories per day could result in successful weight loss over time ³. Thus, even small changes in caloric intake could have a substantial impact on long-term weight control.

Societal advances have created the "obesogenic" environment, which encourages excess energy intake and discourages energy expenditure. It is easy to eat extra calories today: portion sizes are bigger; foods are packaged and easy to eat; and it takes less time to cook.

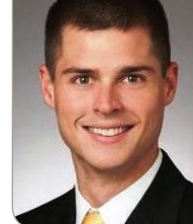


Unfortunately, neurophysiological systems that typically promote increased food intake under conditions of food scarcity only weakly reduce food intake under conditions of satiation and food abundance ⁶. Calorically dense foods are strong reinforcers that strengthen relationships between cues and overeating. These cues to overeat, or food cues, can be visual (fast food signs, cookies on the counter), auditory (ice cream truck bell), olfactory (popcorn smell in the movie theater), location (the couch or island in your home, car), time (evening, after school), activities (birthday parties, holiday dinners) or emotional (bored, angry, sad, anxious, happy). Over time, the pairing of food consumption with these food cues (i.e. "every time I'm bored I eat potato chips"), begin to trigger physiological or psychological craving that ultimately leads to eating when the food cue is perceived (i.e. "I feel bored, I want to eat"). Research shows that habitual overeating, or the susceptibility to overeat in response to food cues in the environment, is correlated with future weight gain ⁷.

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Vitamin D: a stronger link to health

By Taylor C. Wallace, PhD, CFS, FACN



Getting adequate vitamin D and calcium is essential for children, who need to grow strong bones, and for adults, who need to maintain strong bones and prevent bone loss. New findings from the *Women's Health Initiative*, the largest clinical trial of >36,000 postmenopausal women, confirm the safety and synergistic benefits of these two nutrients, showing a 35-38 % reduction in hip fracture incidence¹. If you don't get enough vitamin D, you are less likely to efficiently absorb calcium in the gut and may lose bone as you age. The development of low bone density and/or osteoporosis later in life, which affects approximately 54 million Americans over the age of 50 years², is highly linked to suboptimal nutrition and physical activity patterns during young adulthood. After the age of 20-25 years, when bone growth reaches its full genetic potential, bone "withdrawals" can begin to exceed "deposits" (except in the skull, which increases in mass throughout the lifespan). For many people, this bone loss can be prevented by continuing to obtain recommended intakes of important nutrients such as vitamin D, calcium, protein, dietary fiber and potassium, among others. Unfortunately, most individuals do not consider the consequences of inadequate intakes of nutrients such as vitamin D until it's too late. More than 2 million osteoporotic fractures occur annually in the U.S. at a cost of over \$17 billion to the healthcare system³.

Vitamin D is difficult to obtain from adequate sun exposure for individuals working indoors, living in higher latitudes, and during winter months. Lower levels of total 25-hydroxyvitamin D are more commonly diagnosed in black Americans than in lighter skinned people. This has long been thought to be due to higher pigmentation in the skin, perhaps because dark skin acts as a natural sunscreen, blocking the production of vitamin D⁴. However, new research shows that high prevalence of a genetic polymorphism in the vitamin D-binding protein gene in black Americans results in levels of bioavailable 25-hydroxyvitamin D (but not total 25-hydroxyvitamin D) that are actually similar to levels seen in white Americans⁵. In other words, alterations in the vitamin D-binding protein (which are not measured in a traditional 25-hydroxyvitamin D assay) may be at least partially responsible for the assessed lower total 25-hydroxyvitamin D levels among African Americans.

Outside of its effects on bone, new data supports that adequate vitamin D status seems to be protective against musculoskeletal disorders (i.e. muscle weakness and falls), infectious diseases, autoimmune diseases, cardiovascular

disease, type 1 and type 2 diabetes mellitus, several types of cancer, neurocognitive dysfunction and mental illness, and other diseases, as well as infertility and adverse pregnancy and birth outcomes. Vitamin D deficiency/insufficiency has also been associated with increased all-cause mortality⁶.

It is very hard to obtain adequate vitamin D from diet alone and, in fact, almost no one in the United States obtains the recommended intake of vitamin D from food sources, according to recent findings from the *National Health and Nutrition Examination Survey*⁷. Vitamin D disparities in the U.S. population seem to be more prevalent in low-income, overweight and/or obese minority populations⁸ that have traditionally had less access to healthful nutrient-dense foods. So how can one go about obtaining adequate levels of vitamin D in their diet? There are a few foods that are "natural" sources of vitamin D, including fatty fish and eggs (see table below). Dairy products such as milk, yogurt and cheese are typically fortified with vitamin D (e.g. an 8 oz. glass of milk contains ~100 IU of vitamin D).

Food	Vitamin D
Portabella mushrooms, 100 g, raw, exposed to UV-light	446 IU
Salmon, 100 g, cooked	360 IU
Tuna, 100 g, canned in oil	235 IU
Whole egg	40 IU
Beef liver, 100 g, cooked	15 IU
Portabella mushrooms, 100 g, raw	10 IU

*Source: National Osteoporosis Foundation (www.nof.org)

The *National Osteoporosis Foundation* gives guidance on specific recommended intakes for vitamin D based on your age and gender (see table below)⁹.

Women and Men	Vitamin D
Age 50 and younger	400-800 IU/day
Age 51 and older	800-1000 IU/day

*Source: National Osteoporosis Foundation (www.nof.org)

You cannot get too much vitamin D from sun exposure, but you can from foods and, most notably, from dietary supplements. For this reason, the *U.S. Institute of Medicine* recommends that individuals not exceed 4,000 IU/day of vitamin D from the diet¹⁰. Try to obtain your recommended intakes through food sources, and only supplement to reach target levels as necessary. Choose a variety of foods such as eggs that are rich in multiple nutrients, including protein, choline,

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- Vitamin D is vital for bone health during all stages of the lifecycle but is also protective against a number of musculoskeletal disorders, autoimmune diseases, cardiovascular disease, type 1 and type 2 diabetes mellitus, several types of cancer, and other diseases.



Complexity of individual variability in nutrition

By Tia M. Rains, PhD

One size does not fit all when it comes to health. Be it diet, exercise, or prescription medications, what works wonderfully for one person may produce little effect or even the opposite effect in others. This is not surprising given metabolic differences between individuals. I remember observing this first-hand as an undergraduate student in a clinical chemistry course. Each student underwent some basic blood tests and we compared results across the class. For some tests (e.g., liver enzymes), there was little variability among the students. But in others, there was quite a bit of diversity in results. For example, the blood glucose and insulin responses to an oral glucose tolerance test varied dramatically student to student. The athletic students in the class barely saw much rise in glucose, whereas several of the overweight students saw a dip in glucose below baseline in the late postprandial period (often called reactive hypoglycemia).

In conducting human nutrition intervention trials, I have gained an even greater appreciation for the inter-individual variability that occurs in response to diet and lifestyle interventions. However, this variability is often overlooked or unexplored. Most scientific papers only report means for the subject population. The standard deviation of the mean can provide some insight into the variance of the dataset, but it does not provide descriptive information, such as the percent

of the subject population that responded to a particular treatment. Yet in some cases, inter-individual variability may be important to our understanding of human health.

For example, there is a growing appreciation for understanding inter-individual variability with respect to achieving and maintaining an optimal body weight (i.e., specific genes, environmental factors, epigenetic effects, etc.). McClain et al. recently reported that women with insulin resistance were less successful in adhering to a low-fat weight loss diet and therefore, less likely to lose weight compared to those following a low-carbohydrate diet¹. The investigators hypothesize that higher carbohydrate intakes as part of a low-fat diet negatively influence glucose homeostasis, leading to greater levels of hunger. In an environment where highly palatable food is pervasive, it is easy to quell hunger the minute the urge strikes, compromising diet adherence.

In recent years, the gut microbiome has emerged as another factor that influences responses to diet and lifestyle factors, likely contributing to inter-individual variability in nutrition studies. There is a growing body of evidence that the diversity of bacteria within the gut microbiome is particularly important². For example, Santacruz et al. showed greater weight loss in a subset of individuals who showed more marked alterations in the diversity of gut microbiota in response to a calorie-restricted diet³. Whether there are specific diet-microbiome relationships that further influence weight loss, as well as alter other aspects of physiology, remains to be determined. But based on the research to date, it seems highly likely that we are only beginning to understand the complex set of factors that not only make us who we are, but influence our responses to our environment, including diet.

If there is a theme in this issue of *Nutrition Close-Up*, it is this concept of “one size does not fit all” when it comes to nutrition. Differences between people, whether on a macro level (e.g., age, race, athletic status, dietary preferences, culture, etc.) or micro level (e.g., genetics, diversity of the gut microbiota, etc.), influence responses to diet. Given the increasing complexity of such differences, it may be decades before research provides solutions to prevent and manage chronic disease. In the near term, keeping abreast and appreciating such differences may be the best we can do.

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

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vitamin D and carotenoids, among others, to balance out your dietary intakes of all nutrients. Remember that more is not always better, and a balanced diet is the ideal way to achieve long-term health maintenance.

Dr. Taylor C. Wallace is a blogger and media correspondent at DrTaylorWallace.com

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New research in fight against childhood obesity

By Jamie I. Baum, PhD



The prevalence of obesity in the United States has more than doubled in adults and more than tripled in children and adolescents since the 1970s. Roughly one in three children ages 2-19 years is overweight or obese. Obese individuals have an increased risk of developing type 2 diabetes mellitus (T2DM), hypertension, and dyslipidemia. Once restricted to adults, these metabolic diseases are now being diagnosed in children.

Increasing protein in the diet has been linked to improvements in glucose and insulin control, blood cholesterol, body composition, energy metabolism, as well as increased weight loss in adults. However, very little research has been focused on determining if increasing protein in the diet of school-aged children has comparable health benefits.

Protein needs for children

In general, recommendations call for 10-35% of daily energy intake come from protein. In the United States, children are not at risk of failing to meet protein needs. However, protein intake is still well below the upper end of the acceptable macronutrient distribution range of 35% of energy ¹. The Recommended Dietary Allowance (RDA), the minimum level of protein needed to support growth in children, is listed in the table below. It is important to remember that this is, by definition, the minimum levels of protein needed to support growth in children, and not optimal level for other aspects of health, including meeting vitamin and mineral targets.

Recommended Dietary Allowances for Protein	
Age (years)	grams/day
1 - 3	13
4 - 8	19
9 - 13	34
14 - 18 (girls)	46
14 - 18 (boys)	52

Negative consequences of skipping breakfast

Breakfast is a key component of a healthy diet and can positively impact children's health and well-being. However, there has been a steady decline in breakfast consumption in American children over the past 40 years. Breakfast consumption declined among 8 to 10-year-old children by 9% and adolescents by 20% ². A recent survey conducted in 11 to 15-year-olds indicated that only 54% of boys and 42% of girls eat breakfast daily ³.

Cross-sectional studies have shown a positive association between skipping breakfast and measures of adiposity in

children ^{4,5}. Skipping breakfast may also lead to greater hunger later in the day, which could lead to overeating ⁶. Children who skip breakfast also have reduced intake of essential nutrients. For example, breakfast skipping is associated with reduced fruit and vegetable intake, reduced fiber intake, as well as lower intakes of several micronutrients such vitamins A, B, E, C, B6 and B12; folate; iron; calcium; potassium and magnesium compared to children who eat breakfast ⁷. Skipping breakfast has also been shown to impact performance at school by negatively affecting problem-solving, short-term memory and attention ⁸.

Benefits of eating protein at breakfast

In many cultures, the foundation for breakfast is carbohydrates (e.g. cereals). Protein is typically eaten at lunch or dinner. Incorporating protein into breakfast could result in increased satiety and reduced energy intake throughout the day, but we have little evidence to draw firm conclusions in children. One study has shown that children consuming a high protein diet (23-28% energy from protein) for 6 months had reduced waist circumference, blood pressure and serum insulin compared to children consuming a lower protein diet (10-15% energy from protein) ⁹. Another study showed that girls (9-14 years) and boys (10-15 years) who consumed animal protein had higher levels of fat free mass index and a lower fat mass index ¹⁰. In the same study, plant protein was not associated with body composition. These studies demonstrate that there is a benefit of higher protein consumption in children, but it is not clear if increased protein intake at breakfast (versus other times of day) offers any additional benefits.

We recently presented preliminary data from a randomized, controlled crossover feeding study in school-aged children (ages 8-12 years) who were fed a protein-based breakfast (18 g, or 22% of energy from protein) or a carbohydrate-based breakfast (3 g, or 4% of energy from protein) on two different occasions separated by at least one week ¹¹. Our data suggest that increased protein at breakfast results in decreased hunger and increased fullness during the four hour period following breakfast compared to the carbohydrate-based breakfast low in protein. In addition, children consuming the higher-protein breakfast burned significantly more energy over the same period of time compared to the low-protein breakfast. While these data suggest that increased protein at breakfast can have anti-obesity potential in school-aged children, more research over the longer term is needed.

Easy ways to add protein to breakfast

Based on our experience, it is easy to incorporate more pro-

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Low-carb training getting mileage with endurance athletes

By Dave Ellis, RD, CSCS

“Training low” has nothing to do with altitude and everything to do with intentionally training with low glycogen stores to enhance fat metabolism. It is the latest craze for endurance athletes who seek to preserve glycogen stores by optimizing utilization of fat stores through an adaptive process during their training. This is typically accomplished by lowering carb feed rates to <3 g / kg / d for five days or more¹. Fat intake is increased to compensate for lower carb calories with the idea that intramuscular triglyceride stores go up along with enzymes necessary for fat oxidation. Carb traditionalists seek to determine if this can be accomplished by “periodizing” selected food choices (changing food sources during training at regular intervals to challenge the body in new ways) leading up to a competition without compromising an athlete’s high-end carbohydrate oxidation capacity on the day of competition.

Manipulation of non-protein calories to improve performance sounds pretty sexy to those who embrace “periodized training,” but there is another side to this story beyond the episodic concept of “training low.” It hinges on the idea of “chronically adapted low-carbohydrate diets” for athletes. Very low, to the point of “ketogenic adaptation,” in which carb intake is reduced to 50 grams per day or ~10% of total kcals^{2,3}. Researchers theorize that after successful ketogenic adaptation occurs, glycogen stores level off around 50% of capacity, which in theory would not inhibit high performance energy demands. That’s because keto-adapted muscles have the ability to utilize fatty acids, and because the brain can utilize ketones with great efficiency.

Chronic carbohydrate restriction to achieve a keto-adapted state has a therapeutic track record with seizure-prone populations. The desire to apply ketogenic diets to athletics will require some much needed research to prove efficacy, but researchers say they will eventually be able to prove it with ultra-endurance populations, and ultimately with others, among them those who don’t process carbs well, need to reduce body fat, or have gastrointestinal issues.

Those focused on high-end performance feel that early evidence illustrates pyruvate dehydrogenase (PDH) can become

rate-limiting in athletes who chronically restrict carb intake. During peak workloads, these athletes may not be able to do as much high intensity work⁴. It would seem that high-end carb oxidizing potential becomes metabolically maladapted in these endurance research models. Others question an athlete’s ability to spare lean mass on high saturated fat diets due to endoplasmic reticulum (ER) stress^{5,6,7}. Still, many question the need for chronic high-carb feed rates in some power-focused team sports where vulnerability to accrue body fat is more easily expressed in comparison to endurance populations.

Most veteran Sports Registered Dietitians (Sports RDs) who longitudinally track body composition changes in athletes long ago learned to periodize non-protein calories downward in power athletes on inactive days of training, during injury, and during the offseason when individuals seek to mobilize body fat stores prior to the start of their competitive season. That includes throttling down sugar, starch and fat to adjust for less physical activity. No “non-protein calorie religion” here, just common sense. It may not be sexy enough to sell a book, but it works, and is easy for athletes to comprehend and execute.

My own personal experience when strictly adhering to a ketogenic diet was one of compromised drive to get into the weight room after conditioning activities, along with being a bit grumpy (as per my wife and kids). This recent and rare performance cycling paper speaks to the point of compromised power output on a ketogenic diet in 28-year-old males⁸. No mention if the cyclists were grumpy too. But I stuck with the ketogenic diet and mobilized 25 pounds of body fat in five months compared to a higher carb regimen in which I shed 25 lbs. of fat in 9 months utilizing a similar total calorie intake (about 13-14 kcals per pound of goal body weight). Socially, dining with family and friends while on a ketogenic diet is challenging. Avocados and olives aren’t always easy to find, and I never managed to acquire a taste for coconut oil, choosing instead olive oil to meet my energy demands. By the time carbs are allotted for a glass of milk and one piece of fruit, you barely have room for even one slice of bread without exceeding 50 g of carbs in a day. That makes you odd man out when hash browns or a basket of bread hits the table. It should be noted that a true ketogenic diet is tightly controlled to avoid excess protein intake that could elicit gluconeogenesis (sorry Paleo fans).

The take-home message is to identify your populations carefully when “fueling for performance.” What the weekend warrior might be capable of adapting to in an attempt to mobilize body fat is just not in the same metabolic galaxy as serious athletes who train and compete at high intensities (power or endurance). It’s largely among ultra-endurance populations that we hear anecdotal evidence of successful adherence to ketogenic diets.

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- Applying ketogenic diets to athletics still requires much needed research to prove efficacy, but researchers say they’ll eventually have data, beginning with ultra-endurance populations.
- Chronically adapted low-carb diets have been studied and debated by top researchers, but published research so far is still lopsided in favor of traditional carb-fueling strategies.

New research on childhood obesity

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tein into the diet of children at breakfast. For example:

- Eggs: Scrambled eggs can be incorporated into a breakfast burrito or on a breakfast sandwich for a portable breakfast. Eggs can also be served with toast or prepared in an omelet with low-fat cheese and vegetables.
- Smoothies: Adding Greek yogurt to fruit smoothies is one way to add 10-15 grams of protein to a child's breakfast. Low-fat regular or Greek yogurt alone is another option.
- Consider adding lean breakfast meats such as turkey bacon, turkey sausage or Canadian bacon to breakfast.

Dr. Jamie I. Baum is an Assistant Professor of Nutrition at the University of Arkansas in Fayetteville with a joint appointment in the Cellular and Molecular Biology Program. Her research focuses on the role of dietary protein in energy metabolism and metabolic health.



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- Children who skip breakfast have reduced intake of essential nutrients. Skipping breakfast may also lead to greater hunger later in the day, which could lead to overeating. And skipping breakfast has been shown to impact performance at school by negatively affecting problem solving, short-term memory and attention.
- One study has shown that children consuming a high protein diet (23-28% energy from protein) for 6 months had reduced waist circumference, blood pressure and serum insulin compared to children consuming a low protein diet (10-15% energy from protein).

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Low-carb training getting mileage

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Still, in my experience, high achievers operating on the ketogenic diet in the ultra-endurance community are far from the norm, even where low intensity exercise might be better suited to fat-burning for its primary fuel source. Ultra-endurance athletes still rely on carbs for energy to climb hills, compete at altitude and, when necessary, finish with a burst.

During its annual conference last year, the Collegiate & Professional Sports Dietitians Association (SportsRD.org) brought in Drs. Jeff Volek and Steve Phinney to make the case for chronically adapted low-carb diets for athletes, then challenged Drs. John Ivy and Mike Saunders to debate the issues. The effect on performance when fueling with inadequate carbohydrate was one area of focus. The outcomes-based research was lopsided in favor of traditional carb-fueling strategies. But as health professionals, we must keep an open ear to new ideas, as one size does not fit all athletes. There may be some "offseason" utility for a fat mobilization diet regimen in a power sport like American football, but closely monitored to ensure muscles are properly refueled after exercise to prevent fatigue and risk of injury.

The manipulation of calories might possibly have some impact on maintaining metabolic flexibility over our lifespan and, episodically, some utility with athletes who typically have a larger margin for non-protein calorie error due to their rigorous training schedules. Still, error to even a small degree when all the marbles are on the table can mean the difference between winning and losing. More research on fat utilization in elite athletic populations is definitely necessary before the practice is adopted to meet the energy demands of a franchise athlete.

Dave Ellis, RD, CSCS, was the first President (2010-12) of the Collegiate and Professional Sports Dietitian Association and currently serves as CPSSA Ambassador-at-large; he is widely regarded as among the most respected Sports Registered Dietitians (Sports RD) in the United States; and serves as "Health Professional Advisor" to Egg Nutrition Center. Learn more about Dave at DaveEllisbio.com

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The role of the brain, and ‘food cues,’ in overeating

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In weight control programs, participants are encouraged to avoid these triggering food cues by setting up their home with healthy foods, eliminating calorically dense foods, and keeping track of food intake. Although these recommendations are well grounded in behavior therapy, it is nearly impossible not to be exposed to food cues in today's environment. It is impossible to avoid all food cues.

An individual's neurocognitive functioning in response to food cues, which includes cognitions, emotions, and behaviors, may be an important yet under-recognized factor in overeating and weight gain. Recent studies suggest that overweight and obesity are associated with impaired cognitive functioning, independent of socioeconomic status, depression, and cardiovascular factors among children, adolescents, and adults⁸. Instead of thinking about obesity as “lack of willpower,” obesity may instead reflect an underlying dysfunction in the cognitive and reward processes of the brain in response to food cues that ultimately may lead to failure to sustain an appropriate energy intake to maintain body weight.

Research shows that there are four main functions of the brain that may be impacted in people that are driven to overeat past nutritional needs. These include reward processing (how good eating feels to certain people), food cue sensitivity (how sensitive they are to food cues), memory (how much time food stays in their memory) and inhibition (how soon they can stop once they start eating). Reward processing and food cue sensitivity are mediated by the neurotransmitter dopamine in the brain. Over time, dopamine-based processes become hyper-sensitized to food cues in the environment. Food cues become attention-grabbing, and trigger desire for the food that increases the likelihood of eating. Additionally, once an individual becomes “sensitized” to food cues, they think about food more often and have difficulties stopping themselves once they start eating. Pair this dysfunctional neurocognitive functioning (dysfunction in reward processing, sensitivity to food cues, the memory of food,

and decreased inhibition) with the obesogenic environment full of highly palatable food cues, and it is no wonder that people lack the ability to decrease their eating!

Lack of focus on an individual's neurocognitive risk profile may be why so many people fail at reducing their food intake, and ultimately fail in weight loss and maintenance of weight loss. Our lab and others are studying these neurocognitive systems associated with overeating in an effort to develop a greater understanding of the impact of neurocognitive systems on food cue sensitivity and overeating, and to develop novel interventions based on improving neurocognitive functioning^{9,10}, to ultimately create a more durable program for weight loss and weight loss maintenance.

Dr. Kerri Boutelle is a Professor of Pediatrics and Psychiatry at the University of California, San Diego and Director of the Center for Healthy Eating and Activity Research (CHEAR).

MESSAGES

- Although physical activity appears to be a critical component of weight loss maintenance, exercise alone is not adequate to achieve meaningful weight loss. Recent estimates suggest that a moderate reduction of only 220 calories per day could result in successful weight loss over time.
- Calorically dense foods are strong reinforcers that strengthen relationships between cues and overeating. In weight control programs, participants are encouraged to avoid these triggering food cues by setting up their home with healthy foods, eliminating calorically dense foods, and keeping track of food intake.

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Health Professional Events

National Nurse Practitioner Symposium

July 10-13, 2014 – Keystone, CO

Educational Symposium: Changing Paradigms Regarding Macronutrient

Intake and Health: Translating Science into Meaningful Patient Communications

Sponsored by ENC on July 12

Speakers: Mitch Kanter, PhD and Dixie Harms, DNP, ARNP, FNP-C, BC-ADM, FAANP

Academy of Nutrition and Dietetics Food and Nutrition Conference & Expo (FNCE)

October 18-21, 2014 – Atlanta, GA

Educational Symposium: Strategic Use of Protein Quality and Quantity to Enhance Satiety and Weight Management

Sponsored by ENC with the Weight Management, Diabetes and Education Dietetic Practice Group on October 20th, 6:45-8:00 am

Speaker: Nikhil Dhurandhar, PhD, Pennington Biomedical Research Center

Osteopathic Medical Conference & Exposition (OMED)

October 25-29, 2014 – Seattle, WA

Webinar

Building an “Optimal Diet:” Putting Protein into Practice by Stuart Phillips, PhD, McMaster University
Sponsored by ENC and the Academy of Nutrition and Dietetics’ Sports, Cardiovascular, and Wellness Nutrition (SCAN) Dietary Practice Group

Approved for 1 CPEU through CDR and available at the SCAN website



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