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Relationship of Olfactory and Taste Dysfunction to Dyslipidemia and Hypertension

by Shue Huang, MS, Yi-Hsuan Liu, MS, RD, and Xiang Gao, MD, PhD

Chemosensory function, generally known as olfactory and taste functions, plays an essential role in human health and social behavior including the regulation of various aspects of nourishment and a link to memory and emotions.¹ Disturbance of these functions compromises quality of life, poses potential safety issues, and becomes a threat to public health.

The 2013-2014 National Health and Nutrition Examination Survey (NHANES) data revealed a 13.5% self-reported prevalence of smell alteration and a 17.3% self-reported prevalence of taste alteration² among adults aged 40 years or older in the United States. In the 1994 National Health Interview Survey (NHIS), which included 42,000 adults aged 18 years or older, the prevalence of perceived chronic (lasting ≥ 3 mo) chemosensory problem was 1.65%.³ Interestingly, previous studies reported relationships between olfactory or taste dysfunction and a variety of diseases, including diabetes, stroke, and other cardiovascular disorders.⁴ Underlying mechanisms such as the link between the endocrine system and olfactory system, the role of insulin, and the role of leptin in chemosensory function modulation

have been proposed to explain such relationships⁵

This article reviews the hypothesized mechanisms and discusses our recent epidemiologic studies on the association between chemosensory impairment and two important metabolic disorders, dyslipidemia and hypertension, which are either risk factors or comorbidities of the aforementioned diseases.

Olfactory/Taste Dysfunction and Blood Cholesterol

Several hormones that mediate food perception and appreciation activity by signaling in the olfactory and gustatory systems are also crucial to energy balance, glucose regulation, and lipid metabolism. These hormones include glucagon-like peptide-1, leptin, cholecystokinin, and neuropeptide.⁶

Leptin, a hormone produced in adipose tissue, is known to participate in the regulation of low-density lipoprotein (LDL) cholesterol concentration, decrease triglyceride (TG) and very low-density lipoprotein (VLDL) in various ways, and relate to high-density lipoprotein (HDL) concentration. Leptin also has been reported to

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modulate sweet taste perception, and it is positively related to higher olfactory capacities. Another important hormone, glucagon-like peptide-1 (GLP-1), known to decrease TG and VLDL, has also been found to impact sensitivity to sweet and umami. It is speculated that altered chemosensory dysfunction might occur accompanied with disturbance of these hormones and lipid profiles, although the mechanism for the association between chemosensory dysfunction and higher blood cholesterol concentration remains unclear. Animal models or human studies on how taste or smell function relate to these hormones would help to elucidate the underlying mechanism.

We conducted a cross-sectional study to investigate the association between perceived chronic chemosensory dysfunctions and blood lipid profiles among 12,627 Chinese participants (aged ≥ 25 y) from the Kailuan study.⁹

Chemosensory dysfunctions were assessed using the questionnaire derived from the NHIS.³ The prevalence of perceived olfactory and taste dysfunction was 2.4% and 1.2%, respectively. We found no significant differences in LDL cholesterol, HDL cholesterol, and TG concentrations across dysfunction and control groups, whereas we found that higher total cholesterol concentration was related to presence of chemosensory dysfunction. For example, participants with olfactory and taste dysfunction had higher total cholesterol relative to those with normal function (adjusted mean was 5.22 vs 4.84 mmol/L; $P < .05$), after adjusting for age, sex, body mass index, alcohol drinking, perceived salt consumption, smoking, presence of major chronic diseases, and other potential confounders. Excluding participants with cardiovascular disease, diabetes, or obesity, respectively, did not materially change the results, suggesting that the relationship was independent of other metabolic disorders. Furthermore, the association was more pronounced in participants at least 60 years old or smokers. For the analysis, individuals

using cholesterol-lowering agents, which has been reported in perturbation of taste and smell function and thus could confound lipid profiles, were excluded; potential confounders including socioeconomic status, lifestyle behavior, and comorbidity were considered.

This study confirmed that chemosensory function is related to cholesterol metabolism in a population level. However, whether it is the dyslipidemia that causes the impairment or it is the impairment that occurs before dyslipidemia remains to be elucidated.⁹

Olfactory/Taste Dysfunction and Blood Pressure

Blood pressure indexes generally include systolic blood pressure, diastolic blood pressure, mean arterial pressure, and pulse blood pressure. Maintaining optimal range of blood pressure indexes has been known to be associated with improved health status and better disease prognosis. In particular, several studies have indicated that systolic blood pressure is one of the key predictors for risk of major cardiovascular events and mortality.^{10,11} Therefore, understanding potential risk factors that could lead to dysregulated blood pressure may provide strategies for early prevention and therapeutic procedures.

Chemosensory functions, which serve as one of the main mechanisms for mammals to sense and further react to environmental stimulants, have potential roles in disease onset through participating in signaling processes.¹² It is noteworthy that olfactory receptors located in the kidneys have been found to be involved in renin secretion in mice models, and this in turn plays a role in blood pressure regulation.¹³ In addition, individuals with malfunctioned taste and smell perception may have altered food preferences with higher condiment intake that may further lead to compromised blood pressure control.^{14,15} However, the evidence from human studies regarding the relationship between chemosensory

From The Editor

Betcha Didn't Know

by Mark Kern, PhD, RD, Editor-in-Chief

The feature articles in this issue of *PULSE* have a common thread that really stuck out to me. They're all on topics that few people know much about. But here at *PULSE*, our aim is to rectify that as best we can. While each of the topics requires more research to improve our knowledge base and impart a more complete understanding, the authors have all done excellent jobs of providing us with details that will keep us all in the know.

On the cover you'll find an article from Shue Huang, MS, Yi-Hsuan Liu, MS, RD, and Xiang Gao, MD, PhD describing the latest research on the link between chemosensory dysfunction and key risk factors for heart disease. Our next article in this issue addresses a topic that many of us are relatively unfamiliar with. In it Francis Dizon, MS, RDN discusses the state of knowledge of the male counterpart of the female athlete triad. Lastly, I'm sure you'll enjoy the article by Jessica Reid, Kerry O'Brien, Tracy Burrows, Charlotte Hardman, and Adrian Carter about the very controversial issue of the potential for the existence of food addiction and how it could theoretically relate to the stigma and treatment of obesity.

As always, there's much more for you to learn in this issue. I know I learned a lot from helping to assemble it, and I hope you will too.

function and blood pressure remains limited.

The lack of evidence in this area led us to conduct the first longitudinal study to examine the potential association between chemosensory function and changes in blood pressure.¹⁶ The study included 5,190 normotensive Chinese adults (4,058 men and 1,132 women; mean age: 50.1 y) from the Kailuan study. Approximately 2.1% of participants reported either a perceived taste or smell problem, while about 0.6% of participants reported perceived malfunction in both taste and smell. It was observed that individuals with both altered taste and smell perceptions had larger increases in systolic blood pressure (adjusted mean difference=5.1 mmHg, 95% CI: 0.1-10.0, $P=.04$) and mean arterial pressure (adjusted mean difference=3.8 mmHg, 95% CI: 0.4-7.1, $P=.03$) compared with those without altered perception after 2 years of follow up. In particular, there was no significant association between altered taste or smell perception and change in blood pressure when altered taste or smell function was examined separately, suggesting that potential common mechanisms are shared by taste and smell perception. In addition, excluding individuals with some chronic conditions did not

change the observed association between chemosensory function and blood pressure, indicating that this association is independent of participants' existing medical history.

While these recently-published results provide preliminary insights into the role of chemosensory function on blood pressure regulation in human, as well as directions for future studies identifying risk factors for hypertension, more studies are needed to replicate these findings in different cohorts and to determine the exact mechanisms to strengthen these associations.¹⁶

Conclusion

In addition to traditional roles of sensing and responding to external chemical compounds and stimulants such as flavor and odor, taste and smell function could also play a key role in biological and metabolic processes in living organisms, especially humans. Through its involvement in the endocrine system, specifically lipid metabolism and renin secretion, chemosensory function is observed to be associated with total cholesterol concentration and change in blood pressure level in epidemiologic studies. In clinical settings, taste and smell problems are frequently reported by

patients using certain medications or having medical conditions. It is therefore important for health care professionals to better understand the potential impact of chemosensory dysfunction, whether it be perceived or clinically diagnosed, in order to provide further assessments or necessary medical treatments as early prevention steps to reduce risk of developing metabolic disorders or chronic diseases.

In summary, as discussed in this brief review, evidence exists on the association between chemosensory function and two important risk factors for several chronic disorders: hypercholesterolemia and high blood pressure. Future studies are warranted to examine these relationships as well as the association between chemosensory function and other disease conditions to deepen our understanding of disease risk factors.

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Energy Deficiency in the Male Athlete and the Role of the Sports Dietitian

by Francis Dizon, MS, RDN

Daily energy demands are derived from an individual's basal metabolic rate (BMR), purposeful exercise, non-exercise activity thermogenesis (NEAT), and the thermic effect of food.¹ An individual's energy availability (EA; measured in kcal/kgFFM/day) is a concept that describes the energy remaining for one's energy demands after accounting for physical activity (see Figure 1).²

For athletes, maintaining adequate energy availability may present a challenge because of the high-energy demands of frequent, intense training sessions paired with a lack of the nutrition knowledge needed to fuel appropriately before, during, and after exercise. Other athletes may intentionally restrict their intake to meet a

perceived internal or external pressure to maintain a lean build or frame. Chronic low EA underlies the condition historically defined in female athletes as the female athlete triad.³ Another recent framework, the relative energy deficiency in sport (RED-S) concept, attempts to model low EA and its consequences to additional body systems.⁴

Thresholds of Low Energy Availability

Previous laboratory controlled studies involving sedentary women investigated the effects of varying levels of low energy availability (10, 20, and 30 kcal/kgFFM/day) on hypothalamic hormones and markers of bone formation and resorption.^{5,6} From these

studies, abnormalities in the levels of these biomarkers were apparent at EAs below 30 kcal/kgFFM/day. For example, EAs of 10, 20, and 30 kcal/kgFFM/day elicited decreases of the bone formation markers, osteocalcin (OC), and procollagen type 1 carboxy-terminal peptide (P1CP), while an EA of 10 kcal/kgFFM/day also increased the rate of a bone resorption marker, N-telopeptide

Figure 1. Calculation of Energy Availability (EA)

$$EA = \frac{TDEI - EEE}{FFM}$$

TDEI = total daily energy intake
EEE = exercise energy
FFM = fat-free mass in kilograms

(NTX).⁵ Similarly, triiodothyronine (T3) and leptin were found to be suppressed at an EA of 30 kcal/kgFFM/day, while detriments to estradiol required a more severe EA condition (10 kcal/kgFFM/day).⁶ As such, low EA has been defined in female athletes as EA <30 kcal/kgFFM/day.² In male athletes, initial research suggests that the male-specific threshold of low EA may be lower (~20-25 kcal/kgFFM/day), potentially requiring a more severe energy deficit to elicit health consequences.⁷⁻⁹

Compared with studies involving females, there is a lack of carefully controlled studies evaluating the effect of various levels of low EA in male athletes. However, observations on males with apparent energy deficiency (i.e., case studies and cross-sectional studies on endurance runners, bodybuilders, and other athletes striving for leanness) have linked hormone disturbances and poor bone health to energy deficiency.¹⁰⁻¹³ These reports suggest that male athletes may experience a syndrome parallel to the female athlete triad, as outlined by Tenforde et al.¹⁴

While not exclusively focusing on athletic populations, the “Minnesota Starvation Experiment” performed by Keys and colleagues during World War II induced a state of chronic low EA among 32 young, active men. The men underwent 3 months of a control diet (3,200 kcal/day), followed by a 6-month energy deficient diet of ~1,800 kcal/day, paired with an average total daily energy expenditure of 3,000 kcal/day and a subsequent 3-month refeeding period.¹⁵ The energy deficient phase of the protocol elicited an estimated EA of ~22 kcal/kgFFM/day among the men, who exhibited a mean 16.8kg decrease in body mass, a 38% decrease in resting energy expenditure (REE), and psychological changes (including depression, irritability, social withdrawal, lack of focus, etc.).^{16,17} A more recent but similar investigation by Müller and colleagues identified similar results, with an average decrease of 6 kg body mass, a 266 kcal/day reduction in REE following a 3-week

energy deficient period in which 32 healthy, male participants consumed a total daily energy intake of ~1,350 kcal/day.¹⁸ EA for this study was calculated at ~21 kcal/kgFFM/day. Müller and colleagues also observed a decrease in T3 and testosterone (39% and 11%, respectively, from baseline) during this study.

Together these studies also support the body mass, metabolic, and endocrine changes occurring at a level of low EA at or below ~20 to 25 kcal/kgFFM/day. Further controlled laboratory studies among male athletes are needed to substantiate this proposed threshold in male athletes.

Studying Low Energy Availability in Male Athletes

Recent research has focused on the documentation of low EA in male athletes.^{19,20} However, studies reporting the prevalence of low EA in male athletes are still scarce in the literature. One recent investigation found that 6 of 24 (25%) male world-class, distance athletes presented with low EA when using a cutoff of 30 kcal/kgFFM/day.¹⁹ The relatively low sample size and reliance on self-reported data, however, confound the results of this study.

The evaluation of EA continues to be challenging because of inherent errors with data collection methods involving measurements of energy intake, exercise energy expenditure, and fat-free mass. Measuring these constructs in the field often rely heavily on self-reported data (via 24-hour dietary recalls, food logs, exercise logs, etc.), which may under- or overestimate EA calculations. Indeed, an investigation from 2014 evaluating 59 nonathlete adults described self-reported levels of energy intake 5% to 21% lower than their actual intake when observing ad libitum feeding behaviors in a laboratory setting.²¹

As such, caution is warranted when analyzing self-reported intake to determine energy availability in practical settings. Symptoms associated

with low EA (i.e., fatigue, mood changes, bone stress injuries, etc.) may serve as supplemental indicators for suspected low EA in athletes. As suggested by Heikura et al, qualitative screening methods (i.e., the Triad Cumulative Risk Assessment Tool and RED-S assessment tool), measurements of REE, and assessments of longitudinal blood hormones (namely T3, testosterone, estradiol) may be more sensitive indicators of long-term low EA rather than direct EA assessments through food and training recalls.¹⁹

Consequences of Low Energy Availability

Prior research supports various health consequences of chronic low EA, defined as EA <30 kcal/kgFFM/day, in women. The female athlete triad outlines two such conditions, including amenorrhea and low bone mass. Prior research links factors associated with low EA to increased risk of bone stress injury.³ In male athletes, research supports effects of low EA to hypothalamic hormones, gonadal function, bone health, and bone stress injury supporting a case for a parallel triad that also includes hypogonadotropic hypogonadism and low bone mineral density (BMD).^{20,22}

Previous studies have reported lower levels of testosterone in male athletes participating in sports that emphasize leanness, including endurance, aesthetic, or weight-sensitive sports.^{11,13,23-28} Low EA may affect the hypothalamic-pituitary-gonadal (HPG) axis, with decreases in gonadotropin-releasing hormone (GnRH), followed by reduction in the pulsatile release of luteinizing hormone and follicle-stimulating hormone, which subsequently lowers the synthesis of estrogen and testosterone.²⁹ Loucks and Thuma have previously documented these alterations in the HPG axis in healthy, young women at various EAs <30 kcal/kgFFM/day.⁶ In a recent study investigating active males subject to EA levels of 15 kcal/kgFFM/day (low EA) and 40 kcal/kgFFM/day (control) with and without exercise, the low EA and low EA + exercise conditions re-

sulted in a nonsignificant decrease in testosterone of 7% and 15%, respectively.⁹ While the reductions in testosterone did not reduce levels to below a normal clinical range, this study preliminarily supports an effect of low EA on male reproductive hormones.^{23,26,30}

Studies involving male athletes also report links between factors related to low EA and low bone mass. Inadequate dietary intake, due to either purposeful restriction or inadvertent undereating, may also be associated with below-recommended intake levels of bone-building micronutrients, such as calcium and vitamin D. This is demonstrated in a study by Misra and colleagues involving adolescent males with anorexia nervosa (AN).³¹ Their sample, who by definition exhibited severely restricted dietary intakes, had lower whole body, lumbar spine, and hip BMD compared with healthy controls matched for chronological and bone age.³¹ Furthermore, the authors reported significantly lower levels of procollagen type 1 N-terminal propeptide (P1NP; a bone formation marker) and NTX in the AN subjects, indicating a decreased rate of bone turnover. Aside from dietary intake, other risk factors that may predict low BMD include body mass <85% expected weight, weekly mileage >30 miles/week, stress fracture history, and <1 serving of a calcium-rich food per day, as reported by Barrack et al.³² These risk factors were found to have an additive effect, with increasing number of risk factors tied to a higher likelihood of low BMD.

Energy balance also has been shown to play an important role regarding bone turnover in athletic populations. In an investigation by Zanker and Swaine in 2000 involving eight male distance runners, intakes of 50% of a runner's energy needs resulted in decreased serum levels of P1NP as well as insulin-like growth factor-1 (IGF-1).³³ Similar to the effect of low EA and estrogen deficiency on bone density in female athletes, previous studies have also reported that lowered testosterone may contribute to re-

duced BMD in male athletes.^{34,35} However, a study by Maimoun et al indicated there is no significant correlation between testosterone and BMD when comparing male endurance athletes and sedentary controls.²⁶ Thus, more evidence is needed to elucidate whether testosterone's relationship with bone health is parallel to that of estrogen and bone in female athletes. A possible confounder is the fact that male athletes often present with subclinical hypogonadism rather than clinical deficiencies, possibly leading to the less pronounced effects on bone seen in the literature. Ultimately, poor bone health may predispose an athlete to increased risk for bone stress injuries (BSIs). When an athlete develops inadequate bone turnover (i.e., bone resorption eclipses bone formation), micro-damage from exercise may accumulate and progress into a stress injury.³⁶ In particular, male athletes participating in leanness sports such as endurance runners are known to develop BSIs at elevated rates.³⁷⁻³⁹

Role of the Sports Dietitian

A registered dietitian (RD) specializing in sports is pivotal in the prevention and care of energy deficiency. Sports RDs work closely with athletes to optimize health, athletic performance, and overall wellbeing. As such, a sports RD must be able to accurately assess an athlete's nutritional attitudes and behaviors. If concerns arise regarding the adequacy of an athlete's diet, a sports RD may be first to notice and identify any issues.

Prevention of low EA requires a sports RD to educate the athlete on appropriate fueling needs as well as facilitate the adoption of healthy eating behaviors (e.g., offer easy-access meals and snacks through fueling stations and training tables). In concert with the multidisciplinary care team, a sports RD may assist in the treatment of low EA by providing individualized nutrition counseling, education, and referral to a sports psychologist to support the process of recovery from disordered eating or

eating disorders. To maintain proficiency in these tasks, a sports RD would benefit from critiquing and incorporating emerging research regarding energy deficiency to precisely identify and treat low EA in male and female athletes. With tact, a sports RD may serve as a resource for both athletes and performance staff in managing a complicated and debilitating condition such as energy deficiency.

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Food Addiction and Its Implications for Weight Stigma and Treatment

by Jessica Reid, Kerry O'Brien, Tracy Burrows, Charlotte A. Hardman, and Adrian Carter

In most Western countries such as the United States, more than 60% of the population is categorized as overweight or obese.¹ The majority of people in these countries also understand the significant health consequences of excess weight, such as diabetes, cardiovascular disease, and cancer.² The proportion of people seeking to lose weight via methods such as dietary modification has increased substantially from 18.6% (1970-1979) to 48.2% (2000-2009), with dieting attempts more frequent among overweight populations.³

Unfortunately, behavior change is difficult: dieting and caloric restriction have been shown to be largely ineffective for long-term (2+ y) weight loss and weight loss maintenance.⁴ This is frustrating for most individuals as they encounter failure that causes a range of negative psychosocial consequences, and also frustrating for the health community seeking to address the problem of overweight and obesity. New research involving dietitians, psychologists, and neuroscientists suggests that a large proportion of the population may have a “food addiction,” which may make long-term dieting and caloric restriction extremely difficult and may require different forms of treatment.

What is Food Addiction?

Foods high in refined sugars and fat are termed “hyperpalatable” because of their artificially high reward potency. Hyperpalatable foods trigger the release of dopamine, a key neurotransmitter associated with the rewarding effects of a drug hit or a tasty cheeseburger.⁵ For some people, the continual consumption of hyperpalatable foods produces long-lasting neurobiological changes that could explain difficulties in maintaining a healthy diet. The same neurobiological changes are

observed in drug addiction, suggesting that hyperpalatable foods and drugs may act on similar neural circuitry in the brain and elicit comparable long-term changes that heighten the experience of cravings and mean more food or drug is needed to satisfy these cravings.⁵

The behavioral evidence is consistent with the neuroscience. Self-identified “food addicts” report requiring greater amounts of the food progressively over time to be satiated; using food to resolve anxiety or depressive symptoms; eating more than intended; having failed attempts to cut back or stop eating refined foods; missing social, occupational, or recreational activities because of their eating; and continuing to eat refined foods despite knowledge of negative consequences such as weight gain and fatigue.⁶

Not everyone supports the concept of “food addiction.” Many academics and clinicians have strongly critiqued the animal and human neuroimaging evidence for food addiction.^{5,7} Despite this, our screens are flooded with food- and diet-related information referring to “food addiction,” and while the academic community may be in doubt, the general public appears to be less so. A recent study found that 86% of Australians and Americans believe that foods, particularly sugars and fats, may be addictive;⁸ 80% thought that they were as addictive as cocaine and alcohol, and nearly 75% thought that obesity is caused by a food addiction.

Exposure to a food addiction message may be enough for many of us to attribute our own patterns of eating to an addiction. Researchers found a two-fold increase in self-diagnoses among those who had read an article stating that “food addiction is real” compared

with those who had read an article proposing that “food addiction is a myth.”⁹ While only 11% to 14% of the population meet criteria for food addiction as measured using the Yale Food Addiction Scale,¹⁰ 28% to 52% of the population self-identify as a “food addict,” with these rates highest among overweight and obese persons.⁹⁻¹¹ This raises a number of questions, such as: Does a food addiction explanation for eating and overweight reduce blame and stigma towards people who are overweight? Might people who are overweight or obese view dieting as pointless and beyond their personal control, lowering self-efficacy around weight-control?

Effects of Food Addiction Messages on Stigma

Being overweight and obese is one of the most stigmatised conditions in society.¹² Overweight people are often seen as lazy, incompetent, and lacking in will power, and these perceptions can significantly limit opportunities in employment, health care, and educational settings.¹² Perhaps more concerning, however, is the tendency for people to internalize these hurtful comments and even begin to believe them, contributing to body dissatisfaction, depression, and lowered self-esteem.¹²

Despite the severity and prevalence of weight-based stigma and its adverse consequences, research into strategies to reduce weight-based stigma is scarce. Perhaps turning to food addiction explanations of obesity is one such strategy that deserves further attention. When provided with an external cause for an undesirable characteristic (such as being overweight or overeating), we tend to view ourselves and others more positively—as a victim of uncontrollable forces as opposed to

someone with negative personal attributes. Consistent with this is the finding that those who believe weight is personally controllable report higher levels of stigma towards overweight and obese people.¹³ The suggestion, then, is that by attributing eating and weight to factors outside of one's control, we can reduce the negative attitudes that surround overweight and obesity.¹³

Research has shown that describing obesity as a genetic disorder rather than caused by poor diet and lack of exercise reduces the personal blame associated with being overweight and improves attitudes towards overweight and obese persons.¹⁴ From a personal perspective, genetic attributes also help to mitigate negative views of oneself while increasing body satisfaction.¹⁵ It is not yet clear whether describing obesity as the result of other biological causes such as a food addiction would have similar effects, especially as the "addiction" label also carries its own stigmatization. Some studies have found that brain-based explanations of addiction may actually increase stigma directed towards people who use drugs.¹⁶ One study found that "obese" and "food addict" labels elicited similar amounts of stigma, but that when combined, an "obese-food addict" label elicited greater stigma than either label alone.¹⁷ Notably, "food addicts" were still viewed as more likeable than alcoholics and smokers.¹⁷ Although this did not appear to be due to external attributions, alcoholism was viewed as more "disease-based" and less likely to be due to individual choices than food addiction.¹⁸ Food addiction was more highly attributed to free will and a general unhappiness with one's life.¹⁸ These findings suggest that although "food addiction" may not cause the same level of stigma associated with "drug addiction," the term may have an additive effect on an already stigmatized population of overweight or obese persons.

In contrast, Latner et al¹³ compared attitudes towards individuals who

were described as either an "obese food-addict," "non-obese food-addict," "obese non-food-addict," or "non-obese non-food-addict." They found that an addiction-based model of obesity reduced weight-based stigma and blame towards the "food addicted" individual and obese persons in general. Exposure to food addiction explanations was also associated with a decreased concern about gaining weight or fear of becoming fat.¹³ These findings suggest that a food addiction explanation of obesity could help to reduce the widespread stigma and personal distress that surrounds excess weight.

However, the limited evidence that is available at present is inconsistent. With the term "food addiction" gaining popularity in the media, there is a pressing need for research to clarify the effects of food addiction explanations of obesity on weight stigma and discrimination.

Clinical Implications of Food Addiction Messages

Current treatments of obesity are centered on calorie restriction through diet and exercise. The recognition of food addiction as a valid concept would likely promote the introduction of new treatments, such as cognitive behaviour therapy (CBT), which have been useful in drug addiction. While only a relatively small subset of people will meet criteria for food addiction on the Yale Food Addiction Scale, a research tool often used by researchers to identify food addiction, the tool could still be used to assess other aspects of their thoughts and behaviours that may be impacting on weight loss results. The concern, however, is that use of a food addiction approach, particularly in clinical settings, could have a negative impact on clients' belief in their ability to control their weight (referred to as self-efficacy) or their willingness to seek treatment. Self-efficacy is an important predictor of success in both weight management and abstinence from addictive behaviors.¹⁹ It is therefore critical to understand what effect food

addiction messages will have on self-efficacy for eating and weight. A recent study has shown that people who believe their weight is due to biological causes such as genetics are more likely to perceive their weight as unchangeable.²⁰ This may explain why providing biological explanations of obesity has also been shown to predict unhealthy food choices¹⁵ and difficulty achieving weight loss.¹⁵

Other research suggests that receiving a mental health diagnosis can be beneficial, with patients reporting the experience as affirming and optimistic.²¹ A recent study found that educating smokers about the changes in the brain that caused tobacco addiction made quitting seem "easier" and increased their motivation to quit.²²

There is little research on the impact of a food addiction explanation of obesity on self-efficacy, treatment intentions, and eating behaviors. While overweight and obese persons have indicated that a diagnosis of "food addiction" would not undermine their sense of personal responsibility for their weight or treatment seeking, this did not necessarily correlate with perceptions of control over eating.²³

Exposing individuals to a food addiction explanation has had mixed results.²⁴ One study found that participants had increased dietary concern and ate fewer calories after being given a food addiction diagnosis.²⁴ However, in another study, participants who read a news article supporting the concept of food addiction showed a trend for increased consumption of indulgent food (corn chips and chocolate cookies) compared with those who read an article dismissing the concept of food addiction.⁹

Where To From Here?

As scientific research continues to delve into the validity of food addiction as a psychiatric diagnosis, the adoption of this concept as a

"real" condition runs deep in many developed societies experiencing an obesity epidemic. It is important that we look at how this is impacting people's relationship to food and weight loss, to their bodies, and to each other. How a client will respond to a belief that he or she is addicted to food is unpredictable and needs to be considered on an individual basis. There is a possibility, based on current literature, that a client will feel comfort in recognizing failed weight loss attempts as something other than a personal failing, and this would likely alleviate self-blame and increase self-esteem. However, dietitians and other health practitioners need to help clients understand that they still have a role to play in their treatment outcomes and that addiction is not a permanent state they must surrender to.

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SCAN's Leadership Harvest

by Lindzi S. Torres, MPH, MS, RDN, CSSD

"It is only the farmer who faithfully plants seeds in the Spring, who reaps a harvest in the Autumn." — B.C. Forbes

One thing that is near and dear to me is the thoughtful and deliberate development of leaders and, more specifically, leadership in dietetics. The quote above reminds me of planting the seeds of leadership early in one's career so that it continues to reap a harvest of benefits for years to come.

Why Volunteer?

One of the best ways to become engaged in an organization is through volunteering. In addition to developing leadership skills and increasing your network, did you know that volunteering with SCAN is good for your health? The Corporation for National and Community Service found a strong relationship between volunteering and health: "Those who volunteer have lower mortality rates, greater functional ability, and lower rates of depression later in life than those who do not volunteer." If you'd like information on how volunteering can benefit your health, go to www.national-service.gov/pdf/07_0506_hbr.pdf. I encourage you to get involved volunteering at any level and hope you will look to SCAN as a place to invest in your volunteer and leadership health!

"My charge to you is to plant seeds sometime in the near future, whether you chose a small volunteer job or jump into a larger role. Want to start even smaller?"

SCAN's Volunteer Opportunities

Here's an overview of the various areas of SCAN where you can find volunteer opportunities:

- **Education** – Webinars, podcasts, continuing education for SCAN programs
- **Website** – SCAN resources and website updating, Student Corner, writing, editing
- **Membership** – Mentoring program, volunteer coordination, communications
- **Partnerships** – Assisting with SCAN's partnership efforts
- **Communications** – Marketing, public relations, editing, writing

- **Publications** – Writing, editing, SCAN'S PULSE, subunit newsletters, fact sheets
- **Symposium** – Planning and organizing committee, on-site assistance

For more information about volunteer opportunities with SCAN, visit www.scandpg.org/volunteer-opportunities/.

Plant Your Volunteer Seeds with SCAN

My charge to you is to plant seeds sometime in the near future, whether you chose a small volunteer job or jump into a larger role. Want to start even smaller? Use the Find a SCAN RD online program to find a local SCAN dietitian or leader in your area, respond to conversations on the SCAN electronic mailing lists (EMLs), join us at the SCAN events planned for the upcoming Food & Nutrition Conference & Exposition™ (FNCE®), or ask other SCAN volunteers how they got involved! We all started somewhere with someone encouraging us to get involved and invest in our future and the future of dietetics.

I hope you will attend FNCE® 2018 on October 20-23, in Washington, DC. You'll find some details about SCAN's events there on page 19 of this issue. See you there!

Conference Highlights

34th Annual SCAN Symposium

Keystone, CO • May 5-7, 2018

As always, the Annual SCAN Symposium was filled with great speakers, high energy, and excellent networking opportunities. Here are just a few of the highlights.

Emerging Research on Omega-3s and Brain Health

Presented by Michael Lewis, MD, MPH, MBA, www.brainhealtheeducation.org

- Omega-3 fats are related to brain health. Animal research (rats, mice) suggests that giving intravenous docosahexaenoic acid (DHA) within an hour after brain or spinal cord injury contributes to better outcomes regarding recovery. Would the same help athletes? Could DHA help with reducing the damage done by brain injuries? According to Michael Lewis, MD, MPH, MBA, athletes, war fighters, and others at high risk for concussion should consider taking 3,000 mg EPA + DHA per day as a protective strategy.
- Omega-3s can also help treat depression, and that might help reduce suicides. The suicide rate was 62% lower for soldiers with adequate levels of omega-3, versus soldiers with low blood levels of DHA.

Exercise and Bone Health

Presented by Wendy Kohrt, PhD, University of Colorado Anschutz Medical Campus

- We've all heard that weightbearing exercise is important for maintaining bone mass. Case in point: Runners have higher bone density than swimmers and cyclists. However, sometimes exercise breaks down bone. Both basketball players and

cyclists lose bone during the season—and then regain some of that loss during the off-season. Is this due to stress hormones, or low energy availability, or disruption of calcium homeostasis?

“Preliminary research is seeking to determine if consuming pre-exercise calcium would help increase bone mineral density or if it would disrupt normal regulatory function.”

- We know that calcium is lost via sweat, and about 20% to 25% of serum calcium leaves the blood during exercise. Where it goes is unknown. Preliminary research is seeking to determine if consuming pre-exercise calcium would help increase bone mineral density or if it would disrupt normal regulatory function.

Should Athletes Supplement with Antioxidants?

Presented by Scott Powers, EdD, PhD, University of Florida in Gainesville.

- Should athletes take antioxidant supplements? Probably not. The body has a natural balance of prooxidants and antioxidants. An imbalance can lead to muscular

fatigue and molecular damage. Antioxidant supplements can downregulate the body's natural production of antioxidants, and that can blunt the training response.

- Athletes can ingest a performance-enhancing balance of antioxidants (including vitamins C and E, zinc, carotenoids, and polyphenols) via all sorts of colorful fruits and vegetables: blueberries, strawberries, tart cherry juice, grape juice, broccoli, spinach, carrots, and so on.

Research Update on Nutrition, Exercise and Aging

Presented by Bob Murray, PhD, www.sportsscienceinsights.com and Christine Rosenbloom, PhD, RD, professor emerita, Georgia State University

- An estimated 35 million Americans are older than 65. By 2030, 70 million Americans will exceed the age of 85. Unfortunately, as we age, we lose muscle strength. That loss is associated with frailty and falls. Because the daily diet of an estimated 25% to 40% of older people lacks adequate protein, muscle loss is exacerbated.
- Research suggests that older people, including athletes, should increase their protein intake to 1.4 g to 1.6 g/kg per day, and up to 40 g after hard exercise. This helps boost the muscle-building response to exercise. For an older athlete who weighs 150 pounds (68 kg), this means 95 to 110 g protein per day. That's about 25 g four times a day—much more than what is provided in a bowl of oatmeal or a handful of nuts!

Possible Linkages Between Cannabis and Exercise Participation and Performance

*Presented by Angela Bryan, PhD,
University of Colorado Boulder*

- As we age, exercise becomes increasingly important, but aches, pains, and disability can limit the desire to exercise. Preliminary research suggests that cannabis can enhance the desire to exercise. Cannabis has anti-inflammatory properties that can reduce pain and enhance recovery. While cannabis is unlikely to enhance performance, it might help motivate a person to exercise. A survey of 429 cannabis users (average age: 40) indicates that 73% endorse cannabis use concurrent with activity for better enjoyment and recovery.
- In addition, in a study of older adults participating in a supervised exercise study, those who used cannabis reported exercising more than those who did not use cannabis. Stay tuned for more results from this emerging research topic.

The Evidence for Health at Every Size Approaches in Nutrition Therapy

*Presented by Julie Duffy Dillon, MS, RD,
CEDRD, Love Food podcast*

- Clients who live in a larger body commonly harbor shame, guilt, and body hatred. While their solution might be to eat less and exercise more to change their body size, we lack evidence that people can lose weight and keep it off. We do have solid evidence, however, that going on a diet leads to going off the diet and regaining the weight, plus more—and then going back on a weight-loss diet again.
- The health risks of yoyo dieting are more harmful than the (short-lived) benefits of weight loss.

Weight cycling (yoyo dieting) contributes to malnutrition, muscle loss, reduced metabolic rate, and feelings of deprivation. The binge-eating that occurs upon "blowing the diet" is linked to fat gain, inflammation, elevated blood pressure, and insulin resistance—to say nothing about disordered eating. Dieting is the number one predictor of who will develop an eating disorder. As a society, we need to accept that humans come in diverse sizes and shapes, and that dieting is harmful.

Binge Eating Disorder and Bariatrics

*Presented by Megan Kniskern, MS, RD,
CEDRD-S, Arizona State University*

- Larger bodies have been in existence since the oldest known human art forms. We need to embrace the fact that people come in—and can be happy in—diverse bodies, shapes, and sizes, and that the messages and actions of dieting can be very harmful. RDNs would do well to ensure a focus on food relationships and food behaviors that support an overall sense of happiness.
- Supporting the struggles and stigmas associated with a larger body requires evaluating the bigger picture. Can RDNs provide support for their clients, yet step away from the "weight loss cures all" mentality we have been seeing in the past few decades? Research does not suggest that larger bodies or bodies that might be considered "obese" by medical standards live shorter lives; they may even have an advantage over other weight categories as it relates to overall mortality.
- Binge eating disorder can be a contributor to obesity. An estimated 35% of those who seek bariatric surgery present with binge eating disorder. Many of the possible food struggles in bariatric candidates are often missed. This increases their risk for serious

emotional and medical complications down the road. If you suspect your clients might suffer from binge eating disorder, be sure to ask these questions:

- What percentage of your time do you spend thinking about food? (There is a larger percentage among binge eaters.)
- What defines a binge for you? (This opens up the conversation, reduces shame, takes away the isolation, and gives the client the opportunity to talk about this unspoken topic.)
- What do you really want—health or happiness?

"A survey of adolescent athletes indicates that 97% believed they would benefit from greater nutrition education."

Developing a High School Nutrition Program

*Presented by Brett Singer, MS, RD, CSSD,
Memorial Hermann IRONMAN Sports
Medicine Institute, and Christina Curry,
MS, RD, Memorial Hermann IRONMAN
Sports Medicine*

- A survey of adolescent athletes indicates that 97% believed they would benefit from greater nutrition education. That means the time is ripe for sports dietitians to teach them how to eat to win.
- How we help the students? Some options include team presentations, small group talks, one-on-one counseling, talks with parents, social media, and creating handouts and nutrition posters. What a good use of money from booster clubs and PTOs!

Improving Trail Nutrition Through Education and Meal Planning Preparation

Presented by Aaron Owens Mayhew, MS, RDN, www.BackCountryFoodie.com

- Long distance hikers can be on the trail from 10 days to more than 6 months. They carry with them their own food, water, and anything required to survive in the wilderness. They need food that is high in calories, light in weight, low in cost, and easy to prepare. This often results in a diet that includes highly processed convenience foods with limited nutrient-density (followed by binge-eating fast foods when in towns along the trails).
- The question arises: Are thru-hikers' diets nutritionally adequate? The answer is probably not, given that male hikers commonly report losing 30 to 40 lb on extended hikes. Aaron shared how she has developed ultralight foods for a 5,000-calorie nutrient-rich meal plan. Her goal is to help hikers go the distance with good health and energy to spare.

Applying Science to Performance

Presented by Leslie Bonci, MS, RD, CSSD, www.ActiveEatingAdvice.com #ScienceNotOpinion and #FactsOverFallacy.

- Evidence shows that exercising in a fasted state leads to muscle breakdown. Athletes should think twice before having nothing to eat before a morning workout.

- Swishing and spitting a sport drink can offer an energy boost at the end of a tiring exercise bout, but this can lead to inadequate fluid intake.
- The keto diet does not enhance performance; rather, it leads to a downregulation of the enzymes that carbohydrate needs to fuel a sprint at the end of an event.
- Whole30 and Intermittent Fasting are just two more fads to add to the list of unsuccessful diets.
- "Carb-phobia" refuses to go away, despite the plethora of research supporting the performance benefits of a carbohydrate-based sports diet. #Don'tDreadTheBread.

Filling the Gap in Sports Nutrition Guidance for Active People

Presented by Asker Jeukendrup, PhD, www.MySportsScience.com and Nanna Meyer, PhD, RD, CSSD, University of Colorado in Colorado Springs.

- The Position Statement of the Academy of Nutrition and Dietetics, the American College of Sports Medicine and Dietitians of Canada offers guidelines on nutrition for athletes—but what about nutrition for fitness exercisers and weekend warriors? Exercise physiologist Asker Jeukendrup, PhD, suggests that RDNs help match clients' nutritional guidelines to their athletic goals. In other words, determine why the client is exercising: Is it to lose weight, to build muscle, to finish an Ironman Triathlon, or simply to invest in better health?

- When it comes to fueling during extended exercise, Jeukendrup stated that the recommendations are similar for both athletes and less fit people: Both elite athletes and weekend warriors who exercise hard for more than 2 hours want to train the gut to be able to tolerate the recommended 60 to 90 g carbohydrate (240 to 360 kcal) per hour. They might have to start at the low end of the calorie range and build up to the recommended amount. The goal is to be able to enjoy high energy during exercise.
- Nanna Meyer, PhD, RD, CSSD, proclaimed that climate change is here and it's a critical time for athletes and RDNs alike to think more about how we can be good citizens and take better care of the earth that we enjoy. This could involve eating locally grown foods, choosing more plant foods, buying sustainably farmed fish, using fewer plastic water bottles, eating less food in wrappers, and buying from local farmers. We want to eat with integrity and with respect for the planet.

Conference Highlights editor Nancy Clark, MS, RD, CSSD has a private practice in the Boston area and offers online workshops for health professionals. For more information, visit www.NancyClarkRD.com and www.NutritionSportsExerciseCEUs.com.

Research Digest

Weight Management and Atrial Fibrillation

Fioravanti F, Brisinda AR, Sorbo G, et al. Compliance in weight control reduces atrial fibrillation worsening: a retrospective cohort study. *Nutr Metab Cardiovasc Dis.* 2017;27:711-716.

Of late, researchers have focused on the link between atrial fibrillation (AF) and obesity. Recent findings have shown a strong correlation between obesity and the etiology of AF. Research suggests that a normal body mass index (BMI) no higher than 25 kg/m² may prevent and even reduce repeated arrhythmia episodes. This retrospective cohort study selected 270 eligible patients who were analyzed for their symptomatic AF relapse over a 2.5-year time frame. Patients were divided into four groups according to their BMI during the follow-up period. Group 1 participants had normal BMI (<25); group 2 participants were overweight (BMI 25-29.9) but lost weight over time (at least two BMI units); group 3 participants were overweight but had no weight change over time; and group 4 participants (initial BMI >25) gained weight over time by two BMI units. Results showed that one AF episode occurred every 1.7 months in group 4, every 4.6 months in group 3, every 9.7 months in group 2, and every 10 months in group 1. The findings suggest that a BMI <25 reduces the risk of AF recurrence two-fold. AF risk increased in noncompliant overweight patients. This study supports the LEGACY Trial findings showing that obesity is directly implicated in the genesis of AF. It is important to stress achieving a normal BMI to lower the risk factors of AF and protect against occurrence or recurrence.

Summarized by Dori Cinque, MS, RD, CDE, CDN, clinical nutritionist at Island Cardiac Specialists, a NYU Winthrop Medical Affiliate, Garden City, NY.

“Educating teens to identify higher-quality foods and improve overall eating habits may support not only physical health but also cognitive development.”

Diet Quality and Adolescent Attention Capacity

Henriksson P, Cuenca-García M, Labayen I, et al. Diet quality and attention capacity in European adolescents: the Healthy Lifestyle in Europe by Nutrition in Adolescence (HELENA) study. *Br J Nutr.* 2017;117: 1587-1595.

Adolescence is a crucial period of cognitive development. To understand potential modifiable factors, this study examined dietary patterns and their effect on adolescents' attention capacity. Using data from the Healthy Lifestyle in Europe by Nutrition in Adolescence (HELENA) study, this cross-sectional study involving 384 adolescents examined their dietary patterns, as measured by two nonconsecutive 24-hour recalls, and their attention capacity, as measured by the d2 Test of Attention. Macronutrient and fiber intake in addition to indices of three dietary patterns (the Diet Quality Index for adolescents [DQI-A], the ideal diet, and the Mediterranean

diet) were calculated using two-sided T-tests. The DQI-A measures overall diet quality and diversity, the ideal diet is based on the Dietary Approaches to Stop Hypertension (DASH) diet, and the Mediterranean diet measures consumption of specific foods. After adjusting for age, sex, body mass index (BMI), maternal education, and family affluence, scores for the DQI-A and ideal diet were positively associated with attention capacity ($P=.002$ and $P=.005$, respectively). After adjusting for physical activity, the ideal diet did not reach significance, because 44% of participants had missing physical activity data. A Mediterranean diet was not associated with improved attention capacity. While sodium and soft drink consumption was negatively correlated with attention ($P=.006$ and $P=.037$, respectively), these were the only significant food-specific findings. These results suggest that an overall pattern of high-quality food choices is most highly associated with improved attention capacity in adolescents.

Educating teens to identify higher-quality foods and improve overall eating habits may support not only physical health but also cognitive development. This study was funded by the Spanish Ministry of Economy and Competitiveness and supported by the SAMID III network, RETICS, funded by the PN I + D + I 2017-2021 (Spain), ISCIII-Sub-Directorate General for Research Assessment and Promotion and the European Regional Development Fund and by the University of Granada, Plan Propio de Investigación 2016, Excellence actions: Units of Excellence, Unit of Excellence on Exercise and Health.

Summarized by Andrea Walsh, graduate student, Department of Nutrition and Integrative Physiology, Coordinated Master's Program, Nutrition, Education and Research Concentration, University of Utah, Salt Lake City, UT.

Exhaustive Training and Oxidative Stress

Withee ED, Kimberly MT Dehen R, et al. Effects of methylsulfonylmethane (MSM) on exercise-induced oxidative stress, muscle damage, and pain following a half-marathon: a double-blind, randomized, placebo-controlled trial. *J Int Soc Sports Nutr.* 2017;14:1-11.

Exercise results in the production of free radicals necessary for training adaptations, including muscle growth. However, excessive levels during exhaustive exercise contribute to cellular damage, including increased muscle damage.

Methylsulfonylmethane (MSM) is a sulfur-based nutritional supplement that appears to have pain and inflammation-reducing effects. The purpose of this study was to test the effects of MSM in reducing oxidative stress associated with muscle damage, soreness, and joint pain. In this randomized, double-blind, placebo-controlled trial, 22 male and female participants from the registrant pool of the Portland Half Marathon were randomized to receive either 3 g/day of rice flour placebo or 3 g/day of MSM for 3 weeks prior to the race and continuing until 2 days after the race. Blood serum measurements of oxidative stress (8-hydroxy-2'-deoxyguanosine [8-OHdG] and malondialdehyde [MDA]) and muscle damage (creatine kinase [CK] and lactate dehydrogenase [LDH]) were collected 4 weeks prior to the race day (baseline), and again 15 minutes (T1), 90 minutes (T2), 1 day (T3), and 2 days (T4) posttrace. To measure muscle and joint pain, a 100 mm Visual Analog Scale (VAS) was used at each time point. Running in a half-marathon resulted in a significant increase in oxidative stress, muscle damage, and pain outcome measures ($P < .001$). There were no significant time-by-treatment effects for any

outcome measures. However, there was a clinically significant (change >10 mm) reduction of muscle and joint pain with MSM supplementation. The results of this study suggest that MSM supplementation does not decrease pretraining levels of oxidative stress but may be associated with a reduction in pain. Athletes considering supplementation to combat joint pain should consult a registered dietitian regarding individual efficacy. This study was funded by Bergstrom, supplier of the supplements and placebos in this study.

Summarized by Lindsey Kotecki, graduate student, Department of Nutrition and Integrative Physiology, Coordinated Master's Program, Sports Nutrition Concentration, University of Utah, Salt Lake City, UT.

“The results suggest that athletes may benefit from vitamin C and gelatin supplementation, but further research is needed.”

Vitamin C and Gelatin Supplementation to Promote Collagen Synthesis

Shaw G, Lee-Barthel A, LR Ross M, et al. Vitamin C-enriched gelatin supplementation before intermittent activity augments collagen synthesis. *Am J Clin Nutr.* 2017;105:136-143. The collagen-rich extracellular matrix supports the body's connective tissues. However, intense training strains the

musculoskeletal system, resulting in more frequent injuries. Nutrition strategies, such as use of vitamin C and gelatin, may promote collagen synthesis and improve mechanics in these tissues. The purpose of this study was to evaluate the effects of gelatin supplementation on collagen synthesis. In this randomized, double-blinded, crossover study, eight active males consumed either 5 or 15 g of gelatin dissolved in a vitamin C-enriched isocaloric beverage or a vitamin C placebo. Blood samples were taken at baseline and at 30 minutes and 1 hour after beverage ingestion. Engineered ligaments that were formed using ligament cells from a male donor were treated with blood from before or 1 hour after initial drink ingestion. One hour after the initial drink, participants performed rope-skipping continuously for 6 minutes, and blood samples were taken 30 minutes, 1 hour, 2 hours, and 4 hours postexercise. The supplementation and exercise regimen continued for 3 days, three times daily, with ≥ 6 hours between bouts. Blood samples from baseline, 4 hours, 24 hours, 48 hours, and 72 hours after the first exercise bout were used to examine N-terminal peptide of pro-collagen I (PINP). Serum glycine, proline, hydroxyproline, and hydroxylysine significantly increased and peaked 1 hour after ingestion in the 15 g group ($P < .05$). The engineered ligaments increased in collagen content in the 15 g group and mean tensile strength in all groups ($P < .05$). PINP increased in the 15 g group, and this effect was maintained throughout the 3 days ($P < .05$). The results suggest that athletes may benefit from vitamin C and gelatin supplementation, but further research is needed.

Summarized by Kala Riester, graduate student, Department of Nutrition and Integrative Physiology, Coordinated Master's Program, Sports Nutrition Concentration, University of Utah, Salt Lake City, UT

SCAN Notables

by Traci Roberts

- **Michele Macedonio, MS, RD, CSSD** and **Christine Rosenbloom, PhD, RD, CSSD** teamed up with other notable experts to produce the *Active Nutrition Guide for Clif Bar & Company*. The guide provides evidence-based recommendations that can be used as a resource for nutrition professionals working with active individuals.
- A team of RDNs received acceptance of their manuscript that adds to the evidence for medical nutrition therapy (MNT) for dyslipidemia management. **Geeta Sikand, MA, RDN**, along with **Renee E. Cole, PhD, RDN**, **Deepa Handu, PhD, RDN**, and colleagues wrote, "Clinical and Cost Benefits of Medical Nutrition Therapy by Registered Dietitian Nutritionists for Management of Dyslipidemia: A Systematic Review and Meta-Analysis," which will be published in the *Journal of Clinical Lipidology*.
- **Marie Spano, MS, RD, CSCS, CSSD**, **Laura Kruskall, PhD, RD, CSSD** and **D. Travis Thomas, PhD**,

RDN, CSSD had their book, *Nutrition for Sport, Exercise and Health*, published through Human Kinetics. The book is meant to serve as a textbook for students and as a resource for professionals involved in sports nutrition and dietetics.

- **Cheryl Toner, MS, RDN** was honored to represent SCAN at the Special Olympics Inclusive Health Summit in June in Seattle, WA. She was joined by SCAN member and Academy President-Elect, **Teri Raymond, MA, RD, CD, FAND** in learning how our professional organization can do more to promote health care that is inclusive of those with intellectual disabilities (ID), as well as support our members in providing services that are appropriate for athletes and others with ID.
- SCAN member **Mary Pittaway, MA, RDN** along with Alice Lenihan, MPH, RD led a team of dietitians (including SCAN member **Abby Pattison, MS, RD**), kinesiologists, nurses, physicians and health educators in providing healthy eating, hydration, and physical

activity guidance to athletes at the 50th Special Olympics USA Games in Seattle in July. The interactive stations assessed height, weight, bone density, and blood pressure, and engaged athletes in conversation and interactive education opportunities to reinforce health education recommendations. Athletes were involved in health-related goal setting and referred to health care providers including dietitians for follow-up care. Mary and Alice developed the Health Promotion education, screening and referrals program now delivered in the U.S. and throughout the world. The program, part of the bigger Healthy Athletes program, is designed to help reduce health disparities of people with intellectual disabilities. Together, they have been serving Special Olympics athletes and training health care professionals to join them for more than 15 years.

If you have an accomplishment that you would like published in an upcoming issue of PULSE, please contact Traci Roberts at fivespotjones@gmail.com.

of Further Interest

■ News from Wellness/CV RDNs Subunit

Here is an update from the Wellness/CV subunit:

• **New Webinar on Health Coaching.** Health and wellness coaching is becoming more and more popular and dietitians are uniquely suited to this role. Well-developed coaching skills can positively affect patient outcomes by helping clients work toward positive behavior changes. Our new webinar, Health & Wellness Coaching for the RDN, is almost ready and is a great introduction to health and well-

ness coaching and how it can help you and your clients. Watch for its release this fall at SCAN's e-library at www.scandpg.org/e-library.

• **CV Reimbursement Trends/Efforts.** RoseAnna Holliday, PhD, RDN and Geeta Sikand, MA, RDN, CDE, CLS, FAND, FNLA are SCAN's new reimbursement co-representatives. If you're interested in becoming involved in our efforts to increase awareness of reimbursement issues/topics, please contact Wellness/CV co-director Carol Kirkpatrick at fellcaro@isu.edu.

• **SCAN Symposium Recap.** We enjoyed meeting new members and re-connecting with long-time members at the 2018 SCAN Symposium at the Keystone Resort. If you couldn't attend this year, we hope you'll plan to join us in Phoenix, AZ, April 26-28, 2019, for the 35th Annual SCAN Symposium, which has a wellness-focused theme (see "Upcoming Events" in this issue).

• **Seeking PULSE Liaison.** The Wellness/CV subunit is looking for a volunteer to serve as the PULSE liaison. This role entails writing brief news items and announcements (as shown

here) and submitting these as our subunit's contribution to "Of Further Interest" for each issue of *PULSE*. If you're interested in serving in this role, contact either of the Wellness/CV co-directors: Mark Hoesten at mshcgc@yahoo.com or Carol Kirkpatrick at fellcaro@isu.edu.

■ News from Sports Dietetics—USA (SD-USA) Subunit

Below are some highlights from the SD-USA subunit:

- **SCAN Speaking Opportunity.** The SCAN-NATA (National Athletic Trainers' Association) Committee has developed a PowerPoint presentation that highlights the collaborative working relationship of sports RDNs and certified athletic trainers (ATCs). Any SCAN member can apply to offer this presentation at any NATA-approved provider program. SCAN benefits from increased exposure, NATA members benefit by connecting with a local nutrition expert, and you can benefit from potential referrals and an honorarium. Visit www.scandpg.org/sports-nutrition/working-with-a-sports-nutritionist/promoting-a-sports-dietitian/ for more information.

- **Volunteer Opportunities.** SD-USA runs on volunteers, and we need you! Specifically, we are looking for members who:

- o Have experience with podcasts
- o Have a passion for working with high school athletes
- o Are excellent editors and reviewers (for fact sheets and webinars)
- o Want to strengthen partnerships with our external relationships (with NATA, National Strength and Conditioning Association [NSCA], Professionals in Nutrition and Exercise Science [PINES], Athletes in the Arts)
- o Want to become leaders in sport nutrition

Visit the SCAN volunteer page at www.scandpg.org/volunteer-opportunities/ today!

- **Athletes in the Arts Partnership.** SCAN now has an official partnership

with Athletes in the Arts (an initiative of the American College of Sports Medicine). This ties in with our Expanding the Arena Initiative by promoting opportunities for sports dietitians to work with performing artists. We are looking for volunteers who are interested in developing this partnership. Please contact the SCAN office at info@scandpg.org.

- **CSSD Exam Window.** The 2019 exam dates and fee schedule for the Board Certified Specialist in Sports Dietetics (CSSD) credential are now available. Visit the Commission on Dietetic Registration (CDR) website at www.cdrnet.org/certifications/board-certification-as-a-specialist-in-sports-dietetics for more information.

■ Manuscripts for *PULSE* Welcome

SCAN'S *PULSE* welcomes the submission of manuscript to be considered for publication. In particular, *PULSE* is interested in receiving original research reports and review articles. Manuscripts presenting practical guidelines, case studies, and other information relative to SCAN will also be considered.

Manuscripts must be prepared and submitted in accordance with *PULSE*'s Guidelines for Authors; only manuscripts that follow these guidelines will be considered. The Guidelines for Authors can be accessed at www.scandpg.org/nutrition-info/pulse/.

■ Call for Abstractors for "Research Digest"

The "Research Digest," which appears in each issue of SCAN'S *PULSE*, provides summaries of published papers relating to all of SCAN's practice areas: nutrition for sports and physical activity, cardiovascular health, wellness, and disordered eating and eating disorders.

You can contribute to the "Research Digest" by volunteering to abstract a recently published study on any of the above practice areas. For details on this opportunity, contact Kary Woodruff, MS, RD, CSSD, co-editor of

"Research Digest," at kary.woodruff@health.utah.edu. Become a contributor to *PULSE*!

■ Sports Nutrition Manual: The Authoritative Text

Sport dietitians who haven't yet purchased their copy of *Sports Nutrition: A Handbook for Professionals*, sixth edition, can purchase the latest version of this long-revered sports manual today at www.eatrightstore.org. This full-color edition—edited by two SCAN members and written and reviewed by esteemed sports RDNs and other exercise experts—presents timely research and evidence-based advice for health professionals working with athletes at all levels. Comprehensive in scope, the manual incorporates theoretical and practical information with key takeaways designed for easy implementation in daily practice.

The latest *Sports Nutrition* explores all areas of sports and fitness nutrition for both the seasoned and novice dietitian. Included in this edition is a new chapter discussing emerging opportunities in sports nutrition, a completely revised overview of exercise physiology, strategies for sports nutrition assessment, updated population- and sport-specific recommendations, and more. The sixth edition also serves as an excellent study aid for the CSSD specialty exam. The price is \$65 for Academy members at www.eatrightstore.org.

■ Learn More About Providing Telehealth

Telehealth is an emerging area of practice for many health care professionals. Until a consensus "gold standard" is in place, the health care landscape remains in flux in terms of regulations, policies, and standards. Despite this, technology is entering into mainstream practice, and many RDNs are asking themselves how their patients can benefit from telehealth and tele-nutrition. The Academy provides resources on this growing delivery strategy. To obtain more information on providing telehealth care to your patients, go to www.eatrightpro.org/practice/practice-resources/telehealth.

■ Academy Webinars Cover Numerous Topics

The Center for Lifelong Learning's Webinar Series is the perfect way to expand your practice skills and learn about late-breaking developments in dietetics while earning continuing professional education units (CPEUs), all at your convenience. Live webinars offer opportunities to interact with leading food and nutrition practitioners, while recorded webinars make online education available anytime. The Academy's suite of recorded education webinars covers a range of subjections, from emerging clinical topics to reimbursement issues, practice methods, and more. For information on the Academy's webinars, including a list of upcoming live webinars, go to www.eatrightpro.org/practice/professional-development/distance-learning/webinar-series.

■ Interactive Handout Teaches Plate Method for Healthy Eating

Ideal for RDNs working with clients on weight control, healthy eating, and diabetes, *Dish Up a Healthy Meal* is a new handout that helps you explain the popular plate method for portion control and healthy eating in an engaging and interactive manner. This tearpad of 50 colorful, placemat-sized handouts includes tips for choosing healthful options from each *MyPlate* food group and offers a place to create a customized meal plan. To order, go to www.eatrightstore.org.

■ Certificate of Training Program in Informatics in Nutrition—and Much More

Today's RDN can keep up with the rapidly changing world of health care through a training program that examines informatics in nutrition. The Academy's Center for Lifelong Learning, planned with the Nutrition Infor-

matics Committee, the NIC Consumer Health Informatics Workgroup, and the Interoperability and Standards Committee, offers this program to ensure that nutrition professionals stay up-to-date with the latest methods of processing and using data in all areas of the profession. The program covers every facet of informatics, including electronic health records, security and ethics, utilizing data, and more. The information presented in this program can be successfully used on a daily basis.

Several other certificate of training programs are also available from the Academy's Center for Lifelong Learning. A sampling of the areas covered include vegetarian nutrition, obesity interventions in adults, childhood and adolescent weight management, and public health nutrition. For more information on all of the Academy's certificate of training programs, go to www.eatrightstore.org/cpe-opportunities/certificates-of-training.

■ Take a Look at the Academy's Online Marketing Center

The Academy's Online Marketing Center provides members with the resources needed to improve their brand. The more RDNs do to cultivate their career brand, the more successful they will likely be in their career. Self-branding is essential to career advancement because branding helps define who you are, how you are great, and what value you bring to the workplace. For resources on how to build a name for yourself and showcase what sets you apart from the competition, visit www.eatrightpro.org/practice/career-development/marketing-center.

Mark Your Calendars

FNCE® 2018
October 20-23
Washington, DC

Join us at the **2018 Food & Nutrition Conference & Expo™ (FNCE®)** for outstanding sessions and events.

A few of the highlights include:

- **SCAN Networking Reception**

Enjoy this opportunity to meet and network with your SCAN colleagues

- **SCAN Booth at the DPG/MIG Showcase**

Take a look at what SCAN offers members and chat with your SCAN leaders

- **SCAN Spotlight Session**

"Heart of an Athlete: Managing Hypertension in Athletic Populations"

Presenters: Alan Hinderliter, MD and Jackie Buell, PhD, RD, CSSD, ATC

For more information and updates, watch for eblasts and visit www.scandpg.org/fnce-2018/

Upcoming Events

October 20-23, 2018

Food & Nutrition Conference & Expo™ (FNCE®), American Academy of Nutrition and Dietetics, Washington, DC. **SCAN Spotlight**

Session: *Heart of an Athlete: Managing Hypertension in Athletic Populations*, presented by Alan Hinderliter, MD and Jackie Buell, PhD, RD, CSSD, ATC. For information: www.scandpg.org/fnce-2018 and <https://eatrightfnce.org/>. Also, see page 19 in this issue for some highlights.

November 10-12, 2018

American Heart Association Scientific Sessions, Chicago, IL. For information: https://professional.heart.org/professional/EducationMeetings/MeetingsLiveCME/ScientificSessions/UCM_316900_Scientific-Sessions.jsp

November 9-11, 2018

Annual Renfrew Center Foundation Conference, Philadelphia, PA. For information: www.renfrew.com

November 11-15, 2018

Obesity Week, Nashville, TN. For information: American Society for Metabolic & Bariatric Surgery and The Obesity Society, <https://obesityweek.com/>

April 26-28, 2019

Join your colleagues at the **35th Annual SCAN Symposium, Navigating the Path of Wellness**, Phoenix, AZ. For more information: www.scandpg.org/symposium-2019/

SCAN'S PULSE

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Appropriate announcements are welcome. Deadline for the Spring 2019 issue: Jan. 1, 2019. Deadline for the Summer 2019 issue: April 1, 2019. Manuscripts (original research, review articles, etc.) will be considered for publication. Guidelines for authors are available at www.scandpg.org. Email manuscript to the Editor-in-Chief; allow up to 6 weeks for a response.

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(Click Nutrition Info tab, then "SCAN'S PULSE")**