An Analysis of the Health at Every Size® Approach to Nutrition Counseling

Anita Bermann, MS, RDN, CD

Whatever your philosophical approach to dieting, the conversation about how food affects body weight is impossible to ignore. Traditional weight management generally prescribes a “calories in, calories out” pathway to health, emphasizing the importance of reducing excess calorie intake and increasing physical activity in order to achieve or maintain a certain body weight. However, a growing body of research exploring the ineffectiveness of restrictive diets to achieve either permanent weight loss or improved long term health, may necessitate a closer examination of certain nutrition practices. A new wave of social justice-driven health philosophy has recently been gaining momentum: the Health at Every Size® approach, or HAES®, trademarked by the Association for Size Diversity and Health. This article will examine both the challenges that arise with a traditional weight-focused approach to health and evidence for the efficacy of HAES methods.

Part I: Weight Management Science

We live in a culture hyper-focused on weight, with headlines frightening us to fight the deadly “obesity crisis,” also referred to in 2003 by the Surgeon General as “the terror within...more dangerous than weapons of mass destruction.” Doctors frequently direct their patients to lose weight through dieting to improve all manner of health conditions, but there is currently enough evidence to suggest, at this point, that we have few successful, effective ways to take people in large bodies and shrink them into small bodies without potentially causing harm.

Restrictive diets have historically been popular because they do achieve weight loss in the short term. In the long term, however, research indicates that we may have less control over our weight than originally believed. Current analyses show that the majority of people, 90% to 97%, regain most or all of their lost weight (and sometimes even more) within five years after a diet, regardless of whether they maintain their diet and exercise changes. This is not always obvious from an initial glance at the literature because most weight loss intervention studies are 6 to 18 months long—too short a time frame for weight regain to occur. For example, in the Women's Health Initiative, more than 20,000 women maintained increased physical activity and ate a low-fat, calorie-reduced diet; but after eight years there was no significant change in weight from the start of the study. Another meta-analysis of 29 studies of US weight-loss programs found that after five years, participants regained an average of 77% of their lost body mass, leading researchers to conclude that “one third to two thirds of dieters regain more weight than they lost dieting...In sum, researchers suggest there may be a lack of support for the notion that diets lead to lasting weight loss or health benefits.”

In response to these findings, healthcare providers often prescribe continuous dieting in order to lose...
Editor’s Notes

The majority of the spring newsletter is built around weight and the methods we employ, for better or worse, to get more or less of it. We thought it was time to make sure members are informed, if not yet, about the Health at Every Size® (HAES®) approach and social justice movement. Unfortunately, the Academy did not approve the article for CPE activity as it was considered unbalanced. While arguably in its early stages, this is an approach with evidence, and shouldn’t be ignored. In the end, these philosophies at their core are advocating for compassionate care and sustainable health which is quite easy to stand behind. To put a rest to any current or future controversy, there will have to be a measure of openness and precise and consistent messaging from all positions.

Please check out my editorial on the intersection of HAES and IFN. Do you agree? Disagree? What’s missing? Email and tell us what you think.

While HAES may expand our working definition of integrative nutrition by further considering unaddressed elements of the human experience, nutritional genomics takes us further into functional nutrition by exploring individual genetic and epigenetic expression. Justine Horne’s article provides an excellent examination of genomics in the context of weight management. What these, and many other tools or perspectives, have in common is that they allow for deeper and more nuanced personalization, a foundational principle in our practices.

Please also check out a bonus and timely article from stipend recipient Denine Rogers on food preservation and essential oils and a well-written review of Andrea Lieberstein’s book Well Nourished which outlines a pathway towards a fulfilling mind-body relationship with food.

The subject of weight, individually and collectively, is deep and layered and encompasses more than the foods we eat. With this issue, we hope to unearth some of its layers and get the conversation started. Huge thanks to our newsletter team, contributors, and DIFM members who keep us going! As always, feel free to email me at jenas_mailbox@yahoo.com or find me on Instagram @jenagrd.

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Chair’s Corner

While an entire year has passed, it seems like just yesterday I was at our Spring Leadership Retreat planning for an amazing year! I remember feeling so full of excitement about all of the great ideas that came out of that weekend! Looking back, it’s crazy how quickly time flies by.

As the end of my term approaches, it seems only appropriate to reflect on the year. First and foremost, we are growing strong! DIFM membership has grown to almost 6000 members and continues to be a thriving community both on and offline. It truly is an exciting time to be a part of DIFM! It’s also exciting to see integrative and functional nutrition being applied to so many practice areas and to see DIFM members at the forefront of relevant and cutting-edge topics in nutrition right now. From yoga therapy to nutrigenomics to digestive health and intuitive eating, applying an integrative and functional lens to wellness is becoming the mainstream way to practice dietetics.

We didn't get to accomplish everything on the agenda this year, but I'm still super proud of DIFM's Leadership Team! Their passion and commitment to the growth of our DPG is unsurpassed, and the collective effort throughout this year has helped to pave the way for our members to be recognized as true leaders in IFN.

Some of this year's accomplishments:

With the help of an amazing task force led by Monique Richard, MS, RDN, FAND, and IFN experts Diana Noland, RDN, MPH, CCN, and Sudha Raj, PhD, RDN, FAND, we revised the Standards of Practice and Standards of Professional Performance (SOP/SOPP) for RDNs in Nutrition in Integrative and Functional Medicine (NIFM). Focus Area SOP and SOPP are tools used by registered dietitian nutritionists for self-evaluation, professional development, and advancement of practice. The Revised 2019 SOP and SOPP for RDNs in NIFM will be available in print in the June 2019 issue of the Journal of the Academy of Nutrition and Dietetics, so keep an eye out for that!

If there was a theme for this past year, I would say it was EDUCATE! Our Professional Advancement Team, led by our 2019-20 Chair-Elect Kory DeAngelo, MS, RD, CD, kicked the year off right with a hugely successful, sold-out, 3-part webinar series on gut health. Our Diversity Team, chaired by Miho Hatanaka, RD, was recently awarded with a diversity mini-grant. Her team plans to start a podcast showcasing diversity and creating community by highlighting the amazing work being done by RDNs of varied ethnic backgrounds.

So proud of Miho and her team! Not only were we helping to bring attention to DIFM, we’re also educating other RDNs and health professionals about IFN and how it can be applied in all practice areas. DIFM members are being sought after to speak about IFN at state and local Academy meetings and nutrition conferences all over the country. We are breaking out of the “alternative” health box in a major way. If you love to share what you know about IFN as a speaker, now is the time to get out there and spread your knowledge!

Here a few speaking highlights from our Leadership Team:

✓ Our California State Ambassador has been leading the charge in California! Sangeeta Shrivastava, PhD, RDN, has done an amazing job hosting two well-attended IFN events in California.

✓ Our new Mind-Body Chair Anu Kaur, MS, RDN, spoke at the annual Illinois Academy Spring Assembly on “The Emerging Field of Yoga Therapy in Dietetics.”

✓ Mary Purdy, DIFM’s immediate past chair, was invited to speak at the Academy of Integrated Health and Medicine (AIHM) conference and presented two posters at the Washington State Academy of Nutrition and Dietetics conference.

✓ Our Chair-Elect Dana Elia, MS, RDN, spoke at the Lancaster Holistic Nurses Association meeting as well as both the Central PA and the WV Academy meetings.

We are moving and shaking, folks!

We cannot talk about accomplishments this past year without giving thanks and appreciation to our FNCE® team. Bridgitte Carroll, MS, RDN, our sponsorship chair, secured partnerships that allowed us to host two wonderful events at FNCE®. Co-Chairs Mary Alice Gettings, RD, and Ann Suls, MS, RD, worked tirelessly planning our hugely successful pre-FNCE® symposium and 20-year birthday bash disco party! After 6 years, they’ve decided to retire and pass the reins to our former newsletter editor herself, Sarah Laidlaw. I know we are in capable hands with Sarah at the helm!

Even with all of these accomplishments to reflect on, I think the best part of this position for me has been the opportunity to connect more with DIFM members at various events and at FNCE® and with other leaders in the Academy. It has also allowed me to be a stronger advocate for our DPG and for all of the bright RDNs working in IFN. Lastly, it has been an honor serving as your chair. I am super thankful for this experience and for getting to work so closely with the Leadership Team. I leave you in the most capable hands going forward! I look forward to supporting Dana Elia, MS, RDN, FAND, as your new chair and will help support her vision and leadership as we continue to stay true to our very passionate points of view and strive to elevate our profession and our skills. Until then, I look forward to seeing you at a nutrition conference or at FNCE®—please stop me and say hello!

Danielle

Danielle Omar, MS, RDN
the regained weight, but this approach often results in weight cycling, or “yo-yo dieting,” which has been found to be more damaging to health than the higher body weights themselves. Further, people with the largest fluctuations in weight seem to have the highest risk of all-cause mortality, in addition to increased risk for diabetes, heart disease, osteoporosis, and certain cancers.5,13,14 People who pursue weight loss also appear to carry the highest risk of weight gain. In the Finn Twin Study of over 4,000 twin pairs, the individual twins with the most frequent intentional weight loss attempts were heaviest at 25 years.15 In the Nurses’ Health Study II, women with a history of weight cycling were found to gain more weight over time and engage in less physical activity and more binge eating than their peers.16

It also appears that restricting food intake can change body composition in a way that results in a higher proportion of fat to lean body mass (LBM) over time as LBM is lost with each diet and fat is regained after, decreasing fitness, muscular strength, and endurance.12,15-18 Research points to associations of weight cycling with increased insulin resistance, loss of bone density, inflammation and damage to endothelial cells, as well as pathogenic disruptions in gut microbiota, including a shift to more calorie-absorbing strains. These changes thus increase risk for chronic diseases such as cardiovascular disease (CVD) and diabetes.12,18 In both the National Health and Nutrition Examination Survey (NHANES) and Framingham Heart studies, the health risks associated with obesity are theorized by Tykla et al to result from weight cycling.5

When the human body experiences the physiologic stress of energy restriction, metabolic changes occur, including greater fat storage capacity, an increase in hunger signals, and a decrease in resting energy expenditure, predisposing an individual to weight regain.5,12,18 An instructive example of this phenomenon is the Biggest Loser Follow-Up Study.24 In this study, 14 participants were followed for six years after completing the television competition. Contestants lost an average of 58 kg of weight during the series, but their resting metabolic rates (RMR) had decreased even further on average, to 704 kilocalories per day. After six years, in which the participants continued competition levels of physical activity and a low-calorie diet, their RMRs had decreased even further on average, to 704 kilocalories under baseline. They also had lower levels of the satiety hormone leptin and regained an average of 41 kg (70%) of their initial lost body mass. They were back near their starting point weight, but now hungrier, exercising constantly, and eating ~700 kilocalories less food a day to maintain that weight.20

Dieting efforts are often characterized by a repeated cycle of restricted eating followed by binge episodes in response. Over time, this has been shown to lead to greater food anxiety, increased obsessive thoughts about food, increased body dissatisfaction, more frequent overeating in response to negative emotions and stress, depression, and clinically significant eating disorders like binge eating disorder, anorexia, and bulimia.26-28 Studies have shown that the more individuals are taught to cognitively restrain their eating, the more they binge eat in response to stressful situations. Therefore, these cognitive controls are disrupted, resulting in further weight gain and subsequent disordered eating. This is especially visible in children, who were shown non-hunger-related snacking for up to three years after a period of parental restriction of certain snack foods.27 In another study of adults, both male and female participants consumed higher energy intake from chocolate snacks and reported increased guilt after eating in response to a period of chocolate restriction.28 Changes in brain chemistry resembling post-traumatic stress disorder have even been observed.29 In the Minnesota Semi-Starvation Study,30 patients following a diet with a 1500 kcal/day limit entered a brain state termed “semi-starvation neurosis” after just 24 weeks, with “obsessive preoccupation with sweet foods and food images.” The DSM-5 definition of an eating disorder includes “recurrent inappropriate compensative behavior to prevent weight gain,” thus, these psychological changes may be surprising.30,31 Often, in order to sustain weight loss long term, many people must maintain extreme levels of dietary restraint, physical activity, and self-monitoring behavior.32

The final consideration when evaluating a weight-centered approach to health is efficacy. Evidence suggests that weight loss through dieting does not offer the promised health benefits of improved mortality or morbidity long term. In other words, when most large people lose weight, they may not achieve the health of someone already in a smaller body.33 The 2012 Look AHEAD study found that people with type 2 diabetes who lost weight had just as many heart attacks and deaths as those who did not.34 Although blood sugar initially improves with bariatric surgery, this happens immediately rather than after weight loss, suggesting that dietary changes (smaller meal sizes) may be the actual cause.35

Some individuals are metabolically healthy prior to weight loss attempts (see Part II) yet become less so through weight cycling. They may lose weight in the short term but increase mortality in the long term compared to if they had never lost weight. Researchers suggest this is likely related to loss of lean body mass and associated inflammatory changes.14 Breakdown of adipose tissue releases stored persistent organic pollutants into the bloodstream, which damages cells.36 In rats, when food is restricted to allow a 20% loss of body mass, followed by permissive feeding to allow weight regain, the weight cycling animals develop additional abdominal adiposity and heart disease.35 In one study, women with a body mass index (BMI) >30 who had dieted had high blood pressure, while those who never tried to lose weight did not.36 In another study of 505 middle-aged men of various BMIs ranging from “normal” to “obese” with and without weight-loss dieting attempts, only the “stable obese” who had never tried to lose weight did not.36 Further, the “stable obese” men had the same risk of death as “stable non-obese” men, demonstrating that it may be the process of weight loss attempts, and not the weight itself, that causes disease.37

Part II: A History of Body Mass Index and Weight Research: BMI May Not Necessarily Be Associated with Health

A large person who loses weight does not achieve the health of a smaller person, but, if weight is stable, that large person’s disease risk in their original body may not be much higher after all.38 To investigate this, it is instructive to think about the history of weight and health research.

The level of fatness found to be socially acceptable or even ideal has varied widely across cultures and eras but the idea of a “healthy” versus “unhealthy” number on a scale did not come into common understanding until 1943. It was then that the Metropolitan Life Insurance Company published a chart of “desirable” height/weight values, based on mortality data from their life insurance policies. A revolution in language followed: no longer were people “plump” and “thin,” they were “over” or “under” weight. The term “obese” entered the lexicon from the Latin obesus, or “having eaten until fat,” conveying the judgment that anyone “over” the “normal” range on the weight scale...
must have eaten themselves there. A National Obesity Society formed, with the vision statement that "the thinner she or he was, the healthier she or he was."19

In 1972, Keys et al found the Metropolitan Life Insurance data to be critically flawed due to a failure to account for leg length and correctly this with a new "Body Mass Index" value based on a formula calculated as the weight in kilograms divided by height in meters squared, previously developed by Adolphe Quetelet. This equation purported to reduce "the effect of a variance in height to the relationship of weight to height."19 The new measurement was not perfect, however, and over time other researchers found countless flaws with BMI as a measure of health. BMI does not account for body composition or location of visceral fat is associated with insulin resistance and other pathologies.20 In one study of individuals with a BMI of 25, body fat in men varied 14% to 35%, and in women, 26% to 43%, spanning the range from "low normal" to "obese" body fat percentage. BMI does not account for actual metabolic health; however, BMI may still be used as its proxy. Metabolically healthy people can be found at all BMI ranges, and the BMI at which morbidity and mortality is lowest changes depending on how the data is analyzed.21

The originally published BMI research placed the "overweight" category at a BMI of 27.8 or above for men and 27.3 or above for women.19 This was based not on health, but on averages: 85% of the US population was found below these BMI markers at the time.41 Because this number includes undernourished populations across the globe, it is lower. When the NHANES data show the lowest relative mortality risk in the BMI 25 to 30 range ("overweight") for all adult age groups up to age 70, after which there is no association between BMI and mortality risk.19 In one study, body mass index (BMI) calculated by adjusted mortality rate for men over 13 years was "essentially unchanged" from BMI 18.5 to 35.39 Another pooled analysis of 26 studies and over 350,000 deaths confirmed that "overweight" was associated with a lower relative mortality risk in the BMI 25 to 30 range than "normal" weight, and an even larger systematic review from researchers at the Centers for Disease Control and Prevention (CDC) of 97 studies showed that those with a BMI of 30 to 35 had no greater risk of death than those with a "normal" BMI.39 40 A 25-year follow-up study analyzing rates of cancer deaths in "normal," "overweight," and "obese" individuals found the lowest mortality rate for all cancers in the "overweight" category.41 Altogether, around 73% of all body weight-mortality studies published since the 1950s find weight mostly irrelevant to health and mortality.42

Studies in the 1990s blamed hundreds of thousands of deaths each year in the general population on high BMI.43,19 As with previous studies, these numbers have been exploited to advertise an "obesity epidemic."44,45 The new measurement, however, was "essentially unchanged" from BMI 18.5 to 35.19

"Obese" individuals have been found to have an elevated risk of CVD compared to the "normal" weight counterparts.46 It is well-established that physical fitness improves insulin sensitivity and blood pressure, and circulating pro-inflammatory cytokines.47

Furthermore, a certain percentage of people of all sizes, including those who are "normal" weight, become less metabolically healthy as they age.50 Whether or not this happens at a greater frequency in larger-bodied individuals simply by virtue of their size cannot be known for sure until studies control for lifestyle and psychosocial stressors.19 One could argue that perhaps if large persons were given the same opportunities for physical activity, balanced diets, social acceptance, and non-discriminatory medical care as thinner patients, their metabolic health would be equivalent as they aged.48

Part III: The Negative Health Effects of Weight Stigma

Weight stigma is a key piece of the puzzle of weight and health that has been hypothesized as one explanation for the increased morbidity/mortality of obesity. Social stigma can be a major source of stress, and chronic stress causes increased blood pressure, mental health pathology, and elevation of the same pro-inflammatory cytokines that are found in higher rates at higher body weights, as well as a cortisol-induced shift in fat accumulation to the viscera.49,50

The term "weight stigma" encompasses a broad range of negative attitudes and behaviors towards larger-bodied people, including unfair treatment, bias, teasing, hostility, bullying, harassment, violence, discrimination, negative appearance commentary, and pressure to lose weight. According to Rebecca Puhl, PhD, of the Yale Rudd Center for Food Policy and Obesity, around 40% of the general population reports...
experiencing some sort of weight stigma in their lifetime.44

Weight stigma has increased in conjunction with the growth of the thin ideal body standard in the late 20th century. Our culture portrays a thin, narrow-waisted, narrow-hipped body as positive, and larger bodies as negative, with physical attractiveness as a badge of moral superiority. Negative attitudes towards individuals with BMIs in the “obese” range, such as presumptions of laziness and gluttony, have been referred to as a “socially acceptable” form of prejudice.44 From 1985 to 2003, researchers discovered a five-fold increase in obesity-related media attention, with a shift from focus on weight as a societal problem to one of personal responsibility.45 When we believe that people are “responsible” for their weight, we assume that they “fail” due to poor self-discipline or lack of willpower. This belief is often compounded by shaming people into change, which does not work. Research shows that weight stigma, which “blames the victim,” doesn’t encourage people to lose weight, and is associated with riskier health behaviors like smoking, drug use, and higher blood pressure, as well as low self-esteem, increased depression, binge eating, and avoidance of physical activity. Seventy-nine percent of individuals respond to weight stigma by eating.46,47,48

When people accept that weight-based stereotypes are true about themselves and internalize weight stigma into shame, the worst health outcomes result.49 In one study of discriminatory experiences, there was a nearly 60% increased mortality risk for those experiencing discrimination and the link between weight discrimination and mortality was stronger than for any other type of discrimination.45 The difference between one’s actual and desired body weight is a more powerful indicator of morbidity than BMI alone, especially for women, who experience more social pressure to conform to a thin ideal.45 Women are seven times more likely than men to experience quality-adjusted life years lost to overweight.50 The stigmatization of fat in so pervasive that when one group of people formally classified in the “obese” BMI range were asked to choose between “obesity” and blindness, 89% chose blindness.51 An increase in weight-stigmatizing attitudes has been linked with a doubling of eating disorder prevalence in the last decade.52 It has also been linked to unprecedented profits for the diet industry, from $33.3 billion in revenue in 1995 to $55 billion in 2006.44

Even though weight stigma has clear negative impacts for health, it is widespread within our culture, among many health professionals and a major factor in avoidance of medical care.45 Physicians are the number one source of weight stigma for men and the number two source for women, but all medical and fitness professionals, including RDs, are included.45 One study found 69% of patients reported weight bias at the doctor’s office, and 37% from dietitians.45 Even in the eating disorder field, a study observed 56% of providers making negative comments about larger-bodied patients.45

Healthcare practitioners have reported bigger patients as less self-determined, less compliant, and more annoying and note feelings of disgust, anger, and blame towards these patients.53 One study found that 55% of providers assumed larger people over-ate, 33% assumed poor self-control, and 24% commented that these patients were “unattractive.”54 This leads to less respect, less desire to help patients, less time spent with patients—28% less time in one study.54 Physicians have been found to over-attribute symptoms to “obesity” and fail to refer patients for actual medical activity.55 This approach is not evidence-based methods work for people of all body sizes and believes that “weight-normative” terms like “obese” and “overweight” should be removed from the lexicon and replaced with morally neutral terms such as “large” or “small” bodied, or even “fat” or “thin.” The HAES philosophy is rooted in the belief that the healthy weight for an individual cannot be determined by any numbers on a scale but is instead the weight “at which individuals settle as they move toward a more fulfilling and enjoyable lifestyle that includes eating in an unrestrained manner guided by internal cues and participating in enjoyable, reasonable, and sustainable levels of physical activity.”52 In a HAES approach, your healthy weight is the weight where you stabilize when living a healthy life.

The primary goal of a HAES-focused nutrition intervention is to promote body acceptance and heal one’s relationship with food.1 Nutrition “advice” is typically not seen as helpful, and practitioners utilize counseling approaches to help address root causes of disordered eating.57-59 This means learning to eat in an intuitive, non-objective, health-focused manner guided by internal cues and food preferences to decide what to eat, rather than external dictates based on calories, grams of fat or carbohydrate or portion size. Indeed, the HAES approach challenges the concept of “good” and “bad” foods and suggests that all foods are “legal” and have a place in the diet.58 HAES-focused practitioners encourage patients to listen to how their bodies feel when eating certain foods, and to make dietary choices based on this attuned body sense, which for some people, can result in a natural movement towards more nutrient-dense foods. With physical activity, the goal is also to rely on intrinsic motivation and move with “activity” rather than for exercise.1 This means moving for fun and increased fitness but not for weight loss, to change body composition, or in response to external pressure to be thin.57,58 HAES-focused practitioners also help patients externalize their problems, recognizing that “the prevalence of sedentary living in US society is
largely a cultural phenomenon that cannot be significantly impacted without addressing cultural barriers.42 Taking the shame and judgment out of food and physical activity opens the door for everyone to find comfortable eating and activity behaviors that fit their own personal needs and desires and thus are sustainable.

The overall opinion of the HAES movement is that emotional health is equally or even more important than physical health, and that by taking care of yourself as best you can (without obsession) at your current weight you will achieve your best health and avoid weight cycling.43 HAES practitioners take a holistic approach to health and support patients in establishing better sleep, stress management, joyful movement, and intuitive eating practices, and counsel patients to accept wherever their body weight lands throughout this work. Everyone is welcome to become healthier in HAES. “Instead of imagining that well-being is possible only at a specific weight, this approach considers empirically supported practices that enhance people’s health regardless of where they fall on the weight spectrum.”

The HAES approach is endorsed by all major eating disorder organizations including the Academy of Eating Disorders; Binge Eating Disorders Association; Eating Disorders Coalition for Research, Policy & Action; International Association of Eating Disorder Professionals; and the National Eating Disorder Association. The HAES approach has been associated in randomized controlled clinical trials with improved physical activity, and better mental health (increased self-esteem, reduced depression).59-63 HAES interventions often result in normalized eating behaviors, including eating in response to hunger and fullness rather than for emotional reasons; and although this does not typically result in weight loss, it is successful in promoting weight stability and decreasing weight cycling, as well as decreased anxiety, guilt, and preoccupation with food.5 HAES research demonstrates that when people value the bodies they have right now, they are more motivated to care for them and increase health behaviors. This is supported by compassion-focused behavior change theory in the eating disorders field: when a person has higher body confidence and greater self-compassion, they are more likely to practice positive health behaviors.44-66

HAES-focused studies do not appear to show the negative effects often associated with weight-loss interventions. In six HAES-focused randomized controlled clinical trials, no negative effects (including weight gain) were seen; and all measured behavioral, psychological, and physiological indicators were stable or improved.39,65,66 Even though patients may remain at higher body weights, they typically see improvements in other cardiovascular and metabolic risk factors, demonstrating that for some, weight loss may not be necessary for health improvement.17,59-67

The nutrition counseling in HAES is based on intuitive eating, which has its own solid track record of success. Several studies have associated intuitive eating with improved nutrient intake, reduction in disordered eating behaviors, and maintenance of lower body mass.17,59,65,67 In studies of intuitive eating in small children in which no advice to eat more or less of any particular food is given, researchers have found that children maintain a stable calorie and macronutrient intake.27 In another study of adult women in Canada, a HAES intervention resulted in higher scores on both the Intuitive Eating Scale (which measures eating for physical rather than emotional reasons, unconditional permission to eat when hungry, and reliance on internal cues) and the Healthy Eating Index (greater fruit and vegetable intake and lower sugar and fat consumption).57

In one year-long Brazilian pilot study70 of a HAES intervention composed of individualized physical activity thrice weekly, nutrition counseling (a few sessions focused on neutralizing food as neither “good” or “bad” and teaching intuitive eating skills), and a series of philosophical workshops addressing emotional facets of health, participants in the HAES experimental group had significant decreases in body dissatisfaction, perception of body size and symptoms of binge eating, as well as greater willingness to participate in physical activity. No significant changes to food groups eaten were seen.

HAES-focused interventions seem to affect longer-lasting changes than other health interventions. In one study comparing HAES counseling to “social support for weight loss,” women in all groups experienced psychological and clinical improvements during the first year of the study.71 However, after 12 months, the non-HAES groups, while the HAES group continued a stable weight and improved psychological trajectories. HAES seems to work more slowly and deeply and promote longer-lasting, even if less dramatic, behavioral changes.

When compared to traditional dieting interventions, HAES approaches appear to have much lower attrition. In one study, a diet group experienced a high 41% attrition at six months versus only 8% in the HAES group.55 It may be that setting an expectation for weight loss that is not achieved risks disappointment and thus subsequent loss of motivation, whereas body acceptance is potentially available to all participants.

Evidence for the efficacy of a HAES approach continues to grow, but the research is still very much in its infancy, which has led to criticism. The argument that weight is not a good marker of health is not accepted by all, especially when pointing to correlations such as osteoarthritis and sleep apnea, in which the physical pressure of greater body mass seems to play a role at higher BMI.68 The fact that metabolically healthy obesity exists in a significant proportion of people, especially those large patients with greater fitness and more nutrient-dense diets, would seem to point to the fact that health is indeed available to all shapes and sizes when practicing certain health behaviors; but the research on metabolically healthy obesity is also limited.69 The research literature has defined metabolically healthy obesity in at least 30 different ways, and thus has been measured in anything from only 6% to as much as 75% of the “obese” population. Some studies do show metabolically healthy obesity transitioning to metabolic disease at higher rates than metabolically healthy non-obesity with age.70,71

Some studies do also associate overweight and obese class I BMIs (between 25 and 34.9) with increased all-cause mortality (a two-year shorter lifespan has been proposed), such as the Global BMI Mortality Collaboration.72 However, critics of this study and others like it point again to the fact that physical fitness, income security, the stress impact of discrimination (including weight discrimination), and other lifestyle factors are not controlled.73 The correlative studies are also not able to show whether a BMI > 30 leads to disease, or, whether weight gain could be a side effect of chronic disease, especially when illness leads to more sedentary behaviors.
attention to the concepts of weight inclusivity, respect for all experiences, cultures and backgrounds, joy-enhancing movement, eating for well-being, and adoption of healthy behaviors. As population obesity rates continue to rise, current interventions that use restrictive diets and physical activity have sometimes resulted in minimal clinical improvement and may instigate negative effects. While certainly more empirical studies need to be undertaken, the weight-neutral Health at Every Size approach is worthy of consideration and implementation into practice.

References


To begin integrating HAES techniques into a nutrition practice, http://www.sizediversityandhealth.org/ and/ or https://haescommunity.com are main hubs in which to start for resources. Consider shifting discussions of the risks and benefits of various body weight changes, helping patients achieve concrete holistic health behaviors such as better sleep and more enjoyable movement. Suggestions are to focus on teaching intuitive eating skills and improving relationship to food rather than labeling foods as “good” or “bad” or prescribing set diets or portion sizes. RDNs can help patients put their experience into perspective and support the difficult emotions that arise when considering the reality of thin privilege (the ability to eat or exercise as one chooses without societal judgment) and weight discrimination. In this context, health has become a social justice issue as much as it is a personal one, so, if inspired, RDNs can find themselves involved in activism for body equality.

With its focus on compassionate care, the HAES framework brings


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Health at Every Size® Through an Integrative & Functional Lens and Beyond...An Editorial

Jena Savadsky Griffith, RDN, IHC

All throughout nature, human history, and even in scientific law, we have evidence that for every action, there is an equal and opposite reaction. When it’s cold, we seek warmth; too much solitude necessitates connection; anger can create fear; kindness can create gratitude. If we need a food-related example, warm weather climates produce cooling foods. When we simply have too much force in one direction, there is resistance, push back, a reaction. From a wide-angle lens, the Health at Every Size® movement (HAES®) was an inevitability. It represents almost a century of backlash against a diet culture built on the false premise that lost weight will guarantee good health and happiness. Their momentum is reaching a crescendo as statistically, we are larger than ever before, yet still remain one of the most chronically ill countries on the planet. In simple terms, integrative and functional nutrition (IFN) practitioners examine the biography and biology of each patient to determine the root cause of a condition. In this way, every individual assessment necessitates a unique, personalized, and co-created intervention. What follows is a look at some of the HAES principles, points of potential confusion, and various paths of intersection from the IFN perspective.

Integrative Nutrition
The general focus of traditional dietetics has historically focused on the body. Tangible measurements like calories, proteins, carbohydrates, fats, pounds, weight, inches, body mass index, etc, are used to assess, intervene, and monitor what is happening on a physical level. Further, one could say, that it is a left brain, directed, linear, characteristically masculine and logical approach. There is comfort in numbers, they give us information, they are orderly, they don’t lie, and certainly have their place. Yet, numbers, or rather quantitative tangible information does not tell the whole truth and never has. The human experience is multidimensional. We have a right brain that is emotional, sensory, intuitive, characteristically feminine, oriented to the larger perspective that has generally been ignored...in the field of dietetics and beyond. We are not just a jumble of atoms sitting down to a meal, ingesting a plate of nutrients, vitamins, and minerals. We are complex beings with individual thoughts, beliefs, ancestry, culture, biographies, feelings, stressors; and all of that impacts how, why, when, if, and what we eat. Who we are matters, or in other more familiar words, we are minds, bodies, and spirits. Not only do we metabolize food and information differently, we may look at food on a plate differently. An identical meal may be calories for one person; but for another, it may be guilt, companionship, comfort, freedom, or punishment. For far too long, the expansive nuance that is the human experience has been ignored. All body. No mind, heart, spirit. Left brain without the right. Integrative nutrition and HAES principles take similar views in respecting not only the individuality of each person, but also in understanding that besides physical issues, attention to economic, social, spiritual, intellectual, and emotional needs warrants inclusion and affects all aspects of health. In this way, HAES principles and research has helped IFN RDNs bring to light even more information and giving further legitimacy to working integratively.

Functional Nutrition
Functional nutrition practitioners work with their clients to restore physiological functioning and vitality to the body. They identify patterns and make connections in core areas of imbalance to get to the root cause of a condition. Weight is never the focus in and of itself, for any IFN practitioner, because it is simply a symptom. Weight changes over time do matter, in the same way stomach pain or a fever or low mineral status matters, because it is a symptom; and symptoms are always directing our attention elsewhere. Symptoms are invitations to go deeper. Changes in weight could be pointing to physiological stressors (eg, thyroid, nutrition and metabolic factors, prescription drugs) or emotional and personal stressors (eg, relationship challenges, death of a loved one, financial stress, challenges of raising a family) or any myriad combinations. The list is as long and as individual as the clients themselves. IFN RDNs understand that metabolism or weight loss is not a simple equation of fats, proteins, carbohydrates, and activity. Metabolism encompasses many body systems and involves hormones, neurotransmitters, detoxification channels, and other physiological processes still under investigation. Additionally, body size is not just about what a person eats but involves genetics, medical and personal history, all aspects of environment, biochemistry, accessibility, and is further and often entangled with relationships, sexuality, pain, and humility. Once we can better understand the root cause and focus on restoration of health and wellness, symptoms often resolve and the body can return to homeostasis.

Weight and Diet
While it is acknowledged by most that weight loss and thinness is a cultural obsession pervading all aspects of society, we do not ignore nor are we fearful of a client coming into our office with such a goal. In fact, irrespective of any diagnosed condition, many come in with weight loss as their primary focus. Regardless of where the desire for body changes originates, the role of the RDN is not to judge. Rather we compassionately seek to understand our client’s lived experience and lean into our expertise to help meet individual needs—the tenets of evidence-based medicine. Again, weight is never the issue but a symptom.
Nor is the body to be beaten into submission and/or disappearance. Instead, we encourage awareness and refocus and guide their intention toward the life values, flexibility, momentum, peace, and aspects of health they want to create and gain. Maybe they want to be able to heal their digestion, increase energy, improve sleep quality, increase healthful foods; or it can be more specific like being able to bend down to tie a shoe, walking one mile, or finding a way to incorporate green vegetables into their meals. When addressing core issues that reside not only physiologically, but emotionally, mentally, and spiritually, then unneeded symptoms, habits or thoughts are often replaced or fall away.

The word “diet” brings with it much history, controversy, and interpretation. According to the ancient Greeks, diet meant “way of living.” It is not what culture has now appropriated it to become—a period of time when one deprives, counts, restricts, obsesses, punishes, and isolates in order to possibly reach an arbitrary number and feel whole, especially around the new year or before summer. However, IFN RDNs very often use therapeutic, evidence-based diets to support a client’s health and healing process. Even within the boundaries of therapeutic diets, there is individual tailoring. In this way, major transformations occur, which may or may not involve weight loss.

Starting the title of a movement or group with the words “anti” or “non” comes with unfortunate downsides. Prefixes like “anti” or “non” begin with opposition and may engender a negative connotation—in this case, opposition to dieting. It’s easy to interpret that as “all diets are bad.” However, it is important that we understand therapeutic and medically necessary diets are not included; serious medical complications necessitate a therapeutic diet. Thus, anti-diet actually means anti–diet culture; this sometimes sets up a certain degree of confusion. Adding to this, the profession title itself has the word “diet” within it. Further, there is the idea of giving voice and language to what we want rather than what we do not want. When typing “non-diet” into a Google search, diets with so-called “good” and “bad” foods still come up in the results.

Lastly, what we focus on expands. This can be called metaphysics or experience-dependent neuroplasticity, and evidence abounds. If we focus on weight, we get more weight. If one focuses on restoring health in whatever specific manifestation that may occur, there is a good chance there will be more of that.

Conclusion

As with any philosophy or set of principles, there needs to be some degree of flexibility; practitioners do not want to exhibit the same absolutist tendencies as the weight-focused, outside-in paradigm it’s arguing against. Overall, however, there is much more integration, support, and synergy between HAES and IFN principles than separation. HAES brings to light legitimate and underrepresented issues that have been missing from the conversation for too long, importantly and specifically regarding weight stigma, equal access, and checking personal bias. Both begin and end with bio-individuality and seek to expand the RDN toolbox by further personalizing approach and interventions all while proceeding with care and compassion. Further, identifying with one way of practicing does not exclude the other; in fact, it could be argued that one strengthens the other. To continue the metaphor, the brain maintains its balance by using both left and right sides….one is not better than the other, and both are needed. Finally, the focus of an IFN RDN, a HAES RDN, and our profession at large is to restore health and wellness to the individual. No other profession is better positioned to make an impact on the physical and psychological health of the nation. It’s time to build on common ground and get to work.
Personalizing Weight Management Strategies Based on Individual Genetic Variation: The Science of Nutritional Genomics

Justine Horne, MScFN, RD, PhD Candidate

Abstract

Nutritional genomics is a science that explores interactions between individual genetic variation, nutritional intake, and health outcomes. This science can be applied in the context of weight management to develop nutrition plans for patients that are targeted towards their personalized genetic profile. While many gene-diet interactions have been extensively researched, this article highlights three specific gene-diet interactions applicable in the context of weight management: FTO and protein, APOA2 and saturated fat, and MC4R and appetite. Furthermore, this article discusses the potential for nutritional genomics to motivate patients to change nutrition behaviours and highlights the appropriate incorporation of nutritional genomics into clinical practice.

Introduction

Patients’ nutrient needs differ substantially from one individual to the next. Therefore, a one-size-fits-all approach is not optimal for patient-centered care. When it comes to weight management, research demonstrates that tailoring a nutrition plan according to an individual’s genetic profile can help to enhance weight loss and improve body composition.1,3,5 This science, referred to as nutritional genomics, allows clinicians to provide genetically tailored nutrition plans. Table 1 outlines key genetic terms and definitions used throughout this article.

FTO & Protein

The FTO gene is also known as the “fat mass and obesity-associated gene” as it has been consistently linked to obesity, body composition, and weight management. Individuals with the AA variant of FTO at rs9939609 (which is in strong linkage disequilibrium with rs1558902; i.e., rs9939609 can be used as a surrogate marker for rs1558902, as further explained in Table 1) are more likely to be overweight or obese.1 Multiple studies have described the impact of a moderately high-protein diet (about 25% of calories from protein) on weight loss in carriers of the AA variant of FTO at rs9939609. These individuals have an enhanced weight loss response following a moderately high-protein diet1,3 (Figure 1). The mechanism by which this type of diet may enhance weight loss in A allele carriers may be through reducing appetite and food cravings. One study found that individuals with the AA genetic variant of FTO at rs9939609 had dysregulated concentrations of ghrelin, a hormone that helps to regulate appetite;7 and another study found that A allele carriers were more likely to experience reduced food cravings when consuming a hypocaloric, higher protein diet.6 Additionally, in a more specific population—individuals who have undergone bariatric surgery, having the AA genetic variant predicts a greater likelihood of long-term weight loss success.9 Because of this research on FTO genetic variation, protein intake, and weight management, nutrition care plans can be personalized to optimize weight management.

APOA2 & Saturated Fat

Similarly, nutrition care plans for weight management can be targeted based on genetic variation in the APOA2 gene. Individuals who carry the CC variant of the APOA2 gene (rs5082) are at an increased risk of obesity when their intake of saturated fat is high.2,4 Consuming a diet low in saturated fat (<22 g per day) can enhance weight loss and/or reduce obesity risk.2,4 Notably, individuals with the CC variant of APOA2 (rs5082) have demonstrated low ghrelin levels when consuming a low-saturated fat diet, thus demonstrating a proposed mechanism for the association between saturated fat intake, obesity, and APOA2 genetic variation via regulation of a hormone involved in hunger and appetite.6 Knowledge about nutritional genomics can help patients to understand where to focus their lifestyle change efforts to optimize weight loss. For example, an individual with the AA variant of FTO (rs9939609) could focus on optimizing their lean protein intake,1,3 while individuals with the CC variant of APOA2 (rs5082) could focus on limiting their intake of saturated fat.2,4

Genetically Tailored Low-Carbohydrate Diets: More Research Needed

While some commercial genetic testing companies offer genetic testing for predicting weight loss success when following low-carbohydrate diets, the science behind genetically tailored, low-carbohydrate weight loss diets is weak. Two recent nutrigenomics weight loss RCTs focused on genetically tailored, low-carbohydrate weight loss diets. It is not surprising that neither of these studies found that the low-carbohydrate diets enhanced weight loss when the patient’s genetic profile was not “matched” to the low-carbohydrate dietary recommendation (i.e., when the genetic test stated, based on inconclusive and inadequate science, that a low-carbohydrate diet would enhance weight loss).11,12 These studies tested the following genetic loci to determine which diet would best “match” the patients’ genetic profiles: FABP2 rs1799883, PPARG rs1801282, ADRB3 rs49949c, ADRB2 rs1042713, and ADRB2 rs1042714.11,12 Determining which genetic variant(s) can be tested that predict weight loss success from following low-carbohydrate nutrition plans is an area where further research is needed. However, it should also be noted that long-term patient adherence to low-carbohydrate diets (<100 g carbohydrate/day) is typically poor; and regardless of genetics, this nutrition plan may not be the most effective method for long-term weight loss success.

MC4R & Appetite

Genetic variation can also have an impact on eating behaviours. The MC4R gene codes for a receptor found in the hypothalamus region of the brain where hunger and appetite are controlled.8,9 Studies have demonstrated that individuals with the CC or CT variant (A allele carriers) of MC4R (rs17782313) are more likely to eat more frequently during the day and have an intensified appetite. Those with the TT variant, on the other hand, are less likely to eat frequently through the day.13 Studies have found that individuals with the CC or CT variant at rs17782313 of the MC4R gene were more likely to be overweight/obese.13,14 MC4R variants are also associated with a higher intake of calories and fat, binge eating, excessive hunger, hyperphagia, and food-seeking behaviours.11,12 Learning about genetic variation in the MC4R gene can be an interesting and unique way

References

to help patients to reflect on their eating behaviours while providing appropriate nutrition counselling to improve eating habits.

Attitudes & Behaviour Change

Research has demonstrated that patients are interested in and have positive attitudes towards genetic-based dietary advice.21,22 It is hypothesized that these positive attitudes could be one of the reasons why patients may be more likely to change their nutrition habits when recommendations are based on their genes.23 Furthermore, a recent systematic review highlighted several studies that used nutrigenomics to successfully motivate nutrition behaviour change and notably found that when the genetic report provided actionable advice, patients were more likely to change their behaviours.24 An example of actionable advice would be recommending to lower sodium intake to reduce a genetic-based risk for hypertension.25

Incorporating Nutritional Genomics for Weight Management into Clinical Practice

While minimal research exists regarding the use of nutrigenomics for weight management in different patient populations, broader research findings alongside clinical experience can help us to screen patients to determine the appropriate weight management strategy for the individual, whether it be using nutrigenetic testing or another approach. Again, a one-size-fits-all approach does not yield optimal outcomes for patients. Nutrigenomics in the context of weight management can involve quantifying macronutrient intakes, such as protein or saturated fat, by tracking food and beverage consumption (typically through the use of a nutrition tracking app). Tracking nutritional intake can be helpful for many patients when making healthy lifestyle changes for weight management.26 However, it is advised that this approach be avoided in patients with an eating disorder (or history), in line with clinical practice guidelines in eating disorders, specifying that a key priority in this patient population is normalizing eating habits.27 Notably, the prevalence of disordered eating and unhealthy weight control behaviours is higher than we might expect.28 As such, it is important to screen patients for disordered eating and use clinical judgment to determine if nutrigenetic testing is appropriate for a specific patient. When nutrigenetic testing is appropriate for a specific patient, it can enhance attitudes towards nutrition recommendations, motivate behaviour change, and optimize weight loss.21,24

Conclusion

This emerging area of nutritional science helps shed light on conflicting research findings from epidemiological studies given that it takes into account varying responses to nutrition based on genetic variation. While patients are interested in nutritional genomics,21,22 clinicians play important roles in (1) screening patients to determine if nutritional genomics testing is appropriate for a given patient, and (2) choosing a test that is backed by strong science. APOA2 and saturated fat, FTO and protein, and MC4R and appetite are just a few examples of gene-nutrient interactions backed by robust scientific evidence.1,4-11,13,19

It is important to recognize that regulation of the genetic testing industry is minimal when it comes to the science behind these tests, and therefore registered dietitian nutritionists (RDNs) must be careful when choosing a test to ensure that it is evidence-based. Overall, nutritional genomics is an exciting and emerging area of dietetic practice that could help enhance patient-centered care through more accurate and effective nutrition recommendations.

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Table 1: List of Genetic Terms and Definitions

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tr>
<td>Gene</td>
<td>A section of DNA, which forms part of the chromosome. It is the functional unit of heredity. Everyone has the same genes, but people differ in their genetic variants (see definition below).</td>
</tr>
<tr>
<td>Variant (genotype)</td>
<td>A set of two alleles, typically making up a SNP (e.g., a “TT” variant/genotype). Variants/genotypes can also exist in the form of copy number variants.</td>
</tr>
<tr>
<td>Single Nucleotide Polymorphism (SNP)</td>
<td>When one allele is replaced by a different allele (e.g., a “T” replacing an “A”). This is the most common type of variation within the genetic code.</td>
</tr>
<tr>
<td>Allele</td>
<td>One of two variant forms of a genotype (e.g., a “T” allele).</td>
</tr>
<tr>
<td>rs#</td>
<td>A number used to identify a specific location on a gene. The letters “rs” stand for Reference SNP.</td>
</tr>
<tr>
<td>Linkage disequilibrium</td>
<td>The association between alleles in different locations on the genome, whereby having a specific genetic variant at one location predicts a strong likelihood of having a certain genetic variant at another nearby genetic location.</td>
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References


Natural Food Preservation: Herbs, Spices and Essential Oils

Denine Rogers, MS, RDN, LD, FAND

Many consumers are demanding that foods should not contain what they perceive to be artificial and/or harmful chemicals and preservatives. There is growing interest in more natural, non-synthetic antimicrobials as potential alternatives to conventional antimicrobials to extend shelf life and combat foodborne pathogens. Historically, essential oils (EOs), spices, and herbs have been widely promoted for their potential antimicrobial capabilities. Herbs, spices, and EOs are Generally Recognized As Safe (GRAS) products that have been used for centuries in food systems as preservatives and for flavor. Herbs are any plants used for food, flavoring, medicine, or fragrance and are known for their savory or aromatic properties. Culinary use typically distinguishes herbs from spices. Herbs refer to the leafy green or flowering parts of a plant (either fresh or dried). Examples of plants that are herbs include basil, oregano, thyme, rosemary, parsley, and mint. Spices are produced from other parts of the plant (usually dried) and include seeds, berries, bark, roots, and fruits. Examples of spices are cinnamon, cloves, ginger, and pepper. EOs are natural antimicrobials and have been widely investigated for their antimicrobial (antifungal, antibacterial, antiviral), antioxidant, and antiproliferative properties. EOs, also known as volatile oils, are aromatic oily liquids obtained from plant material (buds, flowers, leaves, bark, twigs, seeds, herbs, wood, fruits, and roots). EOs are usually prepared by different extraction techniques such as distillation (including steam distillation), cold pressing, or maceration. The extraction process usually involves the use of chemical solvents or heat, which could affect the functionality of active compounds, and plays a significant role in the overall effect of natural antimicrobial products.

There has been recent growing research about EOs’ therapeutic antibacterial potential in food processing, particularly for combating the spread of bacterial pathogens. Essential microorganisms are any organism capable of injuring its host by competing with it for metabolic resources, destroying its cells or tissues, or secreting toxins. Some spices’ essential oil compounds have been found to act as self-defense mechanisms to protect the plant against infectious bacterial microorganisms. This article will explore the antibacterial herbs, spices, and EOs and their different applications in food preparation, preservation, and safety, particularly against spore-forming bacterial microorganisms such as Salmonella species, Escherichia coli, Staphylococcus aureus, and Listeria monocytogenes.

Mechanism of Action of Herbs, Spices, and Essential Oils

There are more than 1340 plants with specific antimicrobial and antibacterial compounds. Over 30,000 components have been isolated from phenol group–containing plant-oil compounds used in the food industry. Plants such as herbs and spices are rich in a variety of natural antimicrobial compounds such as saponins, tannins, alkaloids, alkenyl phenols, glycolalcohols, flavonoids, sesquiterpenes, lactones, terpenoids, and phenol esters. The exact mechanisms of action(s) of natural antimicrobials are often unknown or not fully understood, but there are some possible theories as to what modes of actions are at work.

The primary EO components with antimicrobial effects are phenolic compounds, terpenes, aliphatic alcohols, aldehydes, ketones, acids, and isoflavonoids. EO constituents are low-molecular-weight organic compounds with significant differences in antimicrobial activity. Phenols exhibit the greatest antimicrobial effect and are the most abundant component.

Phenols have also been shown to disrupt the cellular membrane, inhibit ATPase activity, and release intracellular ATP and other constituents of microorganisms. Up to 34 phenolic compounds also can alter the bacterial cell membrane permeability leading to the loss of macromolecules thereby negatively affecting microbial growth and energy production, leading to cell death.

The antimicrobial compounds in plant materials are commonly found in the EO fractions of leaves (rosemary, sage, basil, oregano, thyme, and marjoram), flowers (buds (clove), bulbs (garlic and onion), seeds (caraway, fennel, nutmeg, and parsley), rhizomes (asafetida), fruits (pepper and cardamom), or other parts of plants. Plant EOs and their constituents have been widely used as flavoring agents in foods since the earliest recorded history, and it is well established that many have a full spectrum of antimicrobial action. These compounds may be lethal to microbial cells, or they might inhibit the production of secondary metabolites (e.g., mycotoxins). Plant EOs tend to exert a greater inhibitory effect against gram-positive bacteria (such as S aureus, L monocytogenes, and Bacillus cereus) than against gram-negative bacteria (such as E coli and Salmonella Enteritidis).

Some agents, such as clove, cinnamon, and citral, however, are active against both groups.

The EOs possessing the most potent antibacterial properties against foodborne pathogens contain a high percentage of phenolic compounds such as carvacrol, eugenol (2-methoxy-4-(2-propenyl)phenol), and thymol. Carvacrol is one of the significant components of oregano and thyme oils and appears to have received the most recognition from researchers. Thymol is structurally very similar to carvacrol, having the hydroxyl group at a different location on the phenolic ring. Both substances appear to make the cell membrane permeable. Carvacrol and thymol can disintegrate the outer membrane of gram-negative bacteria by releasing lipopolysaccharides and increasing the permeability of the cytoplasmic membrane to ATP. A vital component in clove oil, at approximately 85%, is eugenol. There are sub-lethal concentrations of eugenol that have been found to hinder the creation of amylase and proteases by B cereus. Cell wall deterioration and a high degree of cell lysis were present.

Factors Impacting Antimicrobial Activity

Antimicrobial compounds are used in food for two main reasons: (1) to control natural spoilage processes (food preservation) and (2) to prevent growth of microorganisms, including pathogenic microorganisms (food safety). The antimicrobial effect of EOs in food systems is affected by intrinsic and extrinsic properties of the food such as the food matrix composition, use of preservatives, antioxidants, temperature, and...
Antimicrobial activity of EOs also increases with the decreasing temperature and oxygen level in the packaging. Antioxidative compounds can help to inhibit oxidation reactions caused by free radicals such as singlet oxygen, superoxides, peroxy radicals, hydroxyl radicals, and peroxynitrates, thereby delaying or preventing damage to the cells and tissues.

Optimal microbial growth occurs at pH values between 6.5 and 7 although most microorganisms continue to grow within the range of 4 to 9.5. For fresh meat, pH varies between 5 and 6.5. Hence, microorganisms in meat can develop quickly. A decrease in pH improves the dissolubility of EOs in lipids found in the cell membrane of the target bacteria and contributes to their antimicrobial activity.

Safety Data
It is required that the safety, chemical constituents and the range of concentrations of EOs be evaluated. EOs are considered GRAS at flavoring levels. Some EOs and components are known to cause allergic dermatitis with frequent use due to their lipophilic nature and capacity to penetrate the skin. Preventive measures might be needed to ensure the well-being of workers if these substances were to be used on a larger scale. Specification of biological origin, and physical and chemical properties with chemical assays are a necessary part of the safety evaluation of essential oils.

Plant Species and Antimicrobial Activity
The reported antimicrobial activity of EOs derived from the same plant species is often very different. Different geographic locations where plants are grown, harvest time, genotype, and weather conditions during growth and harvest account for these differences, and therefore, the composition and the activity of EOs obtained from plants grown in a defined region need to be characterized.

A study was done to determine the chemical composition of EOs obtained from 10 exotic plant species cultivated in the south of Brazil and to evaluate their antimicrobial activity against 12 bacterial and 5 fungal species that may cause food poisoning and spoilage. Those plants species were the EOs of basil (Ocimum basilicum), cinnamon (Cinnamomum zeylanicum), fenugreek (Foeniculum vulgare), laurel (Laurus nobilis), lemon grass (Cymbopogon winterianus), mint (Mentha arvensis), pennyroyal (Mentha pulegium), orange (Citrus sinensis), oregano (Origanum vulgare), and rosemary (Rosmarinus officinalis). The plants went through steam distillation and were analyzed by gas chromatography and gas chromatography/mass spectrometry. The EOs were tested against 12 bacterial strains: S aureus, Lactobacillus plantarum, L monocytogenes, Enterococcus faecalis, B cereus, Bacillus subtilis, E coli, Salmonella Typhimurium, Proteus vulgaris, Enterobacter aerogenes, Pseudomonas aeruginosa, and Yersinia enterocolitica. The outcome of this study showed that the EOs presenting the most active antimicrobial activity and broadest range of action were, in descending order, lemon grass, basil, oregano, cinnamon leaf, laurel, and rosemary. The species with the highest sensitivity to all EOs tested was Y enterocolitica. Lemongrass EO strongly inhibited gram-negative bacteria and showed higher activity on S aureus as compared to ampicillin. Among the gram-negative bacteria, it presented substantial inhibition of Salmonella Typhimurium, Y enterocolitica, and P vulgaris and moderately inhibited E coli. Results showed that the evaluated EOs offer high potential as natural preservatives.

Another study compared the antimicrobial properties of extracts of 30 types of commercial herbs and spices commonly used in the production of ready meals. Various extracts of spices were evaluated for their antimicrobial activities against E coli, Listeria innocua, S aureus, and Pseudomonas fluorescens using a microdilution broth method. Ethanol and hexane extracts of oregano, clove, sage, rosemary, and celery showed relatively strong antimicrobial activities against all bacteria tested. In contrast, water extracts displayed little or no antimicrobial activity. There were some additive effects observed when oregano was combined with sage or rosemary against L innocua or S aureus.

The aforementioned studies demonstrate that there are a few herbs, spices, and EOs that have greater antibacterial response. Certain oils such as eugenol, coriander, clove, oregano, and thyme were also found to be effective in inhibiting L monocytogenes, Aeromonas hydrophila and autochthonous spoilage flora in meat products. Mint oil is effective against Salmonella Enteritidis with low-fat yogurt and cucumber salad. The high fat content of fish and meat appears to reduce the effectiveness of antibacterial EOs. Oregano oil is more efficient than thyme and the spoilage organism Photobacterium phosphoreum on cod fillets than on salmon, a fatty fish. The effect of the combination oregano EOs with salt treatment has been investigated on the shelf-life of refrigerated trout fillets. The results indicated that combination leads to a significant shelf-life extension to 11 to 12 days.

In vegetable dishes, the antimicrobial activity of EOs is enhanced by a decrease in storage temperature and a reduction in the pH of the food. Vegetables have a low fat content, which may contribute to the favorable results obtained with EOs.

Cinnamaldehyde and thymol are active against six Salmonella serotypes. Oregano oil was effective at inhibiting E coli. Carvacrol and cinnamaldehyde were very efficient at reducing the viable count of the natural flora on kiwifruit. It may happen that the difference in pH since the lower the pH, the more useful the EOs and their components. Overall, carvacol, eugenol, and thymol possess the most potent antibacterial properties against foodborne pathogens.

Conclusion
It is important to understand that there are natural alternatives to protecting our food from bacterial microorganisms. As stated, research exists proving that herbs, spices, and EOs possess the most active antibacterial properties against foodborne pathogens and spoilage organisms in vitro. When these antimicrobial compounds have the correct physical conditions—low pH, low temperature, low oxygen levels, appropriate amount of fat, protein, water content, antioxidants, preservatives, incubation time/temperature, packaging procedure,
and physical structure of food combined with oxygen concentration and availability—they can positively affect food preparation, preservation, and safety.

There is future work that is still needed to investigate the effect of natural plant extracts in combination with other food processing techniques to extend the shelf life of food. This field of research has great potential for the possibility of utilizing antimicrobials from the vast source of plants worldwide.

References

Pure 100% Pomegranate Juice

- Every 16 oz. bottle has the juice of 4 pomegranates.
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- Every 8 oz. serving of POM® has 700 mg of polyphenol antioxidants. Antioxidants may help fight free radicals that damage our cells.
- An in vitro study at UCLA found that pomegranate juice has, on average, more antioxidant capacity than red wine, grape juice or green tea[1].

Food for Thought

Scientists are beginning to examine the potential impact of pomegranate polyphenols on memory and cognition in older adults.

A preliminary 2013 UCLA study indicated that a small group of older adults with age-related memory complaints who drank 8 oz. of pomegranate juice daily showed increased verbal memory performance and functional brain activity in fMRI testing after just four weeks[2].

These early scientific results on the impact of PJ on the brain have not yet been adequately studied. Further clinical research on larger populations is needed to help establish causation and to determine the long term effects of pomegranate on memory and cognition.

[1] Seeram et al., 2008
[2] Bookheimer et al., 2013

*Not a low calorie food, see nutrition information for sugar and calorie content
News You Can Use

Julia Whelan is a foodie at heart who also happens to be a dietitian. She believes in food's natural ability to nourish our bodies and understands, in great depth, how to harness food's power so we can feel our best. Follow her on Instagram at @acoupleddietitians.

Geanna Revell is a brand new dietitian who is currently enjoying life without homework! Her non-food interests include reading, sailing with her husband, and snuggling her cat. She lives in Seattle. Follow her on Instagram at @geannarevellrd.

Upcoming Conferences and Educational Opportunities


Electronic Mailing List (EML) Recent Topics Review

Books were recommended for cancer patients. Those named included The Metabolic Approach to Cancer by Nasha Winters, The Cancer-Fighting Kitchen by Rebecca Katz, and A Dietitian's Cancer Story by Diana Dyer.

The ketogenic diet was given as a popular suggestion to help a patient with Ulcerative Colitis and type 2 diabetes.

Discussion occurred around whether it was safe to give homemade elderberry syrup to children ages 4 and 6 years old. One member noted that elderberry is “possibly safe” when administered for up to 10 days. Another member referred to an article from Healthline.com that suggested eating uncooked elderberry could contain cyanide, so caution should be taken when ingesting homemade varieties.

Advice was given for a vegan woman in her 50s complaining of gas and bloating. Members suggested screening her for first for disordered eating or an eating disorder before removing foods from her diet. Following that, members recommended checking for SIBO, looking at any processed foods in her diet that might be giving her GI distress, such as plant milks, added gums, and sugar alcohols. Recommended supplements included vitamin B12, digestive enzymes, and probiotics, and finally, suggesting to the patient that she add in animal protein so she can remove some food sources that might be causing her symptoms.

What’s New - Journal Reviews and Resources

Plant-Based vs Meat Meal in Type 2 Diabetes, Obese, and Healthy Men

This randomized controlled trial had a cohort of 60 men of Czech nationality aged 30 to 65 years. Twenty of the men were obese, 20 had type 2 diabetes, and 20 were healthy. All men fasted the night before, and those with diabetes were instructed to abstain from taking their anti-diabetes medications both the night before and the morning of the study, at which time the participants were given either a meal of a cheeseburger or a tofu-based vegan burger for breakfast. These meals were energy- and macronutrient-balanced, so that the only nutritional difference was the amount of fiber and saturated fat present. Gastrointestinal hormones [glucagon-like peptide-1 (GLP-1), amylin, and peptide YY (PYY)] were measured before eating, then again 30, 60, 120, and 180 minutes after eating. GLP-1 secretion increases insulin secretion, leading to lower blood sugars. PYY is a satiety hormone, and amylin increases feelings of fullness and regulates blood sugars. The results of the study showed that secretion of GLP-1 increased after the men with diabetes ate the vegan meal. Amylin increased in all groups who ate the vegan meal. The increase of PYY postprandially was only significant in the healthy group. The men who ate the vegan meal reported feeling more satiated than those who ate the cheeseburger. Although this was a very small study with a limited time frame, it suggests that plant-based diets may be useful for those with glucose intolerance and obesity.


App Reveals Erratic Eating Patterns: Narrowed Eating Time Induces Health Benefits

In this study, a smartphone application was used to monitor eating patterns in adults for three weeks. To keep track of their intake, the app users took pictures of or wrote text about the foods or beverages they were consuming. The results of the study showed that the participants rarely stuck to a 3-meal-a-day eating pattern, instead eating more meals throughout the day. Mealtimes lasted for an average of just under 15 minutes, 25% of meals were consumed within 90 minutes of the next meal, and 25% of meals occurred after more than 6.75 hours of fasting. The majority of calories were consumed between 6:00 and 9:00 PM. In general, calories consumed after 6:36 PM were considered more than the “maintenance” amount calculated by the study administrators. “The median daily eating duration was 14 h 45 min,
and only 9.7% of the subjects had a daily eating duration <12 h long.” After this study, 8 people with eating durations longer than 14 hours and a BMI greater than 25 were recruited to participate in an additional 16-week intervention study where they had to restrict their eating timeframe to between 10 and 12 hours a day. As a result of the restricted eating duration, they saw a reduction in both total and excess body weight. The participants reported greater sleep satisfaction and energy levels, and they all voluntarily continued with the time restriction after the study ended. One year after the intervention began, these participants had maintained these positive results.


Case Study: Elimination & Detox Diet Eliminates Pain, GI Distress, and Acne

This case study followed a 47-year-old female who suffered from 8 years of consistent shoulder and knee pain, GI distress, and acne. She underwent a 9-week nutritional intervention that included an elimination diet and a detox diet, both of which were modeled after Institute of Functional Medicine protocols. Following the intervention, the patient was able to move her shoulders normally and could participate in physical activities without causing pain to her knee. Her GI distress disappeared, and her acne greatly reduced.


Hot Nutritional Genomics Topics


Effects of gene polymorphisms of metabolic enzymes on the association between red and processed meat consumption and the development of colon cancer: a literature review. J Nutr Sci. 2018 Oct 2;7:e26. doi:10.1017/jns.2018.17 (PubMed ID: 30305892) Table 1 provides a listing of various studies showing how variations in genes (eg, NAT1, NAT2, PTGS1, PTGS2 and CYP2E1) can influence the risk of colorectal cancer among those with higher intakes of red meat and processed meats. The authors suggest that more knowledge in this area can be useful for both prevention and treatments.

Clinical application of APOE in Alzheimer's prevention: a precision medicine approach. J Prev Alzheimers Dis. 2018;5(4):245-252. doi:10.14283/jpad.2018.35 (PubMed ID: 30298183) Some models suggest that as many as one-third of Alzheimer disease cases might be preventable by modification of various risk factors, including nutrition. A more targeted approach involving genetics/nutritional genomics, lifestyle, pharmacogenetics, comorbidities, etc, is described, with special reference to those who carry the APOE e4 gene variant. Potential risk modifiers described include exercise, smoking, alcohol consumption, cognitive engagement, diet, omega-3 fatty acids, vitamin D, and more.


Copyright 2019 Nutrigenetics Unlimited, Inc. Inquiries about above references? Contact Ron L Martin, MS, President, Nutrigenetics Unlimited, Inc, at ron@nutrigenetics.net. The database at Nutrigenetics.net is available to the public free on weekends (US Pacific time) by using “Free” as the username and “Weekends” as the password, as also shown on the login page at https://nutrigenetics.net/Login.aspx. Check out www.NutritionAndGenetics.org to learn more about ISNN membership discount for dietitians, which includes 24/7 database access plus a subscription to the Lifestyle Genomics journal (formerly named the Journal of Nutrigenetics and Nutrigenomics).
DIFM News!

Revised Standards of Practice (SOP) and Standards of Professional Performance (SOPP) for RDNs (Competent, Proficient, and Expert) in Nutrition in Integrative and Functional Medicine: June 2019

The Revised 2019 SOP and SOPP for RDNs in Nutrition in Integrative and Functional Medicine (NIFM) will be available in print in the June 2019 issue of the Journal of Academy of Nutrition and Dietetics. Focus Area SOP and SOPP are tools used by RDNs for self-evaluation, professional development, and advancement of practice. Highlights from the updated SOP/SOPP for RDNs in NIFM include:

- NEW definition of NIFM
- NEW Levels of Practice Figure
- NEW Integrative and Functional Medicine Principles Figure
- Updated Role Examples, such as Telehealth practitioner and Clinical practitioner
- Updated information on the integral role of “The Patient’s Story” and shared decision-making in NIFM care and services

In simple terms, these are bylaws for practice and act as a foundation, guide and source of credibility for practitioners of nutrition in integrative and functional medicine. Please learn more about it here: www.eatrightpro.org/sop.

Integrative and Functional Nutrition Module 3: Environmental Toxins, Exposure, and Elimination, is available as of June 5, 2019!

The Center for Lifelong Learning introduces the long-awaited new online module for the certificate of training program (COTP) in Integrative and Functional Nutrition. This contemporary module explains the basics of toxicology, including absorption, metabolism and excretion, and discuss common sources of environmental toxins, their effect on human health, and populations at high risk for exposure.

A special thank you to Kelly Morrow, MS, RDN, and Mary Purdy, MS, RDN, who developed the content for this program planned with DIFM. Additional thanks to the course reviewers and to Sheila Dean, DSc, RDN, LDN, CCN, IFMCP, as the developer of the original version of this module.

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Well Nourished
By Andrea Lieberstein, MPH, RDN
Quarto Publishing Group USA Inc.
ISBN: 978-1-59233-752-1
$19.99

Well Nourished by Andrea Lieberstein, MPH, RDN, offers a mindfulness-based framework for individuals struggling with their relationship with food. The book teaches readers how to tune in and use body cues to live fully and embrace the habits, philosophies, and foods that truly nourish them. Cultivating the awareness of whole-life health is something that is often lost in the social media–centric wellness space, and this book is a breath of fresh air for individuals struggling to thrive in their relationship with food. Though the book offers a structured plan, Lieberstein instills the importance of following personal cues and pursuing the reflections and meditations that resonate most. In that way, this book excellently captures the “essence” of working with a trained professional as it prompts readers to be their own guide. Professionals could also easily integrate Well Nourished into their work with clients; the worksheets, journal prompts, and reflective activities could serve as effective and thought-provoking “homework” for clients. Working together, the client and provider can identify which mindfulness and meditation activities feel safe and achievable.

Well Nourished opens with an introduction to the eight areas of life which Lieberstein identifies as essential to live life well; these include meeting physical, emotional, psychological, social, and intellectual needs, as well as pursuing creativity, spirituality, and worldly contributions. Lieberstein cites throughout the book that management and care of these areas of life spill into personal relationships with food and approaches the topics with the end goal of physical and emotional nourishment. The most transformative content is nestled in Part Two of the book, where the stage is set for mindful self-reflection of personal habits, perspectives, and barriers to thrive in the eight key areas.

Lieberstein weaves traditional nutrition education throughout the text. Most notably is her innovative expansion of traditional dietetics goal setting with her “SPRIGS” goals (Specific, Positive, Realistic, Inspiring, Grounded in time, and allow you to Set your next steps). Readers are prompted to integrate positive statements and inspiring feelings into the traditional goal-setting framework to focus on the true heart of the goal and to integrate self-acceptance into the goal-setting process. SPRIGS goals are revisited throughout the remainder of the book to help the reader reinforce the content into their daily habits as well as check in with progress. Specific nutrition guidelines are minimal, but she does include a brief overview of pertinent nutrition literature such as the gut-brain connection, how to balance a plate, and the importance of plant foods to support optimal health.

The calls to action throughout the chapters help readers actualize their goals while also providing flexibility to focus on what feels most meaningful in that moment. There is guidance for different activities, journal prompts, and numerous opportunities to pause and reflect on the content presented. Well Nourished offers guidance for navigating the tough feelings that may arise along the way and probes readers to thoroughly explore what these feelings mean in the context of their life. Lieberstein employs her expertise by anticipating the reader’s struggles and having a plan ready for them to explore the difficult sides of behavior change gently, effectively, and honestly.

Well Nourished offers a simple, predictable framework in each chapter that readers can follow to examine their life at a birdseye view before narrowing down the areas they want to improve first. The specific steps provide guidance while allowing flexibility and personalization. Thus, Well Nourished empowers readers to embark on a self-guided journey to expand their perspectives beyond the food they eat into the areas of their lives that will foster personal growth, strengthened sense of self, and philosophical satisfaction.

Reviewed by Staci Belcher, MS, RDN, LDN.
Staci is a registered dietitian nutritionist at the University of Georgia. Staci counsels students with eating disorders, provides nutrition education to the University community, and assists in program development to educate students about healthy, well-rounded living. Staci’s mission is to equip students with mindful strategies to understand their bodies, deliver practical nutrition education that can inform their choices, and empower them to create a strong foundation of health and wellness. Staci currently is serving as the CPE Editor for The Integrative RDN.

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