Dietitians working in every type of setting have a good chance of encountering patients, clients, and even coworkers who suffer from some form of anxiety. At the DIFM Symposium, “Feed Your Genes, Feed Your Brain,” on October 21, 2017, Dr. James Greenblatt described the prevalence of anxiety during his presentation on “Integrative Medicine for Managing Anxiety.” Anxiety disorder—including panic disorder, obsessive-compulsive disorder (OCD), posttraumatic stress disorder (PTSD), social anxiety disorder, specific phobias, and generalized anxiety disorder—is the most common mental illness in the United States, affecting 40 million adults. With 1 in 5 American adults suffering from this mental disease, the chance of encountering an individual with anxiety is 800 times greater than the chance of encountering an individual with cancer. The most common method of treating anxiety disorders is prescription benzodiazepines. Between 1996 and 2013, the number of adults filling a prescription for this drug rose from 8.1 million to 13.5 million—a 67% increase. In this same timeframe, the rate of overdose deaths involving benzodiazepines increased more than 4 times. In 2013, benzodiazepines were involved in almost one-third of all prescription drug overdose deaths.

Figure 1: Dr. Greenblatt’s THE ZEEBRA Approach to determining causes of anxiety symptoms. Reprinted with permission.

Yet, as Dr. Greenblatt succinctly stated, “anxiety is not a benzodiazepine deficiency disorder.” Many of the factors...
contributing to anxiety disorders are summarized by “THE ZEEBRA”—an acronym that provides a checklist of issues to examine when treating anxiety disorder (see Figure 1). This approach calls attention to such diverse issues as managing sleep, stress, and diet; examining levels of vitamins, minerals, essential fatty acids, and amino acids; and ensuring that patients are getting proper exercise. Current research has suggested additional factors to consider when treating anxiety disorder, including the human need for relationships, the calming effect of being in nature, the ability of yoga practice and mindfulness to reduce anxiety, and the health benefits of spirituality. When all of these factors are considered, it becomes apparent that many of the underlying causes of anxiety disorder can be treated with a wide array of functional, integrative, and alternative medicine approaches.

Individuals with anxiety disorder may be lacking protein or a particular amino acid. One amino acid Dr Greenblatt focused on was L-tryptophan, noting its important role in serotonin synthesis. In a normal diet, tryptophan is the least plentiful of the 20 amino acids, and decreased tryptophan in the diet is associated with decreased serotonin levels in the brain. Decreases in tryptophan are also connected to behavioral disinhibition, impulsiveness, increased aggression, deficiencies of executive function, decreased fear recognition, and impaired learning and memory. Genetics may also play a role in low tryptophan levels. Two different tryptophan hydroxylase enzymes are produced from different genes. The TPH1 gene, found primarily in the gastrointestinal tract and placenta, produces most of the body’s serotonin and is suppressed by vitamin D. TPH2, found only in the brain, is activated by vitamin D. A common single nucleotide polymorphism (SNP) reduces the activity of the TPH2 gene, resulting in lower serotonin levels in the brain. One way to increase serotonin production in individuals with this SNP is to dose with 5-hydroxytryptophan (5-HP), which is the direct precursor to serotonin in the L-Tryptophan-Serotonin pathway (see figure 2). 5-HP is extracted from the seeds of the Griffonia plant, and doses of 50-200 mg have proven effective.

Dr Greenblatt also highlighted research and clinical trials that studied the effects of dosing patients with inositol. Inositol is a naturally occurring isomer of glucose that is a key intermediate of the phosphatidyl-inositol cycle and is a second messenger released by serotonin receptors. Inositol production plays a key role in relaxation, moderating stress, and healthy eating behavior (see Figure 2). In 1978, accounts that depressed patients had reduced levels of inositol in their cerebrospinal fluid were reported. A series of studies and controlled trials since 1993 have found that inositol supplementation improved symptoms of OCD, depression, panic disorder, bulimia, and bipolar disorder. Dr Greenblatt stated that inositol may have therapeutic effects for psychiatric illnesses that respond well to serotonin selective reuptake inhibitors, such as depression, OCD, panic disorder, and bulimia. Clinical case studies demonstrated that inositol was also an effective treatment option for children with mental and behavioral problems, even in situations where medications had previously proven ineffective. Based on the solid research on the efficacy of its use, inositol may be a helpful adjunctive therapy for individuals with a spectrum of psychiatric illnesses. Inositol may also be used as sole therapy for children, the elderly, or others wishing to avoid medications.
dietary intake, certain drugs, and a TT polymorphism in the methylenetetrahydrofolate reductase (MTHFR) gene can all increase the risk of folate deficiency. This, in turn, may lead to central nervous system (CNS) disorders such as depression, dementia, seizures, developmental delays, neuropathy, and myelopathy. Supplementation with folate also enhances the effect of antidepressants. Deficiency of B₁₂ is common and its effects are dramatic, with symptoms including depression, apathy, irritability, memory loss, and hallucinations. Low levels of B₁₂ cause changes in 1-carbon metabolism, which leads to increased levels of homocysteine³ and cortisol, reduction in methylation, and decreased synthesis of monoamine neurotransmitters.⁴ Studies have shown that supplementation with B₁₂ improves outcomes for resistant depression³ and reduces symptom severity of OCD.⁵ B₁₂ levels of 500-600 pg/ml are needed for most individuals to feel well and can be determined by a simple blood test.

Inflammation is also related to many biological variations that are associated with depression and anxiety. In one cited study, elevated levels of C-reactive protein (CRP), a marker of inflammation and depression, were significantly correlated to anxiety, regardless of BMI, age, or sex.⁶ Pro-inflammatory cytokines have been found to increase indoleamine (IDO) enzymes, which leads to deficiencies of tryptophan, serotonin, and melatonin, which all contribute to symptoms of anxiety and depression. One possible cause of inflammation may be an essential fatty acid deficiency. Fatty acids play a role in promoting the health of the nervous system, immune system, skin, and joints, as well as normalizing appetite, burning body fat, and manufacturing hormones. It is not surprising that a deficiency may contribute to anxiety, depression, distorted perceptions, and aggression since fatty acids are also involved in all aspects of neurotransmission, including synthesis, degradation, release, re-uptake, and binding. A double-blind study divided 68 medical students into two groups to determine whether those given an omega-3 supplement would respond differently to stress than those receiving a placebo.⁷ The group given omega-3s showed a 14% reduction in the cytokine interleukin-3 and reported a 20% reduction in anxiety.

Dr Greenblatt also highlighted recent studies pertaining to the connection between the gut and the brain, and discussed the importance of restoring the microbiome. The human microbiota comprised of trillions of cells, primarily in the intestinal tract, composes the microbiome that is made up of the genes these cells harbor and has been studied extensively in recent years. It has been established that the gut microbiome produces nutrients, regulates the immune system, and regulates metabolism. Emerging data indicates that the microbiome influences neurotransmitter synthesis, harvests calories and vitamins, influences inflammatory processes, and affects appetite and weight gain by regulating hunger, cravings, and satiety. Probiotics, defined as microorganisms that are introduced into the body for their beneficial qualities, and prebiotics, which are nondigestible food ingredients that promote the growth of beneficial microorganisms, are both used to help restore balance. Psychobiotics are defined as live organisms that, when ingested in adequate amounts, produce health benefits in patients suffering from psychiatric illness. Studies showed that bacteria-free adult mice had an exaggerated stress response to restraint, but colonization of the gut microbiota at 6 weeks of age led to the mice normalizing the stress axis.⁸ If the mice guts were colonized at 8 weeks of age, the altered stress response persisted throughout adulthood. Additional studies in both mice and humans showed links between gut microbiota with activity of the hypothalamic-pituitary-adrenal (HPA) axis, cortisol levels, and stress, anxiety, and depression-related behaviors. Supplementation with one strain of bacteria can help support the growth of other health-promoting species that already reside in the intestine, but Dr Greenblatt cautioned that one bacteria strain does not fit all diagnoses.

Take-Home Message

In light of the research presented, medical professionals should conclude that using integrative nutrition therapies to personalize treatment for patients suffering from anxiety disorder is good practice. As neurotransmitter deficiencies or dysfunctions may be caused by genetics, nutritional deficiencies, neurotoxins, inflammation, stress, or a combination of two or more of these factors, collecting objective data should be one of the first steps in treatment. Two patients may present with similar symptoms but may have very different underlying causes. Dr Greenblatt further cautioned that medicine is not the enemy; and some patients may still need pharmaceutical means to control symptoms, perhaps in addition to other integrative therapies. Mental illness may be seen as a reflection of multiple dysfunctions in physiology according to Dr Greenblatt; and he feels that if the causes are found, the cures may also be discovered. To learn more about Dr Greenblatt and the integrative approaches he uses to treat psychiatric disorders, visit his website at JamesGreenblattMD.com.

**Clinical PEARL**

**Pain and Appetite**

We may already know that stress hormones are stimulated in times of stress, and blood sugars are out of whack as are other laboratory values, but have you ever wondered why patients lose their appetite when in severe pain? All hormones are depleted with pain, overriding appetite hormones that help stimulate appetite—which may be the reason acutely ill patients lose weight, potentially leading to malnutrition. Dietitians should monitor patients’ appetites and, as appropriate, recommend appetite stimulants or medical marijuana (if applicable in your state).
Nutritional Regulation of Endothelial Function for Reducing Cardiovascular Disease Risk

Sarah A Johnson, PhD, RDN, and Christopher L Gentile, PhD

Introduction

Cardiovascular disease (CVD) has remained the leading cause of death in the United States for over a century and is responsible for 750,000 deaths per year.1 Worldwide, CVD accounts for one-third of all deaths and costs nearly $1 trillion annually in health care and related costs.2 The term CVD encompasses a broad spectrum of diseases including stroke, coronary artery disease, heart failure, and cardiac arrest. The majority of cardiovascular-related disease is not restricted to the heart, but rather includes dysfunction of the vascular system. Among the alterations that occur within the vasculature, disturbances to the arterial endothelium are the most common and clinically relevant.3 Indeed, dysfunction of the endothelium often manifests prior to overt CVD and represents an early cardiovascular insult that, if left untreated, ultimately leads to the development of clinical CVD.4

This article presents information regarding the role of the vascular endothelium in the pathogenesis and prevention of CVD. Specifically, normal function of the vascular endothelium, underlying mechanisms contributing to the development of endothelial dysfunction, methods for assessment, clinical relevance, and nutritional regulation of endothelial function will be addressed. Translation of this information to clinical practice is essential for the promotion of cardiovascular health and reduced CVD risk.

Endothelial Dysfunction and CVD

The arterial endothelium is a single layer of cells that lines the inner surface of blood vessels throughout the body. These cells form an interface between luminal contents and underlying smooth muscle cells. By virtue of this strategic location, the endothelial layer can detect changes in the luminal environment and relay this information to underlying smooth muscle cells, allowing it to regulate a broad spectrum of physiological processes. These processes include angiogenesis, hemostasis, immune responses, nutrient exchange, and vascular tone (ie, the degree of vasoconstriction relative to vasodilation).5

One manner in which endothelial cells relay information to surrounding tissues is via the production and secretion of numerous vasoactive substances. Nitric oxide (NO) is the best characterized, and arguably most important, endothelium-derived vasoactive substance.6 NO plays a critical role in maintaining arterial health by promoting vasodilation, anti-inflammation, and antioxidant activity. Endothelial NO is produced from the oxidation of the amino acid L-arginine, which requires the enzyme endothelial nitric oxide synthase (eNOS) and the cofactor tetrahydrobiopterin (BH4).7 Once produced, NO diffuses to the underlying smooth muscle cells and induces smooth muscle relaxation. In addition to NO, several other endothelium-derived substances help maintain endothelial health, including prostacyclin and endothelium-derived hyperpolarizing factors.8 These substances are counteracted by a number of endothelium-derived factors that promote vasoconstriction, coagulation, proliferation, and inflammation, including endothelin-1, thromboxane A2, and angiotensin II. In healthy arteries, the profile of substances produced is highly regulated and appropriately balanced between vasodilators and vasoconstrictors, pro- and antioxidants, and pro- and anti-inflammatory signals. Conversely, in diseased or dysfunctional endothelium, the balance of vasoactive substances is shifted towards those that promote vasoconstriction, inflammation, and oxidative stress.9 (See Figure 1.)

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Although the underlying molecular mechanisms that mediate a shift towards endothelial dysfunction are unclear, a large body of literature indicates that excessive oxidative stress and inflammation within the vasculature play a key role.\(^9\)\(^-\)\(^13\) Oxidative stress develops due to an increased production of reactive oxygen species (ROS), coupled with insufficient antioxidant enzyme responses. ROS are produced from various sources, such as oxidant-producing enzymes (e.g., NADPH oxidase), eNOS uncoupling, and dysfunctional mitochondria. Once produced, ROS scavenge NO, making it unavailable to exert its protective effects.\(^14\) Additionally, the reaction between NO and ROS leads to the formation of peroxynitrite, a reactive nitrogen species that is able to oxidize the eNOS cofactor BH\(_4\) to its inactive form, leading to the production of superoxide instead of NO (i.e., uncoupled eNOS).\(^13\)\(^,\)\(^15\)\(^,\)\(^16\)

Vascular inflammation is another well-established molecular mediator of endothelial dysfunction.\(^17\) Numerous inflammatory molecules are upregulated during endothelial dysfunction, and their inhibition improves endothelial function in experimental animals and humans.\(^18\) Importantly, a bidirectional relationship exists between oxidative stress and inflammation, and the inception of either pathway will increase the other, initiating a deleterious cycle that can ultimately result in endothelial dysfunction and cardiovascular disease.

The status of endothelial health can be assessed in cell culture models by determining the secretory phenotype of individual endothelial cells (i.e., the ability to produce vasoactive molecules upon stimulation). In experimental animals and humans, the most common method to assess endothelial function is to determine the endothelium-dependent dilation (EDD). Briefly, endothelium-derived vasodilators, typically NO, are activated by a mechanical or chemical stimulus, and the extent of dilation induced by the stimulus is then assessed in either coronary or peripheral arteries.\(^19\)

Over the last 25 years, hundreds of studies have measured EDD in various populations and determined that a reduction in EDD is a distinguishing feature of endothelial dysfunction. It is present in numerous physiological and pathological conditions, including aging, menopause, obesity, hypertension, and type 2 diabetes.\(^20\) Moreover, a reduction in EDD manifests prior to overt CVD and is a strong independent predictor of cardiovascular events and mortality in various populations, including healthy individuals.\(^21\)

Given that endothelial cells are present on all blood vessels throughout the body, it may not be surprising to note that recent data links reductions in EDD with the development of other non-cardiovascular conditions such as Alzheimer’s disease, type 2 diabetes, and chronic kidney disease. In fact, although aging is the primary risk factor for endothelial dysfunction, these cardiometabolic diseases and conditions can cause dysfunction to develop prematurely and can accelerate its development.\(^17\) In
addition, estrogen deficiency associated with menopause leads to progressive reductions in EDD across the menopausal transition, resulting in endothelial dysfunction following menopause.22-25

The strong prognostic and predictive value of EDD has generated considerable interest in adopting its measurement as a clinical tool in daily practice. However, the most common methods to assess EDD are expensive, invasive (eg, intra-arterial catheterization), and technically challenging (eg, require expertise with plethysmography or ultrasound); and thus not suited for widespread clinical use.19 It has been suggested that measurement of circulating factors derived from the endothelium could be used as a surrogate of endothelial function, although this approach has several limitations, including a lack of specificity.26 More recently, several non-invasive and inexpensive techniques to determine EDD have been developed to make it more clinically applicable. For example, peripheral arterial tonometry (PAT) determines EDD by measuring plethysmographic recordings of the arterial pulse wave amplitude in the finger.27 Although more studies are needed to determine the specificity and effectiveness of PAT, existing data indicate that it is highly correlated with more standard measurements of EDD and that it predicts CV events.28 Thus, PAT has great clinical potential, as it is relatively easy to use, is operator-independent, non-invasive, and reproducible.

Nutritional Regulation of Endothelial Function

The common presence of endothelial dysfunction in chronic diet-related metabolic diseases such as obesity and diabetes has spurred extensive research examining the nutritional factors that lead to endothelial dysfunction. In a 2010 study, suboptimal diet quality was found to be the leading risk factor for all-cause mortality and disability and therefore represents an important target in CVD prevention.29 Indeed, evidence indicates that a Western-style dietary pattern (high in saturated fats and refined carbohydrates) contributes to endothelial dysfunction.30 (See Figure 1.) Given the mortality of CVD and the immense economic burden associated with its treatment, lifestyle strategies that can preserve and improve endothelial function, such as diet and nutrition, need to be established and promoted.

Several dietary patterns, foods, bioactive food components, nutraceuticals, and dietary supplements are purported to have cardiovascular effects, including the ability to improve endothelial function. Among these, some are well known for their cardiovascular-protective effects and are supported by a wealth of scientific evidence. For instance, the Dietary Approaches to Stop Hypertension (DASH) and Mediterranean style–dietary patterns have been shown in numerous studies to improve endothelial function. They also improve a number of other factors that impact endothelial function such as body weight and composition, blood pressure, hyperglycemia, insulin resistance, blood lipids, and inflammation.30,31 Consumption of certain types of foods—specifically fruits, vegetables, nuts, seeds, legumes, whole grains, and monounsaturated and polyunsaturated fats—is known to have diverse health benefits and may modulate the aforementioned CVD risk factors, including endothelial function.31,32 (See Figure 1.)

The bioactive component of foods is a primary reason for their broad cardiovascular benefits. The Office of Dietary Supplements at the National Institutes of Health defines bioactive compounds as “constituents in foods or dietary supplements, other than those needed to meet basic human nutritional needs, that are responsible for changes in health status.”33 Bioactive compounds may include nutrient compounds such as vitamins and minerals; plant bioactive compounds (ie, phytochemicals) such as polyphenols, carotenoids, glucosinolates, polysaccharides, betalains, and nitrate; as well as non-plant bioactive compounds, such as omega-3 fatty acids and bioactive peptides, found in fish, dairy, and eggs. These bioactive components are able to interact with human physiology at the molecular, cellular, organ, and system levels to exert changes in health status. Functional foods are foods that contain bioactive food components and therefore provide health benefits extending beyond the traditional nutrients required to meet basic nutrition needs.34 These bioactive compounds can be isolated from foods and other plants and may be modified for the purpose of food fortification and/or dietary supplementation (eg, nutraceuticals).30

Bioactive compounds are able to interact directly with the vascular endothelium and improve function through a number of different mechanisms. For example, polyphenols are a group of phytochemicals characterized by a chemical structure that includes more than one phenol group. Polyphenols are found in numerous plant foods, but particularly fruits and vegetables. Accumulating evidence indicates that polyphenols can modulate endothelial function through mechanisms including, but not limited to, stimulating NO production through eNOS activation, detoxifying ROS by donating an electron, inhibiting enzymes responsible for ROS production such as NADPH oxidase, increasing endogenous antioxidant enzyme activity, and reducing inflammation.35
Some foods such as red beetroot and green leafy vegetables like arugula and spinach are rich in inorganic nitrate which is converted to NO through a pathway that is independent of the vascular endothelium. Through this pathway, nitrate is reduced to nitrite via nitrate-reducing bacteria in the oral cavity, and the resulting nitrite is further reduced in the acidic gastric environment to NO, which is then absorbed in the intestine. Polyphenols have been shown to enhance the reduction of nitrate to nitrite and NO. Omega-3 fatty acids are found naturally occurring in certain fish such as salmon and sardines, and in fortified foods such as eggs, margarine, and milk. Research indicates that they improve endothelial function by reducing inflammation. Bioactive peptides are produced mainly through enzyme hydrolysis or fermentation of protein-rich foods such as dairy, egg, fish, meat, and soybeans. Research indicates that these peptides are able to modulate endothelial function primarily through antioxidant, anti-inflammatory, and angiotensin converting enzyme-inhibitory properties. Notably, emerging evidence indicates that foods and their bioactive compounds such as dietary fiber also modulate the gut microbiota, leading to improved endothelial function.

### Take-Home Message

Despite major advances in medicine and biomedical sciences as a whole, CVD continues to be the leading cause of death globally; and the treatment for CVD represents a major economic burden. Endothelial dysfunction is predictive of CVD events and mortality and is modifiable through lifestyle factors such as diet and nutrition. For these reasons, diet and nutritional strategies that can improve endothelial function need to be established and promoted. The current body of evidence indicates that dietary patterns rich in saturated fat and refined carbohydrates contribute to the development of endothelial dysfunction. Conversely, improved endothelial function and reduced CVD risk are associated with healthy dietary patterns that are low in saturated fat, low in refined carbohydrates, and high in plant foods rich in bioactive compounds. With this knowledge, RDNs can guide patients and clients to incorporate foods rich in bioactive compounds into their diets, thereby promoting a shift towards a cardioprotective dietary pattern.

### Clinical PEARL

**Metformin not only for blood glucose control**

We know that metformin is effective for blood glucose control, but cancer researchers are looking into the use of metformin in preventing recurrence of cancer. Metformin is effective in inhibiting the mTORC-1 complex, the anabolic pathway that is thought to lead to cancer cell growth in breast, prostate, and neuroendocrine cancers, while not inhibiting the mTORC-2 pathway which is involved in blood glucose and blood lipid control.
Nutritional Regulation of Endothelial Function for Reducing Cardiovascular Disease Risk: References


Clinical PEARL

TAS2R38: Motivate your patients to eat their veggies!

Ever wonder why you can’t get your patients to eat vegetables? Some people, especially children, have a polymorphism in the TAS2R38 gene, the bitter receptor, making them hypersensitive to bitter foods such as broccoli, kale, cauliflower, and other cruciferous vegetables. You can test your patients by asking them to sample propothiouracil and see their reaction. Adding a pinch of salt or a drizzle of honey to these foods can mask the bitter receptor and help them enjoy the benefits of these superfoods.
Integrative Therapies for Binge Eating Disorder

James Greenblatt, MD

As a society, we are bombarded by food and food cues. While most of us can regulate occasional indulgences in a healthy manner, those suffering from Binge Eating Disorder (BED), compulsive overeating, and appetite control issues struggle to do so. Sadly, appetite control issues are misunderstood in our culture. Binge eating is sometimes referred to as an addiction; but unlike alcohol where avoidance can be practiced, binge eaters must learn to self-regulate their drug several times a day for the rest of their lives. While certain medications and behavioral therapy can help, biochemical imbalances and underlying nutritional deficiencies must be addressed. Because appetite is regulated by multiple complex neurochemical systems involving neuropeptides and neurotransmitters that manage hunger, treatment is challenging and requires a multi-faceted approach.

Despite millions suffering, there is only one medication approved by the FDA for binge eating—a stimulant used for attention deficit hyperactivity disorder (ADHD) that has the potential for abuse and addiction. While other medications and combinations including selective serotonin reuptake inhibitors (SSRIs), topiramate, zonisamide, and naltrexone may offer some relief, they fail to address biochemical imbalances at the root of disordered eating. It is imperative to consider nutritional intervention to correct underlying issues and deficiencies in those with BED. Amino acids dl-phenylalanine and 5-hydroxytryptophan are particularly helpful for binge eating. Additionally, cofactors, as well as curcumin and quercetin to support healthy neurotransmitter levels and cytokine balance.

Amino acids play a vital role with regard to eating behavior and appetite; all peptides, hormones, and neurotransmitters are manufactured from amino acids, and appetite is strongly influenced by all three molecular structures. If amino acid levels are low, neurotransmitter and neuropeptide levels will decrease leading to hormonal imbalance, mood disorders, and appetite disturbances. Increasing amino acid intake through supplementation provides the raw material to restore healthy neurotransmitter and neuropeptide levels. This realigns underlying biochemical imbalances that exaggerate uncontrollable cravings and amplify destructive eating patterns.

The amino acid L-tryptophan is the precursor to serotonin, which regulates appetite. The conversion of L-tryptophan to serotonin is a two-step process that relies on nutritional cofactors vitamin B₆, vitamin B₉, L-methylfolate, and zinc. The serotonin conversion process begins when L-tryptophan is converted into 5-hydroxytryptophan with the help of tryptophan hydroxylase (a vitamin B₆-dependent enzyme), which requires 5-MTHF (folate). 5-hydroxytryptophan (5-HTP) then converts to serotonin with the aid of decarboxylase (a vitamin B₆-dependent enzyme) and zinc. Thus, supplemental 5-HTP is highly effective because it bypasses the first step of the conversion process directly increasing serotonin levels.

Though 5-HTP shows promising results on its own, I have found it to be even more effective when used in combination with phenylalanine. Phenylalanine is a precursor to dopamine and norepinephrine. Norepinephrine is responsible for the stress response. Phenylalanine works in three different ways to control appetite: it is a precursor to dopamine, it helps stimulate production of cholecystokinin (CCK), and it stimulates thyroid hormones as it is a precursor to tyrosine. It is important to note that phenylalanine comes in D and L form; it is the L form that is useful for appetite suppression and CCK release.

Known as the “master appetite controller,” serotonin inhibits appetite by activating cells in the hypothalamus, which is responsible for satiety and calming. When eating, serotonin levels gradually rise, turning appetite off. Thus, serotonin deficiency tricks the brain into perceiving starvation even after sufficient food intake is fulfilled.
Curcumin is widely known for its anti-inflammatory and antioxidant properties. While more research is needed to validate curcumin’s specific effects on appetite control, a number of studies confirm its use for combating symptoms of depression. Because depression and disordered eating are often comorbid, curcumin may be helpful for BED and appetite control issues. Given curcumin’s wide array of benefits related to depression and eating behavior, I recommend a minimum of 250 mg/day of supplemental curcumin to support appetite control. It is imperative that the curcumin is attached to a delivery mechanism to cross the blood-brain barrier. Look for a supplement that contains a premium form of curcumin attached to a phytosome; this significantly increases absorbability.

Quercetin is one of the active substances in St John’s Wort that has been shown to significantly inhibit COMT and mitochondrial MAO-A activity. COMT and MAO-A are enzymes responsible for breaking down catecholamine neurotransmitters, dopamine and adrenalin (epinephrine). By inhibiting these enzymes, more dopamine is available for use in the brain. Because increased dopamine levels decrease the urge to binge, it is a beneficial integrative therapy for treatment of BED.\(^5\)

Other nutritional therapies should be considered as they can impact mental health status. Vitamin D, B\(_{12}\), probiotics, essential fatty acids, and magnesium may be beneficial as low intake of any or all five is linked to depression. I also recommend essential free-form amino acids for binge eating because they are readily available for neuropeptide and neurotransmitter use as opposed to amino acids from dietary protein which must be broken down. For sugar cravings, I’ve found glutamine and glycine to be helpful.

Though correcting biochemical imbalances can help reduce the urge to binge, other lifestyle factors must be implemented as part of treatment for long-term success. Dietary changes, regular exercise, adequate sleep, and cognitive behavioral therapy are essential as they increase neurotransmitter synthesis and contribute to hormonal balance. Processed “junk” foods rich in high fructose corn syrup\(^6\) and monosodium glutamate (MSG)\(^7\) should be avoided as they can stimulate overeating. Artificial sweeteners must also be avoided as they have been shown to cause an alteration in metabolism as well as desensitization to sweetness. A diet rich in whole foods should be followed to reduce cravings; regulate blood sugar; and provide amino acids, vitamins, and minerals that contribute to neuropeptide and neurotransmitter synthesis. It may also be beneficial to reduce or remove gluten and dairy from the diet since some individuals cannot break down gluten and casein efficiently resulting in partially digested byproducts gliadin and casomorphin which have been shown to be chemically identical to opioid drugs such as heroin and morphine.\(^8\)

In addition to dietary changes, eating slowly without distraction and listening to hunger cues is essential. Because BED onset normally occurs during high-stress periods in life, cognitive behavioral therapy is well researched and is an essential component of a comprehensive treatment plan.


Upcoming Conferences and Educational Opportunities


This announcement is courtesy of an agreement between P-POD and DIFM.

Electronic Mailing List (EML) Recent Topics Review

In a discussion related to elevated A1C levels in highly active diabetic patients, many users recommended lowering carbohydrate intake to 15-30 grams per meal. Additional dietary suggestions focused on increasing animal protein and healthy fats. In regard to possible causes of increased A1C levels in athletes, other members suggested that glucocorticoid activation can increase insulin resistance in endurance athletes. Some responses indicated that elevated A1C levels could be due to the longer duration of red blood cell (RBC) turnover in athletes. Additionally, undiagnosed iron deficiencies were discussed as contributing to falsely high A1C tests in diabetic athletes. It was also mentioned that the gut microbiome plays a role in insulin resistance and that gut bacteria may have an ability to modulate blood sugar. Oxidative stress from diabetes was discussed as contributing to elevated A1C levels, and alpha lipoic acid (ALA) was suggested as an antioxidant to lower blood sugar. Many posts discussed the importance of closely monitoring blood sugar after meals and workouts. Another popular post discussed restless leg syndrome. Several users recommended magnesium glycinate and magnesium malate to treat restless leg syndrome. Magnesium is an important co-factor for vitamin D synthesis, and users mentioned supplementing vitamin D if there is a deficiency. Additional suggestions indicated that vitamin E and magnesium citrate could be beneficial in treating restless leg syndrome. Other responses suggested that medications, such as antidepressants, could exacerbate restless leg syndrome symptoms and that iron deficiency could also be a potential cause. In our commitment to being fair and unbiased, rather than identifying individuals, programs, or organizations, discussions regarding certificate programs, testing, and nutrient analysis programs can be found on the Listserv under: http://groups.yahoo.com/neo/groups/DIFM_Listserv/info.

Reviewed by Tarah Allen
Mediterranean Diet and ADHD

A cross-sectional study out of Spain tested the association between diagnoses of attention-deficit/hyperactivity disorder (ADHD) in children and adolescents with adherence to the Mediterranean diet. The study recruited 120 children and adolescents out of the Department of Child and Adolescent Psychiatry and Psychology in the Hospital of Sant Joan de deu Barcelona. Of the 120 individuals, 60 were recently diagnosed with ADHD and 60 who screened for the absence of ADHD symptoms were used as controls. Dietary intake was assessed using a food-frequency questionnaire and a 24-hour dietary recall. The study used nutrient analysis software (PCN Pro) to evaluate total energy and nutrient intake. To assess diet adherence, researchers used the KIDMED index, a 16-question test that evaluates the quality of following the Mediterranean diet with scores ranging from -4 to 12, 12 indicating greatest diet adherence. Participants wore an actigraph unit on their non-dominant wrist for seven days to measure for physical activity. Findings showed that KIDMED scores were relatively similar for those with ADHD without anxiety (6.5) and those with ADHD with anxiety (5.5). A significantly lower percentage of subjects with ADHD were found to consume either a second serving of fruit daily (p<.027), fresh or cooked vegetables more than one time per day (p<.001), or pasta or rice five or more times per week (p<.001), compared to the control group. About 20% of subjects with ADHD, compared to 1.7% of controls were found to eat out at fast-food restaurants more than one time per week (p<.001). Low plasma levels of iron and zinc have been previously reported in children with ADHD; yet, intakes of these minerals were not significantly different between groups. Total energy intake remained relatively similar between the ADHD and control groups. Overall, an association between low adherence to the Mediterranean diet and diagnoses of ADHD was found, suggesting that certain dietary habits may influence the development of ADHD.


Easier Navigating for Non-GMO Products

In an effort to make finding brands and products created with non-GMO materials and ingredients readily available to consumers, the Non-GMO Project has compiled a guided list of products. All products were assessed by a third-party evaluator to determine if products met with the Non-GMO Project’s standard for verified non-GMO products. Products listed in the guide range from grains, dairy, and meats to body care, vitamins, and infant formula. For more information, visit: [https://www.nongmoproject.org/find-non-gmo/verified-products/product-categories/](https://www.nongmoproject.org/find-non-gmo/verified-products/product-categories/)


Glyphosate-based Herbicides and Non-alcoholic Liver Disease

A two-year study tested the effects of glyphosate-based herbicides (GBH) exposure on liver tissue in rats. The control group (n=10) received plain drinking water while the GBH-treated rats (n=10) were administered a low environmentally relevant dose, per the study, of 0.1 ppb concentration (4 ng/kg body weight) of GBH (Roundup) per day through the same water. At months 1, 2, 3, 6, 9, 12, 15, 18, 21, and 24, blood samples were taken to assess serum triglycerides. Rat liver samples underwent metabolome and proteome analyses to assess for liver pathology which researchers hypothesized the rats would develop following exposure to Roundup. No significant alterations to plasma triglycerides were observed in the rats during the first year of the study, however, by months 18 and 21, significant accumulations (p=.04 and p=.01) of triglycerides were found in GBH-treated rats. Amongst all liver samples, response to drug and organonitrogen compounds were assessed to identify any biological significance to proteome alterations. A highly enriched response to compounds was observed in the liver proteome of GBH-treated rats, suggesting an oxidative response in the liver proteome, likely due to increased oxidative stress. When analyzing metabolome samples, N-methyl proline, N-acetyl-beta-alanine, and nicotinamide riboside were the only compounds significantly altered in the GBH-treated group compared to the control group. Slight alterations in cholesterol levels were found, with a fold change of 1.16 (p=.002). Liver proteome profiles for the GBH-treated rats showed peroxisomal proliferation (p<.001) and steatosis (p<.001), however, proteome profiles for the control group were not disclosed for comparison. Results from this study suggest exposure to GBH in rats may play a role in
development of non-alcoholic fatty liver disease, however, more research on the subject is needed.


Controlling Lupus Through the Gut Microbiome

Lupus pathogenesis was assessed through a comparison of the gut microbiota in female lupus-prone (LPR) mice and Murphy Roths Large (MRL) control mice. Researchers found that at five weeks old, LPR mice had a decreased amount of Lactobacillales in their gut microbiota compared to the MRL controls. In order to determine if the altered gut microbiota was due to the disease or causation for the disease, the LPR mice received cecal microbiota transplants from the MRL mice and the MRL mice received reciprocal transplants. No changes were observed in the MRL mice, however, the LPR mice were found to have a significant decrease in their autoantibody production in the lower gastrointestinal tract. In order to further assess the benefits of Lactobacillales on LPR mice, they were pretreated with antibiotics and then engrafted weekly with five strains of cultured Lactobacillus isolate. No changes in disease severity occurred following the antibiotic treatment, however, by weeks five and seven of Lactobacillus treatment, an increased abundance of Lactobacillales was observed in the gut microbiota, along with a significant decrease in circulating autoantibodies, proteinuria, and renal histopathology and increased survival rate. Upon further investigation, the LPR mice were found to show symptoms of having a “leaky gut” due to significantly increased endotoxemia, which was also decreased with reductions in IL-6 and increased IL-10 production through increased Lactobacillus treatments. Since systemic lupus erythematosus (SLE) is typically found in females, researchers wanted to further investigate if hormones had an influence on the gut microbiota with Lactobacillus treatment. Both intact male and surgically-castrated male LPR mice were treated with the same Lactobacillus treatment administered to the female LPR mice. Increased Lactobacillales colonization was found in both groups, however, significant reductions in proteinuria, renal pathology, and serum levels of IgG2a and IgA were only present in the castrated male population, suggesting hormones may play a role in regulating the gut microbiota with SLE.


BsmI (rs1544410) and FokI (rs2228570) vitamin D receptor polymorphisms, smoking, and body mass index as risk factors of cutaneous malignant melanoma in northeast Italy. Cancer Biol Med. 2017;14(3):302-318. doi:10.20892/jissn.2095-3941.2017.0064 (PubMed ID: 28884047). Two variants in the vitamin D receptor (VDR) gene, together with smoking duration and obesity, were identified as risk factors for both the occurrence of melanoma and its severity.

Bariatic surgery and precision nutrition. Nutrients. 2017;9(9). pii: E974. doi:10.3390/nu9090974 (PubMed ID: 28878180). This review describes the growing importance of nutritional genomics (nutrigenetics, nutrigenomics, and epigenetics) for bariatric weight loss surgery and related weight loss. Table 1 lists specific gene variants reported in various bariatric surgery studies and Table 3 lists genes for which post-surgery gene expression changes have been studied. Reported changes in intestinal microbiota are listed in Table 4.


Dietary fat intake modulates effects of a frequent ACE gene variant on glucose tolerance with association to type 2 diabetes. Sci Rep. 2017;7(1):9234. doi:10.1038/s41598-017-08300-7 (PubMed ID: 28835639). A high-fat diet, when given to those carrying two copies of the rs4343 gene variant (which corresponds to the DD allele of the ACE I/D variant) resulted in impaired glucose tolerance. The authors conclude by suggesting that this may be useful information for dietary counseling with regard to managing type 2 diabetes risk.

metabolomics, and recent advances are also described. It concludes by saying that although still in its infancy, progress with translation into general practice is being made.

Common genetic variants alter metabolism and influence dietary choline requirements. *Nutrients*. 2017;9(8). pii: E837. doi:10.3390/nu9080837 (PubMed ID: 28777294). Figure 3 shows common gene variants which can affect choline dynamics more directly, and figure 2 shows common variants which can affect choline dynamics via folate metabolism. Although additional research is recommended, the authors describe “substantial promise” of such information for better serving the needs of subgroups within the larger population.

A nutrigenomic approach to non-alcoholic fatty liver disease. *Int J Mol Sci*. 2017;18(7). pii: E1534. doi:10.3390/ijms18071534 (PubMed ID: 28714900). The authors attribute the risk of NAFLD to a combination of genetic susceptibility together with a number of other factors, including diet and lifestyle. Specific gene variants and dietary constituents are described, along with epigenetic and intestinal microbiota considerations. The authors suggest that a nutritional genomics “risk score” may be useful.


Genetic variation in SLC7A2 interacts with calcium and magnesium intakes in modulating the risk of colorectal polyps. *J Nutr Biochem*. 2017;47:35-40. doi:10.1016/j.jnutbio.2017.04.016 (PubMed ID: 28501704). The authors found evidence which suggests that the dietary calcium/magnesium ratio may be important for the prevention of colorectal polyps (rather than just considering calcium or magnesium alone), which might also affect colorectal cancer risk.

Copyright 2017 Nutrigenetics Unlimited, Inc. Inquiries about above references? Contact Ron L Martin, MS, President, Nutrigenetics Unlimited, Inc, 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 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 *Journal of Nutrigenetics and Nutrigenomics*.

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In seeking sponsors, DIFM has established product standards for products and services of value to the integrative and functional medicine field. We consider product quality, efficacy, manufacturing, and business practices among other criteria. We encourage all professionals and individuals to choose products aligned with their own specific standards.
Donating Blood Reaps Significant Rewards

Jena Savadsky Griffith, RDN

There is substantial evidence for diet and lifestyle as the main environmental contributor to cardiovascular disease. However, while guiding patients and clients to eat and live their way to good health, the benefits of donating blood should be noted.

In a 1998 study done in Finland, it was found that people who donated blood regularly (every 8 weeks) had an 88% decrease in myocardial infarction. Researchers followed almost 3000 men 42-60 years of age for an average of 9 years and found that heart attack rates for donors was only 0.7% compared to 12.5% for non-donors. Other studies confirm these findings, including a 1997 study from Kansas City that showed a 50% reduction in heart attacks in a smaller sampling of non-smoking male blood donors.

Although these conclusions may be attributed to several factors, the lowered iron stores that result after donation which then decrease oxidative stress may be the primary influence. Women, especially pre-menopausal, have a lower incidence of heart disease than men, further pointing to a lower blood count, and therefore less iron stores, due to regular blood loss from menses. Donation also simply lowers blood viscosity, replacing donated blood with newer red blood cells. A 2005 study from Yale concluded, “High-frequency blood donors had evidence of decreased body iron stores, decreased oxidative stress, and enhanced vascular function when compared with low-frequency donors.”

For comparison, a 2014 task force on statin safety stated that statins lower the risk of heart attack stroke and death by 25-30%, less than half the potential decreased risk from blood donation and with more side effects. Further, in a 2013 study, investigators concluded that “iron reduction may be a safe and low-cost alternative to statins.”

Doctors understood the value of blood-letting in 1799, when they thought they were helping George Washington get over what was presumably a strep infection. Unfortunately, they may have taken it too far and by some accounts took half of his blood volume and his life soon after. Thankfully, we now have modern equipment to monitor blood count and other factors to ensure safety for the donors and recipients.

References

De-Stress With Darla

Peg Rummel, RN, MHA, OCN, NE-BC

De-Stress With Darla

Peg is the nurse navigator for the Multiple Myeloma/Amyloid and Head and Neck service lines at the Abramson Cancer Center, University of Pennsylvania in Philadelphia. She has over 30 years of oncology experience with a focus on nurse navigation for the past 7 years. She has held positions as an oncology manager, director and educator in both community hospitals and academic medical centers. She is certified in both oncology nursing and is a certified oncology nurse navigator. She has lectured and published on the local and national level. Contact Peg at margaret.rummel@uphs.upenn.edu.

My journey started 2 years ago when I lost my beloved dog Darla. She was 16 years old and pretty robust for an old girl until her last few months when old age reared its ugly head. Just like with our patients she died on her own terms when I was away. I think she knew how difficult her loss would be for me and did not want me there when she died. Needless to say I was devastated. I knew I wanted to provide a forever home for a new dog, it was just a matter of finding the right dog and it had to be a rescue dog. I was looking for a specific breed and gender (female Border collie or Border collie mix) and my goal was to train her to be a certified therapy dog. I knew how much comfort and love my dogs have brought to me throughout my life and I wanted to pay it forward by having her visit the cancer center where I work as a nurse navigator.

It was not long after Darla died that I was set to adopt a new dog. I was so excited that I found a new addition to the family only to be rejected three days before I was to pick up my new dog Sally. I was told would not be a good “pet parent” but I later found out that the adoption agency wanted Sally to be adopted by a friend of the owner. I believe in karma and three days later I found an email about a dog I had inquired about. I was doing an internet adoption and after careful screening and a lot of discussion specifically related to being a therapy dog the adoption was approved. My new dog was rescued from a kill shelter in Georgia and was being fostered by a wonderful woman close to the shelter. She came north on the doggie transport bus with several other dogs who were going to their new forever homes. She was named Darla by the rescue. Talk about coincidence! I think this match was made in heaven.

Darla and I trained for over a year. We did basic obedience classes as well as certified therapy dog training. We spent a lot of time practicing to be sure we got it right. She was trained around noise, people, other dogs and many of the things she would be in contact with in a medical setting. She did great and passed her test on the first try. I knew I had a smart girl!

I had spoken with my director and our integrative navigator many times throughout our training with the goal of starting a therapy program both for patients and staff. As oncology providers we deal with a great deal of stress and are so giving to others that we often forget to care for ourselves. We received the approval from administration to start our program ‘De-stress with Darla Days.” Darla comes to work with me once or twice a week and provides therapy to anyone who needs some extra love. She wears her hospital ID badge and she is very proud to wear it. I think she knows the word “work” and when she has her ID and red bandana on she is in her work mode. She brightens everyone’s day and gives us lots of laughs. The changes she brings about in people are amazing. When she comes in in the morning she goes to every staff member’s office for a visit and to check on all her “herd” to be sure everyone is well. She brightens everyone’s day and gives us lots of laughs. The changes she brings about in people are amazing. When she comes in in the morning she goes to every staff member’s office for a visit and to check on all her “herd” to be sure everyone is well. She brightens everyone’s day and gives us lots of laughs. The changes she brings about in people are amazing.

One of our big events was when our clinics were expanding and doubling in size. Needless to say moving clinic space, patients and providers all at the same time to new locations was a massive task. We held a “De-Stress with Darla” week where she was available for staff and patients to come spend some time away from all the craziness and decompress. We made it a fun event with give aways, food and just a quiet space where people could unwind. Of course Darla was the big draw and the feedback we received from the staff and patients told us having her as part of the team helped everyone get through this change feeling a whole lot better.

Darla has become so integrated into our department that she has her own profile on our department website. Her picture has been posted on facebook and she has “starred” in a slideshow about the meaning of pets while undergoing cancer treatment. The link to the slideshow here: https://conquer-magazine.com/web-exclusives/219-pet-therapy

Darla makes “office calls” as needed both for patients and providers. She visits with them and brightens their days. I hear the providers are less grumpy after a visit from Darla. She makes rounds in the clinics to see patients in the waiting areas to provide support and love. This simple thing allows patients to share their feelings and helps pass the time. Many of our patients live far away and have to leave their pets behind, so Darla provides a bit of home. She has provided bereavement therapy for several patients who recently experienced the loss of a pet. It has been cathartic for them and helped with the grieving process as they have sat and petted her and shared their stories. Darla is a very good listener. You never know when you have an idea where it will end up so don’t be afraid to think outside the box as that is what we do best as oncology nurse navigators.

Resource Review: Human Heart Cosmic Heart: A Doctor's Quest to Understand, Treat and Prevent Cardiovascular Disease

Human Heart Cosmic Heart: A Doctor's Quest to Understand, Treat and Prevent Cardiovascular Disease

Thomas Cowan, MD
Hardcover: $24.95
White River Junction, VT; Chelsea Green Publishing. 2016. 176 pp
ISBN-10: 1603586199

Dr. Thomas Cowan, a longtime holistic physician and one of the founding board members of the Weston A Price Foundation, writes a radical exposé of the prevalent model of the human heart in this part memoir, part expository essay about this fascinating organ. The author poses the idea that conventional medicine has really missed some important facts about the anatomy and physiology of this intricate organ and its circulatory system. The first part of the book will take you through how his own heart condition and life experiences led him to challenge what he had learned about the heart and how he embraced the notion that the heart is not a pump. The title alludes to a deeper meaning of the human heart, one perhaps tied into the cosmos and the elements that conform it—posing a potential connection between the element of gold, the sun, the circulatory forces, and the human’s center of vitality, the heart. Albeit, Cowan in fact, tries to persuade the reader to explore some philosophical ideas about the universe and its rather mystical connection to biological systems on earth, such as the force of the sun and stars on things like the movement of water and blood. He compels us to consider this proposed model of the human heart using solid anatomical, physiological, chemical, and even geometrical principles. The reader is also taken back in history to explore how thinkers of old, such as Leonardo DaVinci, knew of certain characteristics of the flow of blood, now proven to be correct, thanks to Magnetic Resonance Imaging technology. Early views of the heart as the center of vitality were held until the works of Dr. William Harvey—considered the father of Cardiology—described the heart as a pump. Harvey’s model has persisted in conventional medicine for around four hundred years without much refute, until now. Dr. Cowan’s premise in this book—the heart is not a pump—will not only challenge the way the heart is viewed, but also asks the reader to reconsider the causes and treatments for heart disease. The concepts of circulation and heart attack will take on a different meaning after reading this book. The book also touches on integrative approaches to health, such as lowering stress, and offers some guidance into lifestyle in the context of heart health. The author also promotes a diet that is rich in vegetables, and more importantly, one that is not low in fat. In several chapters, the author explores some ideas that may appear to deviate from the book’s main focus; however, whether the reader considers the author’s perspectives enlightening and inspiring or is somewhat put off by how sweeping his standpoints may be, this book is worth reading and exploring.

Reviewed by Anita Davila. Anita completed her didactic program in dietetics and graduated with a bachelor’s degree in Food and Nutrition from the University of Alabama in 2015. She is Student Member Services Co-Chair for DIFM and helps with the Instagram portion of the marketing committee. She volunteers locally for the North Suburban Academy of Dietetics in the Northwest suburbs of Chicago, handling portions of their social media and public policy. Anita will be taking the NDTR exam, and applying for dietetic internships in 2018. Contact Anita at anitadavila2@gmail.com.
For centuries, chili peppers (Capsicum annuum, Solanaceae) have been valued for their fiery flavor as well as their medicinal and health-promoting properties. More recently, scientists are also getting steamed up about the potential of these fruit pods to fight or prevent certain diseases and even support overall longevity.

Chili peppers have long been in the spotlight, with traditional uses ranging from a treatment for colds and fevers to an agent that soothes the circulatory and digestive systems. Rich in antioxidants, flavonoids, vitamins, and minerals, chili peppers are the fruit of a member of the genus Capsicum, which is part of the nightshade (Solanaceae) family. They also contain a number of active chemical compounds called capsaicinoids. Of these, capsaicin is thought to be the compound with the most health-promoting properties.¹

It is capsaicin that is particularly intriguing, especially to researchers at the University of Vermont who say that consumption of capsaicin in hot red chili peppers might extend lifespan. The study, led by medical student Mustafa Chopan and Professor of Medicine Benjamin Littenberg, MD, reached this conclusion by analyzing data from more than 16,000 adults aged 18 or above, who participated in the National Health and Nutrition Examination Survey III between 1988 and 1994. The team observed that the primary consumers of hot red chili peppers tended to be younger, male, white, Mexican-American, and married, as well as consumers of cigarettes, alcohol, and various meats and vegetables.² They also typically had lower incomes and less overall education when compared with those who did not consume red chili peppers.

In their analysis, the authors examined roughly 19 years of follow-up data. During this time, there were 4,946 recorded deaths. They found that the mortality of participants who consumed hot red chili peppers was 21.6%, as opposed to 33.6% for those who did not. Although the cause-specific mortality analysis was limited by the relatively small number of deaths, the researchers concluded that there was a “significant decrease in mortality associated with hot red chili pepper consumption.” Interestingly, those with hot red chili peppers in their diet also had generally lower HDL cholesterol levels.

The findings are significant, in part, because they support the conclusion of a study conducted in China in August 2015. The large population-based cohort study looked at data from nearly 500,000 Chinese adults, excluding patients with cancer, heart disease, and stroke at baseline, between the ages of 30 and 79, and is the only other study to have examined chili pepper consumption and mortality. After analyzing 20,224 deaths, they concluded that “habitual consumption of spicy foods was inversely associated with total and certain cause-specific mortality, independent of other risk factors of death.”³

The authors of the 2017 study concluded that the mechanism by which chili peppers may influence mortality is far from certain, but hypothesized that “Transient Receptor Potential (TRP) cation channels, which are primary receptors for pungent agents, such as capsaicin, may in part be responsible for the observed relationship.”⁴

It is also possible, they wrote, that capsaicin, which is known to play a role in cellular and molecular mechanisms that prevent obesity and modulate coronary blood flow, possesses antimicrobial properties that “may indirectly affect the host by altering the gut microbiota.”⁵

“Because our study adds to the generalizability of previous findings, chili pepper—or even spicy food—consumption, may become a dietary recommendation and or fuel further research in the form of clinical trials,” noted Chopan.⁶

### Capsaicin and Disease Prevention

Beyond their possible potential to increase longevity, new research also is suggesting that chili peppers have cytotoxic properties. For example, a recent study investigated the effect of capsaicin on cultivated cells of particularly aggressive, difficult-to-treat forms of breast cancer known as triple negative cancers. The study, led by Lea V. Weber, of Ruhr University Bochum in Germany, investigated the expression and functionality of Transient Receptor Potential (TRP) cation channels, specifically the subfamily V, member 1 (TRPV1, also known as capsaicin receptor channel), which are thought to influence cancer cell growth. Intrigued by the fact that capsaicin has been shown to inhibit cancer cell growth and even cause cell death in cancers of the colon and pancreas, the researchers set out to understand how the compound might be used in breast cancer treatments.⁷

The results suggest that activation of TRPV1 by capsaicin caused significant inhibition of cancer cell growth and induced apoptosis (normal, programmed cell death) and necrosis. The authors concluded that “the current study revealed the expression of profiles of human TRP channels in 60 different breast cancer tissues and cell lines and furthermore validated the TRPV1 against SUM1449PT breast cancers cells [a model system for the most aggressive breast cancer subtype], indicating that activation of TRPV1 could be used as a therapeutic target, even in the most aggressive breast cancer types.”⁸

Though these findings are intriguing, capsaicin may have benefits for human health where evidence can be obtained more rapidly. There is an increasing body of evidence that supports the use of capsaicinoids as an important weight management tool, and researchers are making progress in identifying specific ingredients and innovating methods to make them...
more efficacious.

For example, one study authored by Stacie L. Urbina of the department of Exercise and Sports Science at the University of Mary Hardin-Baylor looked at the effects of daily supplementation with 2 mg of capsaicinoids on appetite reduction and body composition. Intrigued by the potential of capsaicin to positively affect cardiovascular health, the researchers set out to examine the effects of different doses on healthy men and women using a commercially available capsicum extract (Capsimax from OmniActive Health Technologies; Morristown, New Jersey).

The findings suggest that 12 weeks of supplementation may be effective at suppressing appetite and reducing key body composition metrics, such as waist and hip circumference. Results showed that the latter decreased by 2.4% after six weeks and a significant reduction in caloric intake over 12 weeks.

Another aspect of the study is that the ingredient delivers effective levels of capsaicinoids without the side effects of oral and gastric burning common with raw hot red peppers. Capsimax is made using a proprietary OmniBead Beadlet Technology that encapsulates the highly active, natural capsicum extract in a controlled-release coating. In a 2017 study at Arizona State University led by Yue Deng of OmniActive Health Technologies, the product was also found to support healthy weight management by increasing healthy resting energy expenditure (the number of calories burned while at rest) by an average of 6% after a single dose.

**Synergistic Partner**

The news about chili peppers and capsaicin is not all positive. Some studies have suggested that capsaicin may have a carcinogenic effect. However, a new study led by Shengnan Geng of the Pharmacy College of Henan University in China suggests that ginger (Zingiber officinale, Zingiberaceae) and capsaicin may work synergistically, with ginger compound 6-gingerol counteracting capsaicin’s potentially harmful effects. Ginger has been shown to have health-promoting potential in its own right, but these researchers noted that capsaicin and 6-gingerol both bind to the same cellular receptor—one that is related to tumor growth—and decided to investigate this further.

Over a period of several weeks, the researchers fed mice either capsaicin in olive oil, 6-gingerol in olive oil, a combination of the two in olive oil, or olive oil alone. Each subject received 50 mg/kg of body weight. They found that 100% of the mice that received capsaicin developed lung carcinomas, while only half of those that received the 6-gingerol developed the carcinomas. The development of carcinomas was even lower for mice that received both compounds at 20%. The study is notable for providing a new avenue to counteract the possibility of specific capsaicin-related adverse events.

While many questions about the effects of consuming hot chili peppers for health remain, the emerging evidence is providing new insights on the role of capsaicin on metabolism and overall health, and may lead to new dietary recommendations, as well as the potential development of new treatment therapies.

Reprinted with permission from HerbalGram: Volume 14, Issue 5, May 2017 as part of an ongoing networking agreement with DIFM.

**References**

7. Award winning Capsimax Capsicum Extract provides the benefits of red hot peppers without the burn. OmniActive Health Technologies. Available at: http://omniactives.com/capsimax
Coffe is a beloved drink for many of us. However, even though research shows some health benefits for both coffee and caffeine, they also have some downsides. They can cause jitteriness, interfere with sleep, increase cortisol levels, and even be a trigger for heartburn. Thus, many of us are looking for alternatives. Even if you are not planning to give up your morning cup anytime soon, it is great to have some fresh options for those mid-afternoon slumps; and fortunately, there are many great drinks that can give you a healthy boost without the caffeine!

A variety of herbal teas available with have stimulating qualities including teas that contain peppermint, cinnamon, nettles, licorice, or tulsi (holy basil). These teas can be found in combination with other herbs or as stand-alone teas. Stash some at work, or if in school in your backpack, to have on hand for a quick pick-me-up. Or, try one of the recipes below:

**References**

After thumbing through my brother’s CPR manual that I came across at age 10, I became convinced that a heart attack was imminent. I memorized the symptoms and awaited their onset. When I had a minor panic attack in my 4th grade Spanish class and started yelling, “I’m having a heart attack!” (in English—apologies, Senora Guzman), I was taken to the school nurse, given Pepto-Bismol, and sent home where my parents did their best to convince me that a myocardial infarction was even more unlikely than my becoming Annie on Broadway. But this episode began an interesting dynamic between me and my ticker that has never fully resolved. When I experienced idiopathic tachycardia in 2008, my inner 10-year-old’s fear came raging back in full force and catapulted me even more into my exploration of integrative medicine concepts. I learned that I didn’t have a metoprolol deficiency as my cardiologist tried to have me believe, but rather an autoimmune condition that made my chest cavity feel like a disco dance floor. The interconnectedness of our various systems was never so clear as I navigated through various therapies to bring it all back into balance.

With two grandfathers who dropped dead in their 60s from heart attacks and a grandmother who, although she lived until the age of 90, had hypertension and suffered a minor stroke, I have continued to adhere to heart-healthy behaviors. But I also know that the components of cardiovascular health extend beyond just the fat content of our diet and a periodic jog in the park. This issue—jam-packed with blood vessel-dilating information—is another testament to the integrative and functional approach necessary to address issues of chronic diseases. At this year’s FNCE® in Chicago, I could feel the disco beat of my heart revving up again. Fortunately, this time, it was pure joy, excitement, and admiration for our dietetic practice group as we welcomed 219 people to our Feed Your Genes, Feed Your Brain Symposium, greeted dozens and dozens of enthusiastic members and prospective members at our booth, and celebrated 230 of you at our vibrant and delicious Members’ Reception. I cannot tell you what an honor it was to be among so many amazing members of our community. When it comes to heart health, I must extol the benefits of spending time with those who embrace similar philosophies and goals. Thank you to all of you who help keep my cardiac hub (and those of your patients) beating vibrantly.

Warmly, Mary

Clinical PEARL

Treat Your Lettuce Right

Take a few minutes to prepare lettuce when you bring it home from the market and you will reap the benefits of increased flavor and nutrients. Separate the leaves of lettuce and soak in cold water for ten minutes. Dry well to remove surface water. Tearing lettuce increases its antioxidant content, but must be eaten in a day or two. Prick a resealable plastic bag with 10-20 tiny holes; place the greens in the bag, squeeze out the air, seal, and store in the crisper drawer of your refrigerator.

Editor’s Notes

It is hard to believe that another FNCE® has come and gone; where does time go? It was great to see many DIFM members (some formerly Nutrition in Complementary Care, or NCC, members) who I have not seen for quite some time and to make new acquaintances. The meetings and sessions are always stimulating, and I am sent back home with new ideas and information to share with colleagues and patients.

The upcoming year promises to be very exciting—and also challenging—as we approach the 5,000-member mark. Help us achieve that goal by inviting your RDN colleagues who are not already members to join. This also marks the 20-year anniversary of DIFM (NCC), and we have “come a long way, baby.” It seems like just yesterday that ADA members were meeting in Boston to sign the petition for a new DPG, followed by our Founders’ Breakfast at FNCE® in Kansas City in 1998. Taking a trip down memory lane, I took a look at the first issue of the newsletter that listed my name as editor—Fall 2000 Volume 3, Issue 1—covering topics such as Nutrition and Genetic Information; Supplements for Hemochromatosis and Homocysteinemia; Carotenoids, Cancer, and the Connexin Gene; Food Biotechnology; and Point/Counterpoint on the Use of Genetically Engineered Foods. It is heartening to see how we have stood the test of time and have advanced our knowledge, realizing that IFM is the future.

After 17 years as editor, I have decided it is time for some new faces and fresh ideas. I could not nor would not have made this decision without knowing that the newsletter would be in the capable hands (with younger minds than mine) of the current newsletter team. Jena Savadsky Griffith, RDN, has graciously agreed to step in as incoming Newsletter Editor; and I am quite confident she will do an excellent job, accompanied by the Copy Editor Holly Van Poots, RDN, CSP, FAND, and the outstanding editorial team we have. Each one of our Column Editors have special talents and knowledge they bring to the team, and I cannot say how much they have been appreciated. I would like to acknowledge those members who have been on the team for several years: CPE Editor Shari Pollack, MPH, RDN, LDN, and Dina Ranade, RDN, LDN, the Botanicals/Functional Foods/Supplements column editor. Your support and efforts have helped make the newsletter what it is today. As DIFM has grown, the number of members on our team has as well, making it difficult to acknowledge each person by name—but nonetheless, thanks to each of you.

You will see my name as editor until the Summer issue, when Jena will take the helm. So, as always, feel free to contact me at peaknut70@gmail.com with any suggestions or ideas or if you would like to author an article or volunteer.

Have a Happy and Healthy 2018.

Sarah

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The views expressed in this newsletter are those of the authors and do not necessarily reflect the policies and/or official positions of the Academy of Nutrition & Dietetics.

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Upcoming Issues
• Summer 2018; Editor’s Deadline, April 1, 2018
• Fall 2018; Editor’s Deadline, July 1, 2018
• CPE Deadline, June 15
• Winter 2019, Editor’s Deadline, November 1, 2018

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Rita Batheja, MS, RDN, CDN, FAND

2017 DIFM Visionary Award Winner and Academy Medallion Award Winner

Rita truly embodies her own mission statement: “To make a difference in people’s health, nationally and internationally, as a Nutrition Leader.” Rita is in private practice on Long Island, NY, where she provides integrative and functional nutrition services. She has been an invaluable nutrition consultant to many clinical, food-service management, and community organizations, offering her expertise and often tending to those most in need. Notably, Rita is the inaugural Community Leader for the Asian Indians in Nutrition and Dietetics (AIND) Member Interest Group (MIG). Spanning her career, Rita has been the well-deserved recipient of numerous awards as she has tirelessly volunteered her service globally and consistently to countless organizations for more than 25 years. It is for this and many of her other contributions to the field that Rita was one of only six RDNs to receive the Academy’s prestigious Medallion Award. Rita was a key player and founding member of Nutrition in Complementary Care, now Dietitians in Integrative and Functional Medicine (DIFM), and was instrumental in recruiting individuals of like mind to join together to create the DPG. She is a forward thinker and a “people person” who constantly engages individuals and promotes positive change within DIFM and the Academy organization at large.

Rita is truly a true ambassador for nutrition and RDNs, upholding the highest professional standards. She has traveled the world honorably representing and promoting the profession to the medical community, other health care professionals, policy makers, and the public. Further, she is an advocate for diversity within the Academy at every level. Rita has strongly held beliefs that she is not afraid to support, even in the face of opposition. She is in a continual “marketing mode” for integrative nutrition and RDNs and is never without business cards, brochures, or any other appropriate marketing tool to promote our profession.

In 2008, Rita initiated DIFM’s Standards of Practice/Standards of Professional Performance for RDs in Integrative and Functional Medicine, which was published in 2012. She represents DIFM at nutrition conferences and workshops by hosting an exhibit booth and has been successful in using this venue for recruitment and education. She attends numerous nutrition learning events, and her welcoming disposition and personal stamp of enthusiasm leave a mark on everyone she meets. One of Rita’s great accomplishments was soliciting contributors for the AAPI Nutrition Guide to Optimal Health: Using Principles of Functional Medicine and Nutritional Genomics, an e-book for the American Association of Physicians of Indian Origin (AAPI). This book was released in Parts 1 and 2, in 2012, and updated in 2017.

Rita is passionate about integrative and functional medicine (IFM) and practices it in her own daily life as well as professionally. She is a wealth of knowledge in many aspects of IFM and promotes the concepts within other activities and DPGs in which she is involved. She is aware that IFM is the way of the future; in fact, she may have been aware of this even before DIFM came to fruition! This is one reason why she has lobbied so vigorously for a practice group that focuses on this discipline.

Her professional, personal, and ethical manner, as well as her visionary views, stem from her close relationship to her family in India. Rita recounts her career path as follows.

My grandfather owned 140 businesses and was called “King without the Crown.” He introduced Vegetarian Thali (Platter) at the famous Taj Mahal Hotel in Mumbai. I caught his vision and drive. At the age of 20, I completed my post-graduate studies and came to New York. When I went to look for a job in New York City, the interviewer asked, “Do you have any experience?” I said, “How can I have experience if you do not give me a job?” My first job was as a filing clerk in a wholesale fine furniture company on Park Avenue in Manhattan. I worked full time, studied full time, and did community work full time! This was the beginning of my career in New York. I have had the opportunity to experience the best of both countries, from the spiritual roots and deep traditions of India to the depth of evidence-based information from western countries, which has given me a unique perspective and vision. People with vision change the world—the sky is the limit!
Mary Purdy, MS, RDN

Despite having a deep affection for food throughout her childhood, Mary Purdy’s definitive choice to become a dietitian came in her early thirties as her father recovered from a serious illness. When the hospital nutritionist recommended her father grab a Big Mac to regain weight, she knew she’d found a field in which she could make a difference.

Serving the Broccoli Gods, her recently published book, is packed with nutritional tips wrapped around the lighthearted and humorous tale of Mary’s journey of transitioning from a gritty New York City actor to a registered dietitian. There is humor, a few life lessons, and even a love story to keep you entertained. Purdy tells how she grew from a teenager who chose apples over chips and salad over fries into a trained nutrition expert. The book includes personal anecdotes, simple recipes, and links to informational videos from her web series, “Mary’s Nutrition Show.” It will tickle the funny bone, touch the heart, and hopefully trigger a rush to the produce aisle.

In addition to being DIFM Chair, Mary was in private practice for eight years and has worked at Arivale in Seattle for the past three years as a Coach and Clinical Education Lead providing nutrition and lifestyle counseling to clients using personalized genetic data and functional labs.

Katherine Rhodes, PhD, RDN

Allied Health Senior Supervisor, University of Michigan
Ann Arbor, MI

Each year, the Academy funds seven awards on behalf of the Nutrition and Dietetic Educators and Preceptors (NDEP) dietetic practice group (DPG) and the Accreditation Council for Education in Nutrition and Dietetics (ACEND) to recognize preceptors who are exemplary educators and mentors. The award recipients receive reimbursement for FNCE® attendance and are recognized at the Academy Member Showcase and the NDEP Member Meetings during FNCE®. Dr Rhodes is the 2017 Outstanding Preceptor Award winner for Area 2.

I have had the privilege and joy to serve as a preceptor for dietetic interns from the University of Michigan School of Public Health for almost 25 years. My goal is that each intern be introduced to the role of the dietitian within a multidisciplinary cardiovascular outpatient clinic including providing individual medical nutrition therapy for complex lipid disorders and other cardiovascular risks as well as group medical nutrition therapy for Cardiac Rehabilitation and Metabolic Syndrome.

The interns also participate in nutrition outcomes research, material development and various writing projects. In our clinic they work with myself and a team of talented dietitians including Martha Weintraub, MPH, ACSW, RDN; Sarah Meyers, RDN; Susan Ryskamp MS, RDN; Brenda Allison Fay, RDN; and Rachael McClellan, MPH, RDN, each of whom brings a unique background and style to nutrition practice. This allows the interns to gradually develop their own styles.

Our interns bring new questions, skills, and insights to our work, and we grow as a team as they grow in skills needed to begin their careers. Interns from our program have gone on to a wide variety of positions, some even choosing jobs in cardiovascular nutrition and a few joining our staff. Precepting allows me the opportunity to help build the future of the field of nutrition.
Be the Change You Want to See: Compete Action Alerts Weekly

We all want to see principles of health and nutrition advanced at the state and federal level. Yet, with so much going on in our lives, the idea of participating in policy can be daunting. The Academy of Nutrition and Dietetics public policy team works tirelessly on identifying priority legislations and communicating messages to our policymakers, but they need members’ help to relate a unified voice to legislators on top priority issues.

As we all know, the Academy creates Action Alerts, messages to legislators on top priority issues the Academy is advocating for. Action Alerts are a quick and easy way to stay up to date on nutrition policy and get involved. Emails composed by the public policy team of the Academy and sent to legislators explain the issue, where the Academy stands on the issue, and the reasoning behind it. The emails contain contact information for the Academy’s public policy staff so legislators can contact us with questions. Based on the zip code you provide when you complete Action Alerts, the Academy’s website identifies your Representatives and Senators to make sure that emails are sent to your legislators. When completing Action Alerts, you have an option to edit the message or to add a personal story about how the issue affects you or your clients. Action Alerts only take a couple of minutes to complete. The more members who complete Action Alerts, the more legislators will be reached.

Legislators’ offices count the amount of times they are contacted by constituents about each public policy issue, so the more messages legislators receive about priority nutrition topics, the stronger our voice will be. This increases the likelihood of legislators listening to our messages and taking action.

If each member of DIFM completed every Action Alert, legislators throughout the US would receive over 5,000 messages per topic. Together, we can communicate a strong and unified message to our legislators on important nutrition issues. Action Alerts change from time to time, so the DIFM public policy team encourages you to visit the Academy’s Action Center weekly and complete all available Action Alerts by clicking “Take Action”. Internet browsers that work best with the Action Alert Center are Google Chrome, Firefox and Internet Explorer 9+. If you experience any technical problems, please contact Nate Stritzinger at nstritzinger@eatright.org. As always, please reach out to our DIFM Public Policy Team with any nutrition public policy questions or if you would like to get more involved.

Let’s make our voices heard and change nutrition and health policy for the benefit of all!

DIFM’s Action Alert Center: http://

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Breaking News!!

Congratulations to the following individuals elected to the DIFM Executive Committee for 2018-2019.

Your passion and dedication to DIFM has been outstanding and is appreciated beyond words!

Chair Elect: Dana M. Elia, MS, RDN, LDN, FAND
Treasurer: Ryan Whitcomb, MS, RD, CLT
Nominating Committee Chair Elect: Christa Elmers Biegler, RD, LN, CLT
Nominating Committee Member: Rebecca Bitzer, MS, RD, LD, CEDRD

www.eatrightpro.org/resources/advocacy/action-center

Lisa l Shkoda, RDN, CSP, CNSC, FAND, DIFM Policy & Advocacy Leader lisa.shkoda@gmail.com
Christine Benson, MS, RDN, DIFM Policy Advocacy Committee Member chrissiebenson@gmail.com
10 WAYS DIETITIANS CAN GET INVOLVED IN POLICY AND ADVOCACY (FOR BEGINNERS)

**LOCAL**

1. **READ**
   - Read the news or sign up for newsletters with relevant organizations.

2. **WRITE**
   - Write a blog post, write your local paper, or your local, state or federal representatives.

3. **SPEAK**
   - Participate in action alerts. Share on social media. Tell your friends.

4. **VOLUNTEER**
   - Volunteer with an existing program in your community, like a food bank, food pantry, soup kitchen, or farmer’s market SNAP program.

5. **START**
   - Start a new program in your community, like community garden or school garden, grazing program, grocery store busts, or cooking classes.

6. **JOIN**
   - Join a board or political organization, like school board, government board, non-profit, neighborhood association, or health or nutrition coalition.

7. **GET INVOLVED**
   - Attend a town meeting, public hearing, or advocacy day. Volunteer on a campaign. Provide expert commentary or testimony.

8. **MEET YOUR OFFICIALS**
   - Visit with your local, state or federal legislators. Host a site visit for government officials. Offer to assist with researching or drafting policy.

9. **START A MOVEMENT**
   - Start a petition or organize for a cause.

10. **BE THE CHANGE**
    - Run for a government office or position. Propose a new policy (ALLC.org for state policies). Serve as an expert for your local government on nutrition-related issues.

Ready to take action now?
Go to the Academy of Nutrition and Dietetics Advocacy: Action Center at www.eatrightpro.org and take action on the legislative alerts with just a few simple clicks!

Content created by Christine Benson, DIFM
Policy Advocacy Committee.

integraterd.org
## Elected Officers

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