CPE Article  Medical Cannabis: Considerations for Dietitians Working in Oncology  Kelay Trentham, MS, RDN, CSO

Medical Cannabis: Considerations for Dietitians Working in Oncology  CPE Objectives

After completing this CPE activity, the nutrition professional will be able to:

1) Describe cannabis’ two major classes of bioactive constituents and list three of their physiological effects.
2) Discuss available evidence regarding cannabis’ effectiveness in cancer symptom management.
3) Describe cannabis’ pharmacokinetics when it is inhaled, ingested, or taken orally.
4) Discuss the most common adverse effects and contraindications to cannabis use.

In This Issue  Medical Cannabis: Considerations for Dietitians Working in Oncology  CPE Objectives

CPE Reporting Form, Instructions, and Questions ............................................... 44
CPE Certificate ........................................................................................................... 45
Subclinical Hypothyroidism — Controversial Treatment Recommendations Made Clear ............................ 46
News You Can Use .................................................................................................. 48
Use of Mind-Body Practices from the Tibetan Bon and Buddhist Traditions by Oncology Patients ......................... 52
Professional Stipend Award Winner Review ................................................................ 54
Award Winners ........................................................................................................ 59
Chair’s Corner ........................................................................................................ 60
Editor’s Notes ......................................................................................................... 61
Resource Reviews: Cauliflower Fried Rice With Roasted Cashews Recipe ......................... 62
Fact Sheet: Yoga’s Role in Cancer, Chronic Disease Management, and Health Promotion ................. 63
Executive Committee Full List .................................................................................. 64

Introduction

Public interest in the medicinal use of cannabis has become increasingly apparent. In 2016 alone, six states passed medical cannabis-related legislation or ballot measures, while another 14 attempted to do so unsuccessfully.1 Common conditions or diseases for which cannabis is often used include glaucoma, muscle spasticity disorders, HIV-related cachexia, nausea caused by cancer and/or its treatment, seizure disorders, pain, and inflammatory bowel diseases, to name just a few.2 Based on registry data from states that have medical cannabis laws, there are an estimated 1.2 million medical cannabis users in the United States.3 As more states seek to legalize its use, the likelihood that RDNs will be working with medical cannabis users is increasing. RDNs working with oncology patients are highly likely to encounter patients using cannabis for cancer symptom management. Because RDNs often discuss integrative approaches to disease management with their clients, they are in a unique position to include cannabis education in their toolkits. To equip RDNs working with cancer patients with some basic knowledge of medicinal cannabis, this article will provide a brief history of cannabis’ medical use, an overview of the endocannabinoid system, evidence of efficacy for treating cancer-related problems, pharmacokinetics, adverse effects, contraindications, safety concerns, and essential elements of cannabis counseling.

The Cannabis Plant and Its Use as Medicine

The cannabis plant is a member of the Cannabaceae family, which also includes hops and hackberry.4,5 Cannabis contains over 100 unique phytocannabinoids, the most well-known of which include tetrahydrocannabinol (THC) and cannabidiol (CBD).5,6 While the terms sativa and indica are often used by laypersons to describe perceived differences in their effects on the body, these terms were historically used to denote what were thought to be two distinct subspecies of cannabis: Cannabis sativa and Cannabis indica.4,5 The term Cannabis sativa was used in reference to the fiber or hemp variety, once distinguished by its higher CBD
content and relatively low THC content, while the term Cannabis indica was used in reference to what was considered the “drug variety,” which could contain up to 20% THC by weight.\(^6\)\(^7\) Due to years of interbreeding, these terms no longer accurately reflect cannabinoid content nor physiological effects.\(^8\)

Cannabis has a long history of medicinal use, the earliest mention being medical writings of ancient Egypt, in addition to Chinese oral history in the 28th century BCE.\(^4\)\(^9\) Written evidence of medicinal cannabis use in ancient China is found in its first, and the world’s oldest, pharmacopoeia, the Pen Ts’ao Ching, which was written in the second century.\(^7\) Cannabis was first introduced to modern Western medicine when, in 1839, Irish physician William B O’Shaughnessy, co-founder and professor of Calcutta Medical College, wrote about “Indian Hemp.”\(^6\) O’Shaughnessy described using cannabis for its analgesic, anticonvulsant, and antiemetic effects.\(^9\) Medical usage of cannabis as a sedative or hypnotic, analgesic, and for management of various other conditions was also described in Sajou’s Analytic Cyclopedea of Practical Medicine in 1924.\(^9\) By 1937, cannabis use was effectively banned in the United States with the passage of the Marihuana Tax Act, which exacted severe penalties for anyone who failed to register its use or pay the tax. Subsequently, cannabis was removed from the US Pharmacopoeia in 1942.\(^9\) With the 1970 passage of the Controlled Substances Act, US drug policy classified cannabis as a Schedule 1 drug, which meant it was considered to be highly addictive with no medicinal value.\(^10\) It remains thus classified today.

Interest in medicinal cannabis use resurfaced in the 1990s, when researchers described cannabinoid receptors in the human nervous system.\(^9\) In 1996, California became the first US state to legalize cannabis for medical use.\(^11\) Now, 29 of the 50 states, the District of Columbia, and the territories of Guam and Puerto Rico have laws allowing for the legal use of medicinal cannabis, while 16 other states’ laws allow for limited access to CBD.\(^12\)\(^13\) US state, district, and territory medical cannabis laws vary widely. Some state laws allow for use of cannabis but have few or no provisions for dispensaries, no hardship provisions for patients who cannot access a dispensary, or no available information about obtaining product.\(^12\) Other limitations include caps or bans on dispensaries, limited forms of use (smoking is not approved in two states), limited ability to grow one’s own product, and possession limits set by statute rather than by medical professionals.\(^11\) Thus, understanding local laws and access issues is a critical element of developing one’s “cannabis counseling toolkit.”

### Endocannabinoid System and Cannabinoids

A basic understanding of cannabis therapeutics starts with the endocannabinoid system. The endocannabinoid system consists of endogenous cannabinoids (eCB), cannabinoid receptors, and related enzymes.\(^14\) Endocannabinoids are lipid mediators comprised of amides, ethers, and esters of long-chain polyunsaturated fatty acids found in the brain and peripheral tissues that act upon the cannabinoid receptors.\(^14\) The first eCB discovered in the porcine brain in 1992, arachidonylethanolamide, was termed anandamide (AEA), or the “happy amide,” ananda being Sanskrit for “bliss.”\(^14\) The discovery of 2-arachidonoylglycerol (2AG) followed a few years later.\(^15\) These and other eCBs are released on demand, having been synthesized by various enzymes from endogenous phospholipid precursors; they are also enzymatically deactivated.\(^14\)\(^16\) Endocannabinoids bind to various cannabinoid receptors, the most well-studied being CB1 and CB2. CB1 is found predominantly in the central nervous system, while CB2 is found primarily in peripheral and immune cells.\(^14\) That cannabis’ phytocannabinoids have significant effects on our own complex endocannabinoid system is surely the basis of our long-standing relationship, fascination, and conflict with this plant.

THC and CBD are the phytocannabinoids most widely known and studied. THC exhibits analgesic, antiemetic, muscle relaxant, antispasmodic, bronchodilatory, neuroprotective-antioxidant, anti-inflammatory, and antipruritic activities.\(^17\)\(^18\) CBD exhibits analgesic, neuroprotective-anticonvulsant, antinausea, anti-MRSA, and antianxiety effects.\(^17\) CBD has also been shown to modulate THC-associated adverse effects, such as anxiety, tachycardia, and sedation. As well, CBD was found to be essential to the effectiveness of an oromucosal cannabis extract, nabiximols, for treating intractable cancer pain.\(^17\) Other noted phytocannabinoids include cannabinichromene, cannabigerol, tetrahydrocannabivarin, cannabidivarin, and cannabinol, which have been shown to have antifungal, antiemetic, anti-inflammatory, antibacterial, and analgesic activities among others.\(^17\)

In addition to cannabinoids, cannabis contains terpenoids, essential oil components which impart characteristic odors and/or flavors to cannabis as well as to other foods, plants, and herbs that also contain them.\(^17\) Table 1 shows some of the terpenoids found in cannabis, examples of other plants in which they are found, and some noted pharmacological effects. When inhaled, terpenoids have pharmacological effects on humans and animals even when present at very low serum concentrations.\(^17\) Noted terpenoid effects include anxiolytic, anti-inflammatory, bronchodilatory, analgesic, sedative, muscle relaxant, antiemetic, antifungal, and antiparasitic. It is thought that terpenoid content may explain why cannabis strains with similar quantities of THC or CBD are observed to exert different effects on the body. In addition, it has been proposed that terpenoids and cannabinoids have synergistic activities, in which terpenoids may either enhance or attenuate cannabinoid activities.\(^17\) Many who espouse the use of cannabis as a whole, rather than use of THC and CBD singly, believe access to the whole plant is of greater benefit. This is referred to as the “entourage effect,” or the synergistic effect of the various compounds in cannabis when taken together.\(^17\)
Table 1: Terpenoids found in cannabis and their effects\textsuperscript{17}

<table>
<thead>
<tr>
<th>Terpenoid:</th>
<th>Also commonly found in:</th>
<th>Pharmacological effects:</th>
</tr>
</thead>
<tbody>
<tr>
<td>β-Caryophyllene</td>
<td>Black pepper</td>
<td>Selective CB2 agonist</td>
</tr>
<tr>
<td>Caryophyllene Oxide</td>
<td>Lemon balm</td>
<td>Antifungal</td>
</tr>
<tr>
<td>Limonene</td>
<td>Lemon</td>
<td>Anxiolytic</td>
</tr>
<tr>
<td>Linalool</td>
<td>Lavender</td>
<td>Antianxiety, analgesic</td>
</tr>
<tr>
<td>β-Myrcene</td>
<td>Hops</td>
<td>Sedative, muscle relaxant</td>
</tr>
<tr>
<td>Nerolodol</td>
<td>Orange</td>
<td>Sedative</td>
</tr>
<tr>
<td>α-Pinene</td>
<td>Pine</td>
<td>Anti-inflammatory, aids</td>
</tr>
<tr>
<td>Phytol</td>
<td>Green tea</td>
<td>Increases GABA</td>
</tr>
</tbody>
</table>

Cannabinoid Medicines

Cannabis medicines can be categorized as (1) single-molecule pharmaceuticals, (2) cannabis based liquid extracts, and (3) whole cannabis preparations. Dronabinol and nabnilone are single-molecule, FDA-approved, synthetic THC pharmaceutical products available by prescription,\textsuperscript{6} while levonantradol is a synthetic cannabinoid analog used in research.\textsuperscript{19} Dronabinol is approved for treatment of chemotherapy-associated nausea and vomiting that is refractory to standard treatment and for anorexia associated weight loss in AIDS patients. Nabilone is also approved for chemotherapy-associated nausea and vomiting in cancer patients.\textsuperscript{6} Levonantradol is the only cannabinoid used parenterally and has been studied for its antiemetic properties.\textsuperscript{19} Cannabis based liquid extracts include nabiximols and Epidiolex (GW Pharmaceuticals, United Kingdom). Nabiximols is an oromucosal spray containing THC and CBD that is used for pain and spasticity associated with multiple sclerosis (MS) in several countries outside the US and is approved for treatment of intractable cancer pain in Canada.\textsuperscript{6,20}

Finally, whole cannabis preparations allow access to the complete complement of cannabinoids and terpenoids rather than merely single-extracted or synthetic cannabinoid compounds.

While a complete review of evidence for cannabis use is outside the scope of this article, conditions for which cancer patients commonly use it will be discussed. Available studies may include any combination of the three categories of cannabis medicines described.

Efficacy

Cannabis is often of interest to patients with cancer who are undergoing treatment or seeking palliation and is used in various forms to alleviate nausea, vomiting, anorexia, and pain. Tramer and colleagues conducted a quantitative systematic review of studies conducted prior to August of 2000 using orally administered dronabinol or nabilone or intramuscularly administered levonantradol.\textsuperscript{18} They concluded that these cannabinoids were more effective for nausea control than prochlorperazine, metoclopramide, chlorpromazine, thiethylperazine, haloperidol, domperidone, or alizapride.\textsuperscript{18} However, in this review, cannabinoids were not more effective for patients who received very low or very high emetogenic chemotherapy regimens.\textsuperscript{18} A 2008 meta-analysis of 30 randomized controlled trials (RCTs) with greater than 1700 total subjects showed that, compared with an older class of antiemetics, dronabinol use resulted in a significantly lower risk of chemotherapy-induced nausea and vomiting.\textsuperscript{21} Duran and colleagues studied a standardized and oromucosally-delivered cannabis-based medicine (CBM) vs placebo in the treatment of chemotherapy-induced nausea and vomiting.\textsuperscript{22} In this small study (n=7 treatment, n=9 control), they found that 71% of CBM vs 22% of placebo-treated patients experienced a complete response (no nausea) during the overall observation period due to its effect during the delayed period (24-120 hours post chemotherapy).\textsuperscript{21} There was no difference between groups during the acute phase (0-24 hours post chemotherapy). A more recent study of a 5-HT3 antagonist, ondansetron, showed that cannabinoids were as or more effective at managing nausea, with the absence rate of nausea being 71% with dronabinol, 64% with ondansetron, and 15% with placebo.\textsuperscript{23} To date, there have been no studies comparing cannabinoids with NK1 antagonists such as fosaprepitant.

Although cannabis use is commonly thought to increase appetite, clinical evidence for its effectiveness in the setting of cancer is limited. In one study, megestrol acetate improved appetite in 75% of advanced cancer patients compared to 49% of those patients given dronabinol.\textsuperscript{24} In another study comparing a cannabis extract containing THC and CBD, THC only, or placebo, there was no significant difference in appetite among these groups.\textsuperscript{25} It has been noted that the THC dose used in this study was quite low at 2.5 mg compared to between 5 and 20 mg used for improving appetite in HIV patients.\textsuperscript{25} In a prospective observational study, patients receiving medical cannabis licenses in Israel were interviewed at baseline (day of receiving license) and 6-8 weeks later. For those patients who used cannabis continuously, symptom scores were significantly improved, and the number of people reporting no anorexia increased by 36%, while those reporting minimal anorexia dropped from 65% at baseline to 38% after 6-8 weeks.\textsuperscript{26} That the clinical trial data in cancer patients does not match the subjective observational data may be due to more freedom in dosing when patients use whole cannabis ad lib rather than being subject to controlled dosing in a research setting.

Cancer patients may also experience significant alterations in taste and smell, making it difficult to eat. In a study comparing THC (as dronabinol) to placebo,
Chemosensory improvement was 36% for THC-treated patients vs 15% for placebo. Additionally, 55% of THC-treated patients stated that “food tastes better” compared to only 10% of placebo group. The pre-meal appetite score was greater for the treatment group (p<0.05). It is important to note that this was a pilot study with a total of 21 participants, and more research is needed to establish chemosensory effects of cannabis.

Using cannabis for pain relief is common in persons with cancer, especially given the side effects of opioid use, such as constipation. Cannabis is increasingly being recognized for its pain management properties coupled with lack of overdose risk and low toxicity profile. A 2009 review of use of various cannabinoids for malignant pain, MS, and chronic upper motor neuron syndromes found a statistically significant mean difference favoring cannabinoids over placebo. This review also pooled results for adverse events, finding statistically significant risk for alterations in cognitive function (memory, attention span), motor function (ataxia, speech disorder), and perception (blurred vision, hallucinations). Thus, the authors concluded that the risk of harm may outweigh the benefit of cannabis use for chronic pain for these conditions. In another review of the use of cannabinoids and chronic noncancer pain that included neuropathic, fibromyalgia, rheumatoid arthritis (RA) and mixed-pain syndromes, 15 of 18 clinical trials showed a significant, modest analgesic effect. In addition, four of the trials also noted improvement in sleep. There were no severe adverse effects, and cannabinoids were observed to be well tolerated, with no side effect–related attrition, whereas studies of opioids have noted 33% dropout rates related to adverse effects. A 2015 update of this review was consistent with the 2011 results. In a 2013 review of 38 RCTs of cannabis for actual or experimentally induced pain, 71% of studies showed significant pain relief. Studies included pain related to cancer as well as RA, neuropathy, upper motor neuron syndromes, MS, and fibromyalgia. Another review of cannabis use for chronic, noncancer pain included six RCTs, five of which were of high quality and assessed management of neuropathic pain. Statistically significant relief of neuropathic pain with cannabinoid treatment was seen in all studies. Three of the studies were considered to have “clinically meaningful” benefit, with 45%, 52%, and 61% of cannabis-treated patients reporting benefit as compared to 18%, 24%, and 26% of placebo-treated patients. Noted adverse effects were cognitive, motor function, and neurologic in nature but were not considered severe.

Owing to various website testimonials touting the cancer-curative power of concentrated cannabinoid-containing oils, the belief that cannabis can cure cancer has been growing in popularity. The majority of studies suggesting that cannabinoids can reduce tumor growth are considered preclinical (based on cellular or animal models). In addition, a few studies have found that cannabinoids increase cell proliferation under certain conditions in vitro and may also interfere with tumor suppression mechanisms of the immune system. Several studies suggest that cannabinoids inhibit the growth of glioma; leukemia/lymphoma; melanoma; neuroblastoma; thyroid epithelioma; and breast, colorectal, gastric, hepatocellular, pancreatic, prostate, and skin carcinomas. In animal models, cannabinoid administration curbed growth of genetically initiated or xenografted tumors including breast, colorectal, lung, pancreatic, and skin carcinomas, as well as glioma, lymphoma, melanoma and thyroid epithelioma. Antitumor effects of cannabinoids include autophagy, apoptosis, and cell cycle arrest; inhibition of angiogenesis; decreased formation of distant tumors in animal models of induced and spontaneous metastases; and inhibition of adhesion, migration, and invasiveness of cells in culture. THC promotes cell death via CB1 and/or CB2 while CBD is thought to do so independently of these receptors and at least partly due to enhanced production of reactive oxygen species within tumor cells. Cannabinoids may work synergistically with standard chemotherapy drugs or radiation. Studies have found some glioma cell lines to be resistant to cannabinoids due to enhanced expression of genes specific to those cell lines. In a series of studies, both in vitro and in vivo, the combination of THC with temozolamide exerted a much stronger antitumor effect than either agent alone. The same researchers found that CBD combined with a lower dose of THC was more effective than either agent alone and was equally effective as a higher dose of THC. Scott et al found that coadministration of THC and CBD increased radiosensitivity in pretreated glioma cells and, combined with radiation, dramatically reduced tumor volume in a murine model of glioma. In other studies, synthetic and endogenous cannabinoids increased effectiveness of some standard chemotherapy drugs. Synthetic and endogenous cannabinoids acted synergistically with chemotherapy agents such as gemcitabine and paclitaxel against pancreatic and gastric cancer cells, suggesting there may be a role for phytocannabinoids alongside traditional chemotherapy.

In what is considered a landmark pilot phase 1 study, nine patients with recurrent glioblastoma multiforme were treated with THC. These patients had failed standard treatment consisting of surgery and radiation and showed tumor progression. With the goal of assessing safety, THC was intracranially administered into a surgically created cavity within the tumor. This method of cannabinoid administration was found to be safe, with minimal psychoactive effects, and tumor cell proliferation was inhibited for some patients. Given the size of the study, however, the significance of this is unclear.

It is important to note that, though they may appear promising, results of these preclinical studies and single phase 1 pilot study are not enough to support the use of cannabinoids as a cancer treatment. More research is needed to determine which cancers would respond to cannabinoids, whether (and which) cannabinoids may be synergistic with chemo- or radiotherapy, appropriate dosing, and safety.

Pharmacokinetics

In addition to understanding current evidence of cannabis’ efficacy, the RDN should have an understanding of its pharmacokinetics. This is a pivotal
point when counseling patients, since cannabis-naïve patients are often unaware of the differences in onset and duration of effect for the various routes of administration and other issues related to product and dosing. Routes of administration include inhalation, oromucosal, oral, rectal, and topical. Table 2 describes pharmacokinetics of these methods of use. Inhalation yields the shortest onset and duration and is similar to oromucosal delivery. Oral intake has considerably longer onset and duration and has significantly greater first-pass metabolism through the liver which reduces the bioavailability of THC. This first-pass metabolism yields the highly psychoactive metabolite 11-OH THC, a compound which has greater psychoactive effects than THC. Coupled with a variable absorption rate of 4-20%, this makes the use of orally ingested cannabis more difficult to titrate. Due to less first-pass metabolism, inhaled, oromucosal, and rectally delivered cannabis are associated with less psychoactivity and often greater tolerance. Little is known about the systemic delivery of THC from topical creams and salves, and there is only preclinical data regarding delivery via patches. A summary of cannabis pharmacokinetics is presented in Table 2.

### Adverse Effects

As with any botanical product, it is important to be aware of cannabis’ potential adverse effects (AE). Most available data regarding adverse effects in general are from studies of recreational use or of cannabinoid medicines and are focused on short-term effects. Because a discussion of short- and long-term AE is beyond the scope of this article, and studies of medical cannabis evaluate short-term effects, short-term AE will be discussed.

One review of six RCTs of smoked or vaporized cannabis for pain management found that AE were greater for treatment rather than for placebo groups. Noted AE included headaches, sedation, dysphoria, impaired memory, poor concentration, disorientation, confusion, dizziness, sense of feeling “high” or “stoned,” and impaired learning and psychomotor speed. Noncognitive effects included fatigue, throat irritation and anxiety. In another review, 62 of 79 trials using various cannabinoids (including THC, CBD, nabiximols, dronabinol, and naboline) reported adverse event data. Common short-term adverse events included vomiting, disorientation, drowsiness, confusion, loss of balance, and dizziness, dry mouth, nausea, fatigue, somnolence, euphoria, hallucination. When compared with controls, cannabinoids resulted in greater risk of any AE, serious AE, or withdrawals due to AE, though serious AE were not clearly defined. Although only two of the included studies were of whole cannabis (smoked and vaporized), there was no evidence to suggest that effects of cannabis differed from those of other cannabinoids.

In a review focused on AE, 23 RCTs and eight observational studies were examined. In contrast to the aforementioned review, this review found that 96.6% of AE were not serious, that the rate of nonserious AE was higher among cannabinoid-treated subjects compared to controls, and that the rate of serious AE was not different between treatment and placebo groups. Unlike opiates, cannabis used for pain is said to carry no risk of lethal overdose, and organ failure due to its effects has not been reported. In a 1999 government-commissioned report, the Institute of Medicine concluded that “except for the harms associated with smoking, the adverse effects of marijuana [cannabinoid botanicals] use are within the range of effects tolerated for other medications.”

### Table 2: Cannabis pharmacokinetics by route of administration

<table>
<thead>
<tr>
<th>Route/Examples</th>
<th>Onset</th>
<th>Duration</th>
<th>Bioavailability</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation</td>
<td>Seconds to minutes</td>
<td>2-3 hours</td>
<td>10-35%</td>
<td>Bioavailability depends on volume inhaled, puff duration, length of breath hold</td>
</tr>
<tr>
<td>Oro-mucosal</td>
<td>15-20 minutes</td>
<td>45 min-2 hours</td>
<td>Highly variable, increases with food intake</td>
<td>Less first-pass metabolism</td>
</tr>
<tr>
<td>Oral: Tablets, capsules, edibles (food/liquid/candy)</td>
<td>30 min-2 hours</td>
<td>5-6 hours</td>
<td>4-20%</td>
<td>First-pass metabolism results in 11-OH THC &amp; decreased THC availability</td>
</tr>
<tr>
<td>Rectal: Suppository</td>
<td>1-8 hours (to “peak concentration”)</td>
<td>not described</td>
<td>~2x that of oral</td>
<td>Less first-pass metabolism</td>
</tr>
<tr>
<td>Topical: Creams, salves, patches</td>
<td>1.4 hours*</td>
<td>48 hours* (patch)</td>
<td>not described</td>
<td>CBD/CBN concentrations ~10-fold higher *Δ-8 THC in an animal model</td>
</tr>
</tbody>
</table>
Contraindications

Another important consideration of cannabinoid use includes contraindications. As with any botanical or drug, a known allergy to cannabis (whole plant), any cannabinoid constituents (eg, THC, CBD, etc), cannabinoid analogs (eg, nabilone) or any delivery vehicle (eg, sesame oil in the case of dronabinol) constitutes a contraindication.

It is also believed that long-term use may worsen preexisting symptoms of psychosis and schizophrenia in persons susceptible to mental illness. Some cohort studies suggest that this occurs in a dose-dependent manner such that potency, frequency, and duration of use, and early onset of use influence onset of initial psychotic episode as well as development of schizophrenia.

Estimates of cannabis dependence range from 9-10% overall, to 16-17% of those who begin using as adolescents, and 25-50% of those who use it daily. Some studies suggest that there is increased risk of crime, suicidal thoughts, illicit drug use, cannabis use disorder, and long-term cognitive impairment for youth who smoke cannabis (as compared with older adults).

Other contraindications may include cannabinoid-comorbidity or cannabinoid-drug interactions. Suggested contraindications and precautions for cannabis use are described in Table 3.

Acutely, cannabis can cause elevated blood pressure and tachycardia, increased cardiac labor, and systemic vasodilation. More severe effects, including angina, myocardial infarction, cardiac death, and cardiomyopathy have been reported in persons with preexisting cardiac conditions. Inhaled cannabis has also been shown to increase airway inflammation and resistance; damage lung tissue; and increase risk of chronic bronchitis, emphysema, and impaired respiratory function. Patients with preexisting lung disease who wish to use medical cannabis may best be advised to consume it by means other than inhalation provided no other contraindications exist. Daily cannabis use was found to be an independent risk factor for steatosis in persons with chronic hepatitis C. In addition, cannabinoids are metabolized by the liver and excreted via the kidneys, so it is thought that their effects could be prolonged or amplified in the setting of liver or renal disease.

A few studies suggest that acute cannabis exposure may result in temporary or, when used during adolescence, persistent psychosis. It is also believed that long-term use may worsen preexisting symptoms of psychosis and schizophrenia in persons susceptible to mental illness. Some cohort studies suggest that this occurs in a dose-dependent manner such that potency, frequency, and duration of use, and early onset of use influence onset of initial psychotic episode as well as development of schizophrenia.

In persons diagnosed with bipolar disorder, some studies suggest that cannabis use may trigger or amplify manic symptoms. However, Aggarwal et al assert that “there are no evidence-based studies demonstrating that chronic cannabis use can cause or exacerbate schizophrenia or bipolar disorder.”

Nevertheless, the package insert information for nabiximols suggests that known or suspected personal or family history of mental illness (including schizophrenia, other psychotic illness, severe personality disorder, or other psychiatric disorder excluding depression) is a contraindication for use. Acute anxiety may be exacerbated by cannabis use, although dose may play a role since lesser amounts of THC can be anxiolytic while greater amounts are anxiogenic. There is evidence that cannabis with high CBD and low THC content may mitigate psychosis and that CBD may mitigate anxiolytic effects of THC.

There is also evidence that cannabis use may decrease conception rate, increase risk of miscarriage, and cause long-term developmental problems for children exposed in utero. Cannabinoids are excreted in human milk and may be absorbed by the breastfed child.

Prevalence of cannabis use disorder is noted to be similar among medical and recreational users.

Table 3: Suggested contraindications and precautions for cannabinoid use

<table>
<thead>
<tr>
<th>Contraindications:</th>
<th>Precautions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diseases: Cardiovascular, respiratory (smoked), hepatic, renal</td>
<td>- High risk of cardiovascular disease</td>
</tr>
<tr>
<td>History: Psychiatric disorders, schizophrenia (including family history)</td>
<td>- Tobacco smoking</td>
</tr>
<tr>
<td>Pregnancy, planning to become pregnant, breastfeeding</td>
<td>- Active mood or anxiety disorder</td>
</tr>
<tr>
<td>Cannabis or substance use disorder (smoked)</td>
<td>- Use of higher doses of opioids, benzodiazepines</td>
</tr>
<tr>
<td>Age &lt;25 (smoked)</td>
<td></td>
</tr>
</tbody>
</table>

Drug Interactions

Cannabinoids are metabolized via liver enzymes, and thus cannabinoid-drug interactions have been observed or proposed. Cannabis can increase the effects of central nervous system depressants such as sedatives or alcohol. Cytochrome P450 (CYP) enzymes that are involved in cannabinoid metabolism include 1A1, 1A2, 1B1, 2C9, 2C19, and 3A4. Inhibitors of 2C9, 2C19, and 3A4 enzymes, such as certain antidepressants, proton-pump inhibitors, macrolides, antimycotics, calcium antagonists, and HIV-protease inhibitors may increase the bioavailability of THC and CBD, thereby increasing their effects. Drugs that induce certain enzymes may accelerate THC metabolism, thereby decreasing its concentration. The botanical St John’s Wort may accelerate THC metabolism. Some cannabinoids can inhibit 1A1, 1A2, and 1B1 enzymes, thereby increasing bioavailability of some drugs.

Studies of cannabinoids in patients treated for other conditions suggest that concurrent use of cannabis with a variety of other medications is well tolerated, and typical AEs are those psychotropic effects often seen with cannabinoid use. Table 4 describes anticipated or reported cannabinoid-drug interactions.
### Table 4: Expected or reported drug-cannabinoid interactions\(^{51,52}\)

<table>
<thead>
<tr>
<th>Effect</th>
<th>Drug</th>
<th>Expected or reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increases Concentration of THC</td>
<td>Ketoconazole</td>
<td>Reported</td>
</tr>
<tr>
<td></td>
<td>Amiodarone</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Boceprevir</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cimetidine</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clarithromycin</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cyclosporine</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cotrimoxazole</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diltiazem</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Erythromycin</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fluconazole</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fluoxetine</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fluvoxamine</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Itraconazole</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Isoniazid</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Metronidazole</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ritonavir</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Voriconazole</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Verapamil</td>
<td></td>
</tr>
<tr>
<td>Decreases Concentration of THC</td>
<td>Rifampin</td>
<td>Reported</td>
</tr>
<tr>
<td>Increases Concentration of CBD</td>
<td>Ketoconazole</td>
<td>Reported</td>
</tr>
<tr>
<td></td>
<td>Cimetidine</td>
<td>Expected</td>
</tr>
<tr>
<td>Cannabinoids increase bioavailability</td>
<td>Carbamazepine</td>
<td>Expected</td>
</tr>
<tr>
<td></td>
<td>Phenobarbital</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Phenytoin</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Primidone</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rifampin</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rifabutin</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Troglitazone</td>
<td></td>
</tr>
<tr>
<td>Cannabis increases effects</td>
<td>Alcohol</td>
<td>Reported</td>
</tr>
<tr>
<td></td>
<td>CNS depressants</td>
<td></td>
</tr>
</tbody>
</table>

### Other Safety Concerns

The availability of cannabis products depends on state-level medical cannabis laws, which vary widely: some allow specialty medical dispensaries; others limit the number and/or location of dispensaries while some do not allow dispensaries at all. Similarly, regulation of medical cannabis products in most jurisdictions is in its infancy. Ideally, patients could be confident that medical cannabis products, like other medications, are accurately labeled for cannabinoid content, contain no contaminants, and list all inactive ingredients. However, like any herb, cannabis plants can carry microorganisms (bacteria, molds), and case reports have described ill effects of *Aspergillus* inhalation from smoked cannabis among immunocompromised patients—including death in some cases.\(^{51}\) Whether or not a post–stem cell transplant patient requiring immunosuppressants can safely use cannabis should therefore be carefully considered. Researchers in Israel have described methods for fully sterilizing cannabis that only reduces THC activity by 12 to 27% compared with nonsterilized samples.\(^{53}\) Cannabis sterilization may make its use safer and viable in this patient population. Increasingly popular cannabis concentrates are made in various ways including extraction via solvents and liquid gasses, such as naphtha, acetone, hexane, butane, and propane.\(^{54}\) Raber et al tested medical cannabis concentrates from California and found that over 80% of samples had some form of contaminant, the most common of which were isopentane and the pesticide paclobutrazol.\(^{54}\)

Another concern for patients is lack of accuracy in content labeling. Vandrey et al sampled edible medical cannabis products from California and Washington and found that only 17% of products were accurately labeled, while 23% of products were underlabeled, and over 50% of products were overlabeled for cannabinoid content.\(^{55}\) Use of underlabeled product (which has more active constituent than is indicated on the label) may lead to tolerance issues and difficulty titrating the desired dose. Patients should be made aware of these issues and encouraged to exercise caution, keeping in mind that cannabis is not currently regulated like traditional medications.
Counseling on Cannabis

For the RDN who elects to provide medical cannabis counseling, there are several things to consider. The primary aim should be to educate patients so that they can make an informed decision about whether to use cannabis for their medical conditions. By federal law, cannabis can be recommended, but not prescribed, by physicians, and the law does not prevent health care providers from providing information about potential benefits and burdens of cannabis use. Though provision of legal advice is not within the RDN’s scope of practice, providing basic information about local laws and accurate sources of information and encouraging clients to further educate themselves is common sense. Those RDNs counseling patients should determine for what conditions their patients intend to use cannabis, advise them of evidence for its efficacy, dispel any expectations unsupported by current research (such as that cannabis can “cure” cancer), and recommend they not forgo more effective treatments for serious conditions. Differences in onset, duration, and psychoactive effects of the various administration methods should be explained as well as actual or potential concerns such as cannabis-drug or cannabis-disease interactions, AEs, contraindications, and product safety concerns. Patients should be given evidence-based resources, such as the ones noted in the sidebar, so that they can further educate themselves. As with any herbal or botanical product, the patient should be encouraged to inform his or her physician and other medical providers of cannabis use. RDNs should maintain an accurate record with specifics of education and resources given and communicate with the patient’s other health care providers as needed. In an institutional setting, RDNs may want to first discuss their intent to provide cannabis education with their manager, risk manager, and/or legal department. In this author’s experience, explaining that cancer patients may access and use cannabis with limited or inaccurate information and that the goal of medical cannabis counseling is to enhance patient safety can be a compelling rationale.

Conclusion

The cannabis plant has been used medicinally for centuries. Though it was effectively prohibited in the US with the Marihuana Tax Act of 1937 and federally classified as having no acceptable medical use in 1970, it has seen a resurgence of public interest, with over half of US states passing laws allowing its medical use since 1996. In cancer care, cannabis may be useful in the palliation of chemotherapy-induced nausea and vomiting, pain, anorexia, and weight loss. At present, research does not support claims that it can cure cancer. When educating patients about cannabis, it is important to discuss efficacy for intended use, pharmacokinetics, adverse effects, contraindications, drug or disease interactions, and safety concerns. Patients should be directed to reputable resources, including information about local medical cannabis laws. The RDN should record an accurate account of cannabis-related counseling and share appropriate information with the multidisciplinary team. The RDN can serve as a valuable source for evidence-based information about medical cannabis to both patients and other health care providers.

Resources

Americans for Safe Access: www.safeaccessnow.org


International Association for Cannabis as Medicine: www.cannabis-med.org

Medical Cannabis: Considerations for Dietitians Working in Oncology References


32. Deshpande A, Mallis-Gagnon A, Zohery N, Lakha SF. Efficacy and adverse effects of medical marijuana for chronic noncancer pain: systematic review of randomized
43. Guy GW, Robson PJ. A Phase I, open label, four-way crossover study to compare the pharmacokinetic profiles of a single dose of 20 mg of a cannabis based medicine extract (CBME) administered on 3 different areas of the buccal mucosa and to investigate the pharmacokinetics of CBME per oral in healthy male and female volunteers (GWPK0112). Journal of Cannabis Therapeutics. 2004;3(4):79-120.
Instructions for Completing the CPE Activity for Credit

1) Read the Continuing Professional Education article and answer the associated quiz questions. For each question, select the one best response. Compare your answers to the answer key on this page.

2) Send your completed quiz and application for CPE credit by email or mail to:
Shari Pollack, MPH, RDN, LDN
4500 Keeney Street
Skokie, IL 60076
sbethp@gmail.com

3) Print the CPE certificate, complete a copy, and retain it for your records. You will be notified only if your application for credit is not approved.

Expiration Date: October 15, 2020

Please print or type
Name: ____________________________________________________________________________________
Address: __________________________________________________________________________________
Academy Membership #: ________________________________ Phone: _____________________________
Email Address: _____________________________________________________________________________
DIFM Member: ☐ Yes ☐ No Date Test Completed: ___/___/____

The answer key for the questions: 1. c, 2. b, 3. d, 4. b, 5. a, 6. a, 7. c.

Questions:

1. Which of the following are the most well-known phytocannabinoids found in cannabis?
   A. Arachidonylethanolamide and 2-arachidonoylglycerol
   B. Dronabinol and nabilone
   C. Tetrahydrocannabinol (THC) and cannabidiol (CBD)
   D. Levonantradol and nabiximols

2. THC exhibits which of the following effects?
   A. Analgesic, anticonvulsant, antinausea, and antianxiety
   B. Analgesic, anxiolytic, muscle relaxant, antispasmodic, and anti-inflammatory
   C. Neuroprotective-antioxidant, bronchodilatory, anti-MRSA, and antiparasitic
   D. Antifungal, anticonvulsant, anti-inflammatory, and antibacterial

3. Terpenoids found in cannabis include which of the following?
   A. Limonene and CBD
   B. THC and β-caryophyllene
   C. Anandamide and phytol
   D. Nerolodol and linalool

4. For which conditions did researchers conclude that the risks of harm associated with cannabis use may outweigh the benefits?
   A. Chemotherapy-related nausea and vomiting
   B. Multiple sclerosis and chronic upper motor neuron syndromes
   C. Anorexia and dysgeusia
   D. Anxiety and sleep disturbances

5. Which route of administration has the fastest onset?
   A. Inhalation
   B. Oro-mucosal
   C. Oral
   D. Rectal

6. Cannabis use is contraindicated for patients with which of the following?
   A. Cardiovascular disease
   B. Leukemia
   C. Fibromyalgia
   D. Rheumatoid arthritis

7. Drug-cannabinoid interactions may include all of the following except:
   A. Increased bioavailability of drugs metabolized by CYP450 1A1, 1A2, and 1B1 enzymes
   B. Increased concentration of THC and CBD by certain antidepressants and proton-pump inhibitors
   C. Decreased effects of alcohol and CNS depressants
   D. Decreased concentration of THC by St John’s Wort and rifampin
Continuing Professional Education Certificate of Attendance
—Attendee Copy—

Participant Name: ________________________________
Registration Number: ______________________________
Activity Title: Medical Cannabis: Considerations for Dietitians Working in Oncology
Activity Number: 135906 (Expires 10/15/2020)
Date Completed: ___________ Number of CPEUs Awarded: 1.0
*Suggested Learning Need Code(s): ________________________________
*Suggested Performance Indicator(s): ________________________________

Provider Signature

Continuing Professional Education Certificate of Attendance
—Licensure Copy—

Participant Name: ________________________________
Registration Number: ______________________________
Activity Title: Medical Cannabis: Considerations for Dietitians Working in Oncology
Activity Number: 135906 (Expires 10/15/2020)
Date Completed: ___________ Number of CPEUs Awarded: 1.0
*Suggested Learning Need Code(s): ________________________________
*Suggested Performance Indicator(s): ________________________________

Provider Signature
Subclinical Hypothyroidism—Controversial Treatment Recommendations Made Clear

Felice L. Gersh, MD

Dr Felice L. Gersh is a board-certified OB/GYN, medical director of the Integrative Medical Group of Irvine, California, a medical advisor to Pure Encapsulations, and one of a small number of fellowship-trained integrative gynecologists. Dr Gersh is an award-winning physician and renowned international speaker on ovarian health, menopause, cardiometabolic health, environmental toxins, and other important issues affecting women of all ages. Assisting her patients in regaining their health, happiness, and vitality is the overriding mission that guides Dr Gersh in the care she provides. She uses the most cutting-edge and high-tech diagnostic testing, incorporating a unique blend of science-based therapies, from herbal to surgical, to assist in the healing process. Adept in all areas of women’s health, Dr Gersh has exceptional expertise in women’s hormones and addressing the negative impact of pharmaceuticals, environmental toxins, stress, and aging. Contact Dr Gersh at fgersh@integrativemgi.com, through polly.dowson@90degrees.co.uk, or her website http://www.integrativemgi.com/.

Virtually all adults recognize the significance of having appropriate thyroid function, and many people suspect that they have thyroid dysfunction at some time during their lives. They may notice some inexplicable weight gain, fatigue, constipation, dry skin, loss of scalp hair, reduced libido and motivation, or cold intolerance and wonder if a thyroid gland malfunction is to blame.

Those symptoms are indeed consistent with low thyroid function, or hypothyroidism, and the standard of care would be thorough testing of the thyroid gland and then an individualized treatment plan according to the results. Such a patient should be tested for free T3 and free T4, TSH, reverse T3, anti-TPO, and thyroglobulin antibodies. Optimal TSH is under 2.5 and above the bottom of the lab’s reference range. Optimal free T3 is at least 3.2, and optimal reverse T3 is near the bottom of the lab’s reference range of 90-350 pg/mL.

That said, there is a rather special category of hypothyroidism, now known as “subclinical hypothyroidism.” Whether or not subclinical hypothyroidism should be pharmaceutically treated is a controversial topic. Subclinical hypothyroidism refers to TSH levels of at least 3 but less than 10. Medical societies have recently recommended that treatment should be withheld in these cases, drawing on studies that found thyroid supplementation made no significant difference in outcomes for such patients. However, the official recommendation for pregnant women, and those planning a pregnancy, is to obtain TSH levels below 2.5, along with free T3 levels of at least 3.2. Most functional medicine doctors would argue that if these values are optimal during pregnancy, they should be considered optimal in all cases. This mentality and the high likelihood that subclinical hypothyroidism will progress to clinical hypothyroidism means that most of these practitioners will recommend and implement personalized treatment at the subclinical stage.

Causes of this mild hypothyroidism can include toxins, stress, autoimmune disease, and nutritional deficiencies. Toxins, which can disrupt thyroid function, can find their way into the body through contact with household dust, plastics in contact with food and drink, and vinyl shower curtains. Early age contact with these endocrine disruptors can result in the malformation of thyroid receptors, the prevention of proper hormone-receptor engagement, and limited or inhibited functionality.

Stress can result in low thyroid function, as the physiological response to stress is to protect the body from a possible famine by slowing the metabolism to conserve energy. The body increases the production of reverse T3, which competitively binds with T3 receptors. The higher the levels of reverse T3, the fewer sites are left for T3 to bind with, effectively lowering the action of thyroid in the body and slowing metabolic functions. There are many ways to address stress. Some people enjoy guided imagery, while others use meditation, emotional freedom techniques, cognitive behavioral therapy, yoga, progressive relaxation, homeopathy, and more! Be sure to include this important piece of the therapeutic puzzle when addressing thyroid health.

Autoimmune diseases of the thyroid include Hashimoto’s thyroiditis and Graves’ disease (which causes hyperthyroidism). The development of Hashimoto’s often involves impaired intestinal barrier function (leaky gut) and environmental toxin exposure. These are reasons to begin with a short-term, food-based detoxification diet protocol emphasizing organic, plant-based foods, adequate hydration, and a supplement regimen including fiber, amino acids, antioxidants, and herbs like milk thistle to support the body’s natural detoxification mechanisms. This is a great complement to the “5R” approach to gut healing—Remove, Repair, Replace, Reinoculate, and Restore the mind and body.

Addressing nutritional deficiencies that cause subclinical hypothyroidism with supplementation can yield a significantly positive response, most often negating the need for thyroid hormone therapy. Accordingly, the general recommendation is to always begin treatment for subclinical hypothyroidism by addressing the need for essential nutrients, rather than with a hormone prescription (except in pregnancy, where there is need for haste). The nutrients of greatest importance are iodine, selenium, and tyrosine.

Iodine is a critically important mineral and is deficient in most diets around the world. Scientists recognized 100 years ago that iodine was essential for proper thyroid development and function and that iodine deficiency was common. This discovery led to the practice of fortifying salt with iodine, which was used widely in subsequent decades. A century later, however, iodine deficiency remains prevalent, and few still use iodized salt—or any salt, for that matter. There has been a great debate over the dosing of iodine. A lack of iodine in infancy leads to a severe state of mental retardation called cretinism, and a lack of iodine in adults leads to goiters (enlarged thyroid glands) and poor function. As a result, some believe high-dose iodine supplementation will improve health. However, as with most things in life, the key is finding the optimal dose. The minimum healthy dosage is 150 mcg daily, with 1 mg recommended daily to maintain optimal function.

Another important thyroid
nutrient is selenium; dosing at 200 mg—or just eating two or three Brazil nuts daily—is sufficient for most patients. Other essential nutrients for a properly functioning thyroid include the amino acid tyrosine (500 mg); zinc (20 mg); vitamins E (30 mg), B2 (3 mg), B3 (20 mg as niacinamide), B6 (4 mg), D3 (2000 IU), and C (150 mg); and iron (dosage per age and gender).

If you still feel a bit confused by or concerned about the concept and treatment of subclinical hypothyroidism, just remember that, except during pregnancy, when the general rule is to treat with thyroid hormone, a prescription for thyroxine is generally not needed. Treating patients with a protocol that includes a four-week detoxification, toxin avoidance, stress management, an excellent diet, and judicious supplementation is often sufficient.

References
News You Can Use

Upcoming Conferences and Educational Opportunities


- Stop by the DIFM Booth at the DPG Showcase on Monday, October 23rd, from 9 AM – 12 PM at the McCormick Convention Center (located in the Registration C area outside of Exhibit Hall F2).
- Join DIFM for the Member Appreciation Networking Event with “make and take home” activities and gifts on Monday, October 23rd, from 6:30 – 8:30 PM, Hyatt Regency Chicago, Room Plaza AB. To register, visit: https://integrativerd.org/fnce-2017-chicago/
- Student Panel. Take part in a discussion on how panelists entered the field of Integrative and Functional Medicine on Monday, October 23rd, from 8:30 – 9 PM, Hyatt Regency Chicago, Room Plaza AB.


December 8-10, Preventative and Integrative Medicine. Las Vegas, NV. http://www.clevelandclinicmeded.com/live/courses/wellness/

December 14-16, The American Academy of Anti-Aging Medicine (A4M) and Metabolic Medical Institute’s (MMI) 25th Annual World Congress. Las Vegas, NV.

https://www.a4m.com/world-congress-2017/home.html

Electronic Mailing List (EML) Recent Topics Review

In several threads discussing nutrition therapy for multiple sclerosis, many users recommend gluten-free diets. The second most common suggestion was increasing polyunsaturated fat consumption to decrease disease symptoms. Increasing n-3 fatty acids and supplementing vitamin D were the most common suggestions on a thread discussing nutritional intervention for psoriasis. In a post discussing orthopedic surgery, several users recommended using arnica cream topically and consuming bone broth to aid in the recovery process. In separate threads, bone broth was also recommended for different uses such as improving gut health, relief from Lyme disease symptoms or joint pain, or to use as a source of glutamine. Additional threads include discussion topics such as supplements to increase testosterone levels, intermittent fasting, histamine foods and probiotics, and nutrition therapy for arthritis. In our commitment to being fair and unbiased, discussions regarding individuals or organizations, as well as certificate programs, testing, and nutrient analysis programs, can be found on the electronic mailing list at https://groups.yahoo.com/neo/groups/DIFM_Listserv/info.

What’s New - Journal Reviews and Resources

Cannabidiol for Epileptic Seizure Reduction

A double-blind, placebo-controlled trial was conducted to test cannabidiol as a treatment in reducing epileptic seizures. In this study, 120 children and young adults with drug-resistant seizures and Dravet syndrome, a rare childhood epilepsy disorder, were randomly assigned to receive either an oral dose of cannabidiol or a matching placebo, in addition to their standard antiepileptic-drug treatments. The primary endpoint was change in conclusive-seizure frequency. After 14 weeks of treatment, participants in the group receiving cannabidiol had a decrease in their average amount of seizures from 12.4 to 5.9 per month, compared to the placebo group with a decrease of 14.9 to 14.1. About 43% of participants receiving the cannabidiol treatment and 27% of those from the placebo group had a 50% decrease in frequency of convulsive seizures. Three participants in the cannabidiol group and no participants in the placebo group remained completely seizure-free for the entire 14-week trial. Caregiver assessments showed that 62% felt their child’s condition improved in the cannabidiol group, whereas only 34% in the placebo group thought there was any improvement. The group receiving cannabidiol treatment had a greater reduction in convulsive-seizure frequency; however, they also had more occurrences of adverse effects such as somnolence, decreased appetite, vomiting, diarrhea, fatigue, and abnormal liver function test results. While more research is needed to determine the safety and efficacy of cannabidiol for epileptic seizure reduction, this trial shows evidence that cannabinoids may be a promising treatment for epilepsy and Dravet syndrome in the future. Devinsky O, Cross JH, Laux L, et al. Trial of cannabidiol for drug-resistant seizures in the Dravet Syndrome. N Engl J Med. 2017;376(21):2011-2020. doi:10.1056/NEJMoa1611618 (PubMed ID: 28538134)

Emotional Eating and Mindfulness-Based Stress Reduction

A two-part exploratory study1 examined a group of individuals participating in a mindfulness-based stress reduction (MBSR) program to determine if MBSR practices could be a possible intervention for emotional eating. The first part (study 1) was conducted to determine if individuals in the MBSR program would have reductions in emotional eating behaviors. The aim of the second part (study 2) was to identify a potential role of mindfulness in emotional eating. In study 1, the population consisted of 347 participants enrolled from January through August of 2013 in the Center for Mindfulness in Medicine, Health Care, and Society at UMASS Medical School’s MBSR program. The eight-week program included...
one weekly class that focused on formal mindfulness practices such as the body scan, meditation, or yoga, which the participants were to practice six days per week. Additional classes on mindful eating, adequate sleep, and self-care were also given. Between weeks six and seven, participants attended one seven-hour silent retreat. The primary outcome was measured by pre- and post-questionnaires, using a modified version of the Internal Distribution Scale (IDS) by Niemeier et al. Analyses from the IDS found a significant decrease (p < .001) in emotional eating scores and additionally, found that higher baseline scores led to a greater change in emotional eating after participation in the MSBR program (p < .001). In order to explore a potential role of mindfulness in emotional eating, study 2 used the full IDS as well as a shortened version of the Five Facet Mindfulness Questionnaire (FFMQ) created by Baer et al. In study 2, 268 participants enrolled in the MSBR program at the Center for Mindfulness in Medicine, Health Care, and Society at UMass Medical School from April through September of 2015 completed an optional pre- and post-online survey. Perception of stress among participants was measured using a four-item, shortened version of the Perceived Stress Scale (PSS). A total of 83 out of the original 268 participants completed both the pre- and post-treatment IDS surveys. Analyses showed that for individuals with a BMI < 25, baseline IDS scores were significantly lower than those with a BMI > 25 (p = .022). Individuals with a BMI > 30 were also found to have a significantly higher IDS score than those with a BMI < 30 (p = .036) at baseline. After analyses were performed on the effects of the intervention, it showed that after completion of the MSBR program, there was a significant decrease (p < .001) in IDS scores, with a greater difference in those who identified as emotional eaters at baseline. There was no significant impact on weight; however, this study showed a large difference in emotional eating scores after the population participated in the MSBR program and gives promise to using MSBR practices as a tool to decrease emotional eating behaviors. While further research is still needed, this study supports the use of MSBR as a potential intervention to decrease emotional eating in individuals.


Curcumin as a Potential Treatment for Nonalcoholic Fatty Liver Disease

A recent study from the University of Buenos Aires suggests curcumin may be an efficient therapy to treat nonalcoholic fatty liver disease (NAFLD). Curcumin was examined for this study because of its strong anti-inflammatory effects and protective properties against linoleic acid-and leptin-induced inflammatory stimuli, which are hypothesized to contribute to increased inflammation in NAFLD. The effects of curcumin were assessed ex vivo on human immune cells on high-fat diet–induced NAFLD mouse model. For the experimental group, liver biopsies and blood samples were obtained from 72 individuals with NAFLD. Blood samples from 44 metabolically healthy individuals were taken for a second control group. Human liver cells or peripheral blood mononuclear cells (PBMCs) were evaluated for production of reactive oxygen species, liver cells were examined for percentage of CD4+ cell infiltration, and PBMCs were evaluated for production of intracellular interferon gamma (IFN-γ) by T cells and tumor necrosis factor-α (TNF-α) by monocytes. PBMCs from patients with NAFLD were treated with 30 μM of curcumin and then incubated to determine the modulatory effects of curcumin. Additionally, in vivo studies were performed on 32 mice; 16 mice were fed a high-fat diet (60% kcal from fat) in order to develop NAFLD/nonalcoholic steatohepatitis, while the remaining 16 were used as the control population. Mice were divided into four groups: high-fat diet (HFD), HFD with curcumin treatment; normal chow (NC), and NC with curcumin treatment. Following four weeks of feeding, evaluation of digested mouse livers was performed to test for reactive oxygen species, TNF-α production, and infiltration of CD4+ cells. Results showed that in the human liver macrophage cells of patients with NAFLD, a positive correlation was found between cells stimulated with linoleic acid and reactive oxygen species generation (p = .032). Additionally, after linoleic acid stimulation, IFN-γ production in circulating CD4+ cells and TNF-α production was increased in both the control group and the NAFLD group. A higher percentage of CD4+ cells (2.81%) was found in the NAFLD group compared to the control group (1.12%) after analyses were complete. Ex vivo curcumin treatment of PBMCs from patients with NAFLD showed a reversion to linoleic acid–induced reactive oxygen species generation (p = 0.011), lowered TNF-α production (p = .016), and decreased IFN-γ production in CD4+ cells (p = .048). In mice fed a HFD, liver macrophages stimulated with linoleic acid showed an increase in reactive oxygen species, compared to those of NC-fed mice. However, a decrease in reactive oxygen species production was found in the curcumin-treated liver macrophages of HFD-fed mice. TNF-α production in liver macrophages of the HFD-fed mice were significantly higher (p < .05) than NC-fed mice; however, production of TNF-α from leptin stimulation was prevented in macrophages that were also treated with curcumin. Additionally, percentage CD4+ cells were higher in the HFD-fed mice than the NC-fed mice. HFD-fed mice treated with curcumin had a lower percentage of CD4+ cells in the liver (p < .01). This study showed a positive correlation between linoleic acid and inflammatory stimuli in the livers of both humans and mice. Furthermore, findings from this study show the potential for curcumin’s preventive effects on NAFLD/nonalcoholic steatohepatitis. Curcumin may be a promising therapy for NAFLD.
Multiple Strains of Probiotics for Necrotizing Enterocolitis in Preterm Infants: an updated meta-analysis

Due to previous studies showing potential for probiotics to be used in the prevention of necrotizing enterocolitis (NEC) in preterm infants, a meta-analysis was conducted to determine if using multiple strains of probiotics were an effective intervention for prevention of NEC and infant mortality. Specifically, the study was to determine first, if probiotics have a potential role in preventing NEC in preterm very low-birth-weight (VLBW) infants and second, if infant mortality was affected before discharge. This study analyzed 25 different randomized controlled trials (RCTs) which included data on 7345 VLBW infants born at or before 34 weeks gestation or with a birth weight ≤ 1500 grams, with findings of NEC stage ≥ 2 according to Bell’s criteria. Additionally, the infants must have received enteral probiotics within their first seven days of life for a minimum of 28 days. Analyses found that in trials with the group receiving probiotics, incidence of NEC stage ≥ 2 was 3.9% versus the placebo group at 6.3%. Subgroup analyses were performed to determine if using multiple strains of probiotics was a more effective intervention for NEC than using a single-strain probiotic such as Lactobacillus, Bifidobacterium, or Saccharomyces. The meta-analyses showed the incidence of NEC stage ≥ 2 in the multiple strain–probiotic group to be 2.4% versus 6.5% in the placebo group. Single-strain probiotic using Lactobacillus had an incidence of 3% compared to 5% in the placebo group. In the Bifidobacterium group compared to the placebo, incidence of NEC stage ≥ 2 was 5.8% versus 6.8%. Incidence of NEC stage ≥ 2 in the Saccharomyces group was 6.2% compared to the placebo group at 7.2%. A total of 21 RCTs were analyzed to determine the relationship between probiotics and mortality. An analysis on all probiotics including multiple strains, Lactobacillus, Bifidobacterium, and Saccharomyces groups, had a mortality rate of 53.3%, compared to the placebo group of 6.9%. This meta-analysis supports the use of multiple strains of probiotics as a preventive intervention against NEC and to reduce mortality in VLBW infants; however, single-strain probiotic usage did not show strong reductions in either NEC or mortality. Chang HY, Chen JH, Chang JH, Lin HC, Lin CY, Peng CC. Multiple strains probiotics appear to be the most effective probiotics in the prevention of necrotizing enterocolitis and mortality: an updated meta-analysis. PLoS One. 2017;12(2):e0171579. doi:10.1371/journal.pone.0171579 (PubMed ID: 28182644)

Nutritional Genomics Research Publications – July 1, 2017

Interaction between the FTO gene, body mass index and depression: meta-analysis of 13701 individuals. Br J Psychiatry. 2017;211(2):70-76. doi:10.1192/bjp.bp.116.183475 (PubMed ID: 28642257) In this study, the commonly reported association between the rs9939609 variant of the FTO gene and obesity was also found when combined with depression. Each copy of the variant was found to be associated with a 2.2% higher body mass index. The authors feel that this observation will be helpful in further research regarding the mechanism(s) by which obesity and depression interact.


The rs7903146 variant in the TCF7L2 gene increases the risk of prediabetes/type 2 diabetes in obese adolescents by impairing β-cell function and hepatic insulin sensitivity. Diabetes Care. 2017;40(8):1082-1089. doi:10.2337/dc17-0290 (PubMed ID: 28611053) An association between the TCF7L2 variant and impaired glucose tolerance among obese adolescents is reported, and possible mechanisms are discussed.

Folate deficiency as predisposing factor for childhood leukaemia: a review of the literature. Genes Nutr. 2017;12:14. doi:10.1186/s12263-017-0560-8 (PubMed ID: 28588742) A deficiency of folic acid and related folates can impair DNA repair, gene expression, and the stability of DNA. This review also discusses how such deficiencies can affect DNA methylation in relation to childhood leukemia, and why supplementation before and during pregnancy can be protective. Further research is needed to establish optimal levels, since excessive intakes can also be problematic by nourishing tumors. This suggests the usefulness of personalized nutrition plans for both prevention and treatment.

Polymorphisms of the oxytocin receptor gene and overeating: the intermediary role of endophenotypic risk factors. Nutr Diabetes. 2017;7(5):e279. doi:10.1038/ndt.2017.24 (PubMed ID: 28530679) Variants in the oxytocin and oxytocin receptor genes (OXR and OXTR, respectively) were associated with traits such as preferences for fatty foods or sweets, and food reward sensitivity, which can affect overeating.

Gene-diet interaction and precision nutrition in obesity. Int J Mol Sci. 2017;18(4):787. doi:10.3390/ijms18040787 (PubMed ID: 28387720) General discussion of factors which can affect obesity and weight loss, including gene variants which may influence the effect of dietary regimens (eg, low-fat or low-carbohydrate), and intestinal microbiota. The potential usefulness of metabolomics is also described and the authors encourage the integration of multiple approaches in future research.

based summaries and interpretations of the literature so that best-practice guidelines can be developed.

**New insights into vitamin D anticancer properties: focus on miRNA modulation.** *Mol Genet Genomics*. 2017;292(3):511-524. doi:10.1007/s00438-017-1301-9 (PubMed ID: 28243735) Although many questions remain, the role of vitamin D in changing the expression of microRNAs (miRNA) is beginning to emerge in relation to specific cancer types. Discussion is offered with regard to breast, ovarian, cervical, prostate, bladder, colorectal, and gastric cancers, plus melanoma and leukemia.

**New horizons in treatment of osteoporosis.** *Daru*. 2017;25(1):2. doi:10.1186/s40199-017-0167-z (PubMed ID: 28173850) A number of treatments for osteoporosis are reviewed, including some still under development. The authors conclude by suggesting that ongoing progress with personalized health care should allow selection of treatments based on the genes and genetic risk score of individuals. Copyright 2017 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 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*. See www.ISNN2017.org/ for information on ISNN’s 11th Congress in Los Angeles this September 16th-19th.

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.

**WHAT’S IN STORE AT FNCE®?**

Experience dynamic educational opportunities not available elsewhere. Gain access to new trends, perspectives from expert speakers and applications that you can apply to practice immediately. Plus, review products and services from over 330 exhibitors showcasing the latest and greatest offerings in food and nutrition. Make plans to attend the Food & Nutrition Conference & Expo™, October 21 - 24 in Chicago.

Visit www.eatrightFNCE.org to learn more today.
Use of Mind-Body Practices from the Tibetan Bon and Buddhist Traditions by Oncology Patients

Laura Galindez, MSW

Integrative medicine has become an impactful approach to oncology care. There are many studies that show a significant portion of patients are using some kind of complementary medical therapy during or after cancer treatment. These practices vary widely and may include nutritional supplements or herbs, exercise, or mind-body practices such as yoga, hypnotherapy, guided imagery, meditation, tai chi, relaxation, biofeedback, and creative arts. Mind-body modalities can help patients manage distress, relate differently to pain, and provide a sense of control in one’s care during a time when they may feel out of control. Even within these categories, there are different styles and traditions from which these practices arise. For instance, both yoga and meditation have widely varied styles; and it can be difficult for patients to determine which type of intervention may be best for them at any given time. This article reviews practices arising from the Tibetan Bon and Buddhist traditions and how they are being utilized for oncology patients today.

What is Tibetan Bon versus Buddhism?

The Bon religion comes from the same region as Tibetan Buddhism, but it is a distinct religion. There are overlapping traditions to both religions, and the current incarnation of Bon is thought to be heavily influenced by Tibetan Buddhism. The Dalai Lama has recognized Bon as a separate but equal religion that has preserved important aspects of indigenous Tibetan culture. Similarly to Tibetan Buddhism, Bon incorporates meditation and monastic practices to help practitioners seek enlightenment. Participating in service to others is also seen as a path to deepen one’s understanding of reality, achieve dissolution of the self, and reach enlightenment.

Why Mind-Body Practices?

Outcomes are worse for cancer patients experiencing chronic stress. Stress is more than just an unpleasant feeling—it creates a cascade of physiological responses in the body. Using mind-body techniques, patients are actually able to exert more control over the activation and deactivation of the body’s parasympathetic and sympathetic nervous systems, which can lead to relaxation of the body and potential improvement in overall well-being.

Another important benefit of these practices is meaning-making. Oncology patients experience distress over why cancer happened to them. Meaning-making can help patients reframe this experience so that they can see growth and positivity from their disease. Some patients experience symptoms similar to post traumatic stress disorder after diagnosis, such as intrusive thoughts and excessively avoidant behavior. However, trauma can also foster psychological growth and resilience. Mind-body practices may increase “benefit-finding” for these patients as they seek to make sense of what is most often a random tragic occurrence.

Also of note, patients can learn these practices over time as they do not always require travel, attendance at a class, or a purchase. Conversely, barriers such as time, distance, and money may limit patient access to traditional methods such as psychological counseling or support groups. After an initial learning period, however, patients can apply these mind-body practices at any time. Meditation is accessible whenever and wherever the patient’s needs arise. These practices can also help mitigate symptoms associated with treatment, potentially resulting in improved mood, reduction of fatigue, more restful sleep, and management of pain and nausea. Simple yoga asanas or breathing techniques can be learned and practiced over and over. Many of these practices are now available online for free. Guided meditation and yoga videos can help patients (ideally) develop a consistent practice, which will not only offer support during times of acute stress but also act as a preventive measure. It may also increase patients’ feelings of well-being by helping them to focus on positive, protective things happening in their lives without denying the more emotionally difficult parts of their experience. Even 10 to 20 minutes per day of these practices can be reasonably integrated into a patient’s day with great impact.

Studies Involving Tibetan Practices

Mind-body practices can help patients achieve more acceptance and integration of contradicting emotions, which can reduce distress. Patients often report symptoms of trauma after their diagnoses. Quality of life is affected by things such as intrusive thoughts or avoidance behaviors. One study among breast cancer patients taking yoga classes during radiation therapy found that those who reported more intrusive thoughts during the first week of the yoga intervention ultimately reported more “benefit finding,” or meaning-making, at the three-month mark after treatment ended. The authors speculated that the mindful, acceptance-focused quality of yoga practice may have allowed processing of these negative emotions regarding their diagnoses more quickly. As part of the yoga program, the participants were asked to concentrate on their breathing without trying to interrupt the flow of their thoughts. Investigators suggested that this may have helped the patients deal with the trauma of their cancer diagnoses more quickly.

Further, a qualitative study involving 28 lymphoma patients who used a Tibetan yoga program...
reported their experiences of “living in a paradox” when trying to make meaning of their cancer journey. Both the control group and the yoga group were asked to respond to qualitative questions about their personal psychological experience of their cancer diagnosis, at 1-week and 3-months post intervention. All patients voiced chronic uncertainty and fear of death or recurrence, while simultaneously expressing gratitude and newly found meaning, purpose, and value in their lives. However, the patients who participated in the 7-week Tibetan yoga class reported a greater sense of acceptance and meaning in their lives than the control group. The authors also reported that the yoga participants had improved measures on several indicators of sleep quality. This is relevant to the oncology population as sleep disturbance is a very common side effect, and poor sleep can result in disturbances in both psychological and physical health.

While most research in supportive care focuses on the patients, caregivers themselves often suffer a great psychological burden resulting from their significant role in supporting the patient. Often, caregivers feel guilt for performing any kind of self-care while their loved one is suffering. However, caregiver well-being is important because the caregiver’s ability to cope can directly impact the patient’s ability to cope and vice versa. Meditation is an intervention that can serve both patients and their caregivers; encouraging them to practice together can help overcome the barriers of time and feelings of guilt. To this end, another research study looked at the efficacy of a Tibetan yoga practice on couples in which one partner had a lung cancer diagnosis and the other was the primary caregiver. The couples attended two to three weekly sessions for 6 weeks. Together, they practiced both guided meditations along with a Tsa Lung movement series. Tsa Lung movements are an ancient Bon contemplative practice with gentle movements and specific, coordinated, breathing patterns. In this study, the patients again reported improvement in meaning-finding and spiritual well-being, especially impactful considering the poor prognosis of some lung cancer patients. The caregivers also reported significantly less fatigue and anxiety at the end of the study. Investigators noted a medium effect (d=52) for meaning-making for the caregivers.7 Cancer patients often report compromised cognitive functioning post treatment, sometimes referred to as “chemo-brain.” This can be very distressing for patients and can impact both their functioning and quality of life long after treatment is completed. A pilot study using Tibetan Sound Meditation was completed to guide future research on the cognitive rehabilitation of breast cancer survivors. This unique style of meditation involved the participants’ creation of vocal sounds during the meditation (ie, Ah, Ohm, and Hoong), included guided imagery of colors, and focused participants’ thoughts on increasing desired protective emotions such as love, peace, and joy. These three components were felt to enhance the attention-training aspect of this specific practice as opposed to other meditation styles. The women who participated in the meditation practice reported better cognitive function, cognitive ability, mental health, and spirituality. The meditation group showed improvements in processing speed and short-term memory as well.8 More research is needed to confirm the clinical application of the effects, as not all of the findings were of statistical significance.

Take Home Message

There are many different mind-body practices available to patients from numerous, equally valid traditions. It follows that there will also be limitations in trying to generalize outcomes from studies on “yoga” or “meditation.” As each practice has large variation in styles, how do patients choose the ‘best’ one? Ultimately, the best method will be the one that the patient is successful in practicing regularly. Techniques that can fit into patients’ lives with minimal barriers such as cost, distance, and time will be the ones that are the most helpful. For cancer patients experiencing emotional and physical distress, gentle yoga and breathing techniques from the Tibetan and Bon Buddhist traditions may be helpful in managing unwanted symptoms and improving quality of life.

References


Dietitians in Integrative and Functional Medicine
a dietetic practice group of the Academy of Nutrition and Dietetics

Fall 2017 Volume 20, Issue 2
Anxiety and depression are the most common mental health disorders today, impacting the quality of life for millions of Americans of all ages. Evidence abounds that food affects mood, with the gut-brain-axis taking center stage. Healing foods, elimination diets, specific dietary supplementation, and mind-body practices can potentially transform the mental state of the individual and restore wellness. Presented by Kathie Swift, MS, RDN, LDN, FAND, EBQ, this session examined the connection between diet and mood and provided actionable strategies to incorporate into practice. What follows is a review and summary of the presentation.

There are currently 43.8 million American adults experiencing mental illness.1 Further, it is the cause of one-third of the world’s adult disabilities. Often misunderstood, mental health disorders were historically treated with physical restraints.2 Today, psychopharmacology is the main form of management. An important question facing clients and clinicians alike is: how do diet and supplementation fit in when patients are taking prescription medications to manage their mood disorders? Patients often come into the clinic with an average of six diagnoses and 30 or more signs and symptoms. The key, however, is the cornerstone of integrative and functional medicine—using nutrition to get to the root cause of an individual’s symptoms. A primary focus of this presentation was the emerging concept of integrative mental health care and how RDNs, as members of the health care team, can provide a tailored and integrative nutrition plan.3

More research is pointing to nutrition and our current food system as a potential root cause for today’s increased prevalence in mental health disorders. Growing brains need docosahexaenoic acid (DHA), iodine, and other sea minerals, which are currently lacking in our land and protein-based food supply. This has severe consequences for brain development and is considered a genuine threat to humanity.4 The new paradigm in mental health now points to brain metabolism in relation to inflammation, the microbiome, oxidative stress, and mitochondrial function and can be treated through diet and/or supplementation.5,6

The Integrative and Functional Medical Nutrition Therapy (IFMNT) Radial (see Figure 1) was presented and discussed as a way to assess, organize, and prioritize information. The radial addresses...
the core imbalances that arise from disease-promoting lifestyle factors and can include diet, physical activity, and stress. It helps the RDN assess inflammation, digestion, detoxification, hormones, and nutritional status.

Inflammation can cause chronic inflammation and result in altered BDNF and other neurotrophic factors. An association between systemic inflammation and PTSD pathology trending with depression has been shown. A high prevalence of moderate and severe depressive and anxiety symptoms has been associated with Polycystic Ovary Syndrome (PCOS). 

Clinical Pearl: Consider possible hormone imbalances as they pertain to thyroid and/or insulin resistance.

Digestion

As the second brain and home of the enteric nervous system, the gut microbiome has emerged as highly influential in mood and well-being and is, therefore, a key mediator in gut-brain health. Further, it is hypothesized that a high-fiber diet can elevate butyrate to prevent/treat brain disorders. Butyrate is a fatty acid that can protect the brain and

Clinical Pearl: Consider the possibility of systemic inflammation as a contributing factor in mood disorders and integrate anti-inflammatory strategies into the care plan.

Hormones

- Hashimoto's thyroiditis, thyroid immunity, and other thyroid

Glossary:

Neuroplasticity: the brain's ability to reorganize itself by forming new neural connections throughout life.

Brain-derived neurotropic factor (BDNF): key protein in brain plasticity and particularly important for survival of dopaminergic neurons. Promotes neurogenesis, development, function, and survival. Microglia: glial cells located throughout the brain and spinal cord and are the resident immune cells of the central nervous system. Microglia search for substances that damage neurons; if altered, increase susceptibility to mental disorders. Neurotransmitter (NT): chemical messengers that communicate information throughout our brain and body; relay signals between neurons.

Inflammation, hormones, digestion, detoxification, nutritional evaluation, and biochemical assessment were then discussed through the lens of mental health and the IFN model.

Figure 1. Integrative and Functional Medical Nutrition Therapy (IFMNT) Radial. Reprinted with permission from Kathie Madonna Swift, MS, RD, LDN; Diana Noland, MPH, RD; and Elizabeth Redmond, PhD, MMSc, RD, LD.
enhance plasticity in neurological disease models. The gut microbiota produce butyrate by fermenting carbohydrates from a high-fiber diet. Individuals with diseases such as Alzheimer’s and autism in particular may benefit from butyrate and consumption of a high-fiber diet. Consuming a variety of fiber is key.

Gut-brain benefits of fermented foods:¹⁶
- Direct protection of the intestinal barrier
- Direct activation of neural pathways between gut and brain
- Indirect influence on NT/neuropeptide production
- Direct, microbial-produced neurochemical production (eg, gamma-aminobutyric acid (GABA); low levels may result in anxiety or mood disorders)
- Prevention of stress-induced alterations to overall intestinal microbiota
- Modulation of neurotropic chemicals including BDNF

Information regarding fecal microbial transplant (FMT) was also introduced. FMT alters brain chemistry and behavior. A study in which gut bacteria was swapped in anxious and fearless mice found that the fearless mice became timid when they received microbes from anxious mice and vice versa. Therefore, caution should be exercised with this type of transplantation in humans due to potential behavioral repercussions.

Clinical Pearl: Consider dietary strategies to support digestive health including nutrient-dense whole foods, fermentable fibers/prebiotics, fermented foods/probiotics.

Detoxification

There appears to be a growing awareness of the connection between today’s toxic burden, chronic disease, and detoxification. Escalating rates of chronic disease are associated with the bioaccumulation of toxicants and may be a factor in neuropsychiatric conditions. Bioaccumulation occurs when a living tissue absorbs more harmful chemicals and/or substances than it can break down, use, or excrete to remain functional. As health care practitioners, RDNs have potential roles in addressing a patient’s toxic burden with individualized nutrition and supplementation.

A sensitivity-related illness (SRI) is defined as an allergy, food intolerance, or chemical sensitivity that manifests as a result of genetic susceptibility and toxic burden.¹⁷ A toxic burden beyond the body’s threshold initiates a state of impaired tolerance which results in hypersensitivity. When hypersensitivity occurs, a Toxicant-Induced Loss of Tolerance (TILT) results in varying clinical sequelae, presenting as myriad health conditions that may involve diverse organ systems. SRIs will generally abate if the underlying toxicants are identified and removed. Sources of potential SRIs include:
- excess calories,
- nutrient imbalances, unsafe additives/excitotoxins,
- heavy metals,
- pesticides and herbicides, and food intolerances.

When oxidative stress is present (associated with depressive disorders), then detoxification is compromised.¹⁸ An antioxidant-rich diet supports the detoxification process. The take-home point emphasized was: nutrients drive detoxification.

Clinical Pearl: Consider sources of oxidative stress [diet, Advanced Glycation & Lipoxidation End products (AGEs/ALEs)] and support with antioxidant-rich diet and possible supplementation.

Nutritional Evaluation

The following is a summary of the presented research regarding mental health and the effects of dietary patterns, in addition to specific micro- and macronutrients.

Dietary Patterns
- A Japanese or Mediterranean diet is inversely associated with depression.¹⁹
- Intakes of magnesium, calcium, iron, and zinc are inversely associated with depressive symptoms.²⁰,²¹
- Fatty acid composition of the Western Diet (high n-6:n-3) is associated with increased incidence of depression.²²
- Dietary intervention demonstrated significantly greater improvement in depressive disorders than social intervention. Dietary improvement may provide an efficacious treatment strategy for major depression with benefits extending to its comorbidities.²³

Omega-3 benefits
- Increased membrane fluidity, BDNF, and hippocampal volume
- Facilitates neurotransmission
- Improved synaptic neuroplasticity
- Decreased neuronal apoptosis

B vitamins
- Adequate levels are essential for proper brain function (cofactors, synthesis of neurotransmitters).
- Folate and vitamins B12 and B6 influence mood.
- Many trials have shown benefits of treatment with B6, B12, and folic acid including reduced major depressive episodes.
- Different vitamin B supplement forms and dosages have been used in the literature (eg, 5-methyltetrahydrofolate (5-MTHF) or folic acid)

Vitamin D
- There is accumulating evidence for the impact of vitamin D on mental health.
- Twenty-five cross-sectional and eight longitudinal studies suggest a role for vitamin D in the pathogenesis of mental disorders in children and adolescents.
- Vitamin D acts by reducing the receptor function.
- Twenty-five cross-sectional and eight longitudinal studies suggest a role for vitamin D in the pathogenesis of mental disorders in children and adolescents.
- Vitamin D acts by reducing the receptor function.
- Vitamin D acts by reducing the receptor function.
- Vitamin D acts by reducing the receptor function.
- Twenty-five cross-sectional and eight longitudinal studies suggest a role for vitamin D in the pathogenesis of mental disorders in children and adolescents.
- Vitamin D acts by reducing the receptor function.
- Twenty-five cross-sectional and eight longitudinal studies suggest a role for vitamin D in the pathogenesis of mental disorders in children and adolescents.
- Vitamin D acts by reducing the receptor function.
- Twenty-five cross-sectional and eight longitudinal studies suggest a role for vitamin D in the pathogenesis of mental disorders in children and adolescents.
- Vitamin D acts by reducing the receptor function.
- Twenty-five cross-sectional and eight longitudinal studies suggest a role for vitamin D in the pathogenesis of mental disorders in children and adolescents.
- Vitamin D acts by reducing the receptor function.
- Twenty-five cross-sectional and eight longitudinal studies suggest a role for vitamin D in the pathogenesis of mental disorders in children and adolescents.
- Vitamin D acts by reducing the receptor function.
- Twenty-five cross-sectional and eight longitudinal studies suggest a role for vitamin D in the pathogenesis of mental disorders in children and adolescents.
- Vitamin D acts by reducing the receptor function.
- Twenty-five cross-sectional and eight longitudinal studies suggest a role for vitamin D in the pathogenesis of mental disorders in children and adolescents.
- Vitamin D acts by reducing the receptor function.
- Twenty-five cross-sectional and eight longitudinal studies suggest a role for vitamin D in the pathogenesis of mental disorders in children and adolescents.
- Vitamin D acts by reducing the receptor function.
- Twenty-five cross-sectional and eight longitudinal studies suggest a role for vitamin D in the pathogenesis of mental disorders in children and adolescents.
- Vitamin D acts by reducing the receptor function.
- Twenty-five cross-sectional and eight longitudinal studies suggest a role for vitamin D in the pathogenesis of mental disorders in children and adolescents.
- Vitamin D acts by reducing the receptor function.
- Twenty-five cross-sectional and eight longitudinal studies suggest a role for vitamin D in the pathogenesis of mental disorders in children and adolescents.
- Vitamin D acts by reducing the receptor function.
- Twenty-five cross-sectional and eight longitudinal studies suggest a role for vitamin D in the pathogenesis of mental disorders in children and adolescents.
- Vitamin D acts by reducing the receptor function.
- Twenty-five cross-sectional and eight longitudinal studies suggest a role for vitamin D in the pathogenesis of mental disorders in children and adolescents.
- Vitamin D acts by reducing the receptor function.
- Twenty-five cross-sectional and eight longitudinal studies suggest a role for vitamin D in the pathogenesis of mental disorders in children and adolescents.
- Vitamin D acts by reducing the receptor function.
- Twenty-five cross-sectional and eight longitudinal studies suggest a role for vitamin D in the pathogenesis of mental disorders in children and adolescents.
- Vitamin D acts by reducing the receptor function.
- Twenty-five cross-sectional and eight longitudinal studies suggest a role for vitamin D in the pathogenesis of mental disorders in children and adolescents.
- Vitamin D acts by reducing the receptor function.
- Twenty-five cross-sectional and eight longitudinal studies suggest a role for vitamin D in the pathogenesis of mental disorders in children and adolescents.
- Vitamin D acts by reducing the receptor function.

Clinical Pearl: Test—don’t guess—serum 25-hydroxyvitamin D level, and encourage daily dose of SUNLIGHT whenever possible as the best source of vitamin D!

Minerals
- Zinc and magnesium have roles in memory, learning, and N-methyl-D-aspartate (NMDA) receptor function.
- An inverse relationship exists between dietary intake of magnesium and depression.
- Risk of depression is inversely...
associated with dietary intakes of iron and zinc. • Higher body iron may be associated with more depressive symptoms in young adult men. • Optimal serum selenium was associated with reduced risk of depressive symptoms.25

Biochemical Assessment

A quote highlighted in the presentation:

In addition to dietary modification, we recognize that nutrient-based (nutraceutical) prescription has the potential to assist in the management of mental disorders at the individual and population level. Many of these nutrients have a clear link to brain health, including: omega-3s, B vitamins (particularly folate and B12), choline, iron, zinc, magnesium, S-adenosyl methionine (SAMe), vitamin D, and amino acids. While we advocate for these to be consumed in the diet where possible, additional select prescription of these as nutraceuticals may also be justified. In summary, nutrition and nutraceuticals should now be considered mainstream elements of psychiatric practice, with research, education, policy, and health promotion reflecting this new paradigm.26

Testing/assessing nutrient levels can be useful in tailoring food and nutrition therapy. In addition, nutrigenetic testing can be used as a tool to improve psychiatric care as it identifies single-nucleotide polymorphisms (SNPs) that may influence health status. Ideally, RDNs should be knowledgeable in functional nutrition testing in order to translate lab findings into meaningful food and dietary supplement recommendations. Considerations when interpreting laboratory results and recommending interventions include:

• Imbalances that can be treated through diet and or supplementation.
• Utilizing critical thinking regarding supplementation when assessing the diet.
• Identification of possible food intolerances contributing to the mood disorder.
• Genetic factors contributing to individual variations in vitamin B status and neuropsychiatric phenotypes.

Clinical Pearl: A comprehensive nutritional profile including red blood cell fatty acids, vitamin, and mineral levels identifies candidate nutrients of concern in mood disorders.

Meditative Movement Therapies

Exercises that combine meditative focus with movement are often called meditative movement therapies (MMTs) and include Qigong, Hatha Yoga, and the Alexander Technique. Benefits of these practices in regard to mental health include reduced anxiety and depression, increased mental and physical relaxation and improved biomarkers for inflammation and immune function.27-29 Qigong is an adaptable mind-body exercise, especially easy to learn for children and adults alike, and can be practiced any time and place.29 MMTs are an effective complement to other practices of known benefit like dance, exercise, aromatics, mindfulness, and gardening.30-32

Conclusion

The presentation concluded with a look toward future requirements and concerns. First, more clinical trials that use an integrative approach to mental health and encompass nutraceutical and psychobiotic interventions are needed.33 Secondly, there needs to be an increase in advocacy and eventual policy change to improve the food system and environment to help alleviate the toxic and inflammatory loads burdening our brains and biology. Lastly, there is an immediate need for skilled RDNs, trained in integrative and functional nutrition, as integral members of psychiatry teams in order to best serve the patient with mental health challenges.

References


The energy and vision Rita has demonstrated throughout her 40 years as a dietitian is evident in the following brief synopsis and through her longstanding dedication to the field of nutrition. Rita is in private practice in 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. Rita helped found DIFM, formerly Nutrition in Complementary Care (NCC). She initiated the Standards of Practice (SOP) and Standards of Professional Performance (SOPP) for Registered Dietitians in Integrative and Functional Medicine. She has held many positions on DIFM’s board. Rita received DIFM’s Excellence in Service Award in 2013. 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. She is also the inaugural Community Leader for the Asian Indians in Nutrition and Dietetics (AIND) Member Interest Group (MIG). “My grandfather owned 140 businesses in India 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 moved 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!”

Excellence in Service – Alicia Trocker, MS, RDN, IFNCP (California)
Alicia believes that volunteerism is an important way to honor all of our blessings. To that end, she is a past chair and has held various board positions with DIFM since 2009. She is in practice as the outpatient dietitian nutritionist at UCLA Health System and has a private practice specializing in integrative and functional nutrition. With a passion for counseling and teaching, her comprehensive practice focuses on mindfulness, non-judgmental counseling, and balanced approaches to nutrition health care. Aside from counseling patients, she is a preceptor for medical students and created a patient nutrition counseling group called “Being in Balance.” She speaks on a variety of nutrition-related topics throughout UCLA and other venues. To honor a dear friend and all women, she has served on the organizing committee for Run for Her®, an in-person and virtual fundraising event for the Cedars-Sinai Women’s Cancer Program, whose mission is to support ovarian cancer research and awareness.

Excellence in Practice – Lisa Dorfman, MS, RD, CSSD, LMHC, FAND (Florida)
Lisa has been an Academy Spokesperson, a three-time DPG chair, co-chair of the DIFM Inaugural Certification Committee, and a member of the DIFM Nominations Committee. She currently serves as Country Representatives Director for the American Overseas Dietetic Association (AODA). As The Running Nutritionist®, Lisa is leader to industry, academia, the public, and press on topics of nutrition. She is a former director of the graduate program in Nutrition for Health & Human Performance at the University of Miami and currently teaches culinary nutrition classes and online sports nutrition courses for My Sports Dietitian University. She is the author of eight books and numerous textbook chapters and has appeared on 20/20, Dateline, CNN, MSNBC, and ESPN and been featured in USA Today, Newsweek, Wall Street Journal, New York Times, and dozens of magazines. As a culinary consultant and educator, Lisa created and launched spa and kids’ cuisine programs for Sandals Resorts, the Ritz Carlton Hotel, and Bitter End Resorts (British Virgin Islands) and taught culinary nutrition at Johnson & Wales University. She launched Miami’s first Farm-to-Table Performance Nutrition Delivery Service and co-founded the award-winning global mobile app called cTHRU Nutrition to help consumers find and make healthy food choices at grocery stores and restaurants worldwide.
When I was in graduate school, I couldn’t wait to “save someone’s life” with a pot of green tea, a shot of cayenne pepper, and a garlic-ginger stir fry. With the dream of being an oncology dietitian, I dove deep into the evidence around epigallocatechin gallate (EGCG), capsaicin, and curcumin, working extra hours on research papers when a family friend was diagnosed with pancreatic cancer and a young woman I babysat for in high school was being treated for breast cancer at age 30. I scurried off to conferences at the National Institutes of Health (NIH) and the American Institute for Cancer Research, churned out an article for the Academy’s Oncology Nutrition DPG, and doubled up on my servings of shiitake mushrooms and cruciferous veggies. In my mind, a cancer diagnosis was a true way to practice “food as medicine”; and I wanted to believe that a plate of healthy food held as much healing power, if not more, than a bag of chemo. I know now that cancer treatment is far more complex than focusing solely on the inclusion of certain nutrients which may or may not result in apoptosis or the reduced expression of certain onco-genes, but I have never stopped believing in the empowering role that food can play in someone’s diagnosis. While I never became an oncology RDN like I thought I’d be, I had the opportunity to work with a number of cancer patients in my private practice who were seeking out additional nutritional support with an integrative twist. In situations where courses of action around treatment plans were limited, diet and lifestyle choices were areas where these folks could feel like they had some say in the matter. There were numerous options available to them when it came to deciding what and how they were going to eat, exercise, practice stress management, and approach their lives. It was my honor to provide them with ideas, encouragement, and guidance including trying to find alternatives to the high-protein liquid nutrition supplements and calorically dense whipping cream recommended by their physicians to maintain weight. And when appetite faltered, as it often does, and the green tea and avocado smoothie I recommended just sounded nauseating, I brainstormed other modalities that they could use in supporting their health and state of mind. I appreciate that part of an integrative RDN’s treatment plan may focus as much on the patient’s sleep as it does on her supper. As this quarter’s newsletter shows, we continue to learn about the many nuances of cancer and the evidence to support how healthy dietary patterns can aid in both prevention and treatment. However, I imagine we all have our favorite super power food that we believe and hope will be the silver bullet in the fight against cancer. Mine continues to be the grassy and delightful cup of Sencha tea which I will likely be drinking until my final days. What is yours? Come find me at FNCE®—at the DPG Showcase, our pre-conference symposium, or one of the Food as Medicine track sessions—and let’s talk! I’d love to meet more of you, hear your experiences, and share stories. Until then, I raise a cup of green tea with a hint of ginger to you all.
Editor’s Notes

I cannot believe how quickly the year goes by and FNCE® planning begins. But yes, it is that time again, and our Executive Committee, along with the help of many volunteers, is planning some great events at this year’s meeting in Chicago. As this is the 100th anniversary of the Academy and the beginning of the second century, there are many festivities and celebrations planned. With over 4300 DIFM members, we are the now the Academy’s 3rd largest DPG. We hope you are attending FNCE® and ask you to stop by our booth or take advantage of both our Member Appreciation Event and the Saturday Symposium “Feed Your Genes—Feed Your Brain.”

Speaking of anniversaries…next year, DIFM (formerly Nutrition in Complementary Care or NCC) will be 20 years old! It seems like yesterday when the founding members met for the first time in Kansas City, Missouri. The enthusiasm was high and everyone was optimistic about the future of complementary care. To think of where we have come from—and where we are headed—is awe-inspiring. Looking back at the first issue of the newsletter, topics such as What is Complementary Care? and What is Natural Medicine? were the headliners. Now our discussions and articles continue to focus on these areas, but with a broader sweeping brush that examines what integrative and functional medicine is, the microbiome, methylation, and the genetics of conditions such as celiac disease. As the saying goes, “We’ve come a long way, baby!”

As we prepare for this year’s FNCE®, I hope that you will reflect on where you have come from and where you are heading in the field of integrative and functional medicine. This is the wave of the future, and the opportunities are limitless. I encourage you to become involved either as a volunteer with one or many of the DIFM committees or with the newsletter as an author or editor. Jumping into DIFM with both feet is one of the best ways to learn and is how many of us began on our educational paths.

If you are attending FNCE® and have not yet signed up to volunteer for any DIFM activities, such as helping with our DPG Showcase booth or the Member Reception (both on Monday, October 23rd), or reviewing and writing a synopsis of a session or two, then feel free to contact Mary Alice Gettings at difmma@gmail.com or me, Sarah Laidlaw, at peaknut70@gmail.com.

We look forward to seeing you in the Windy City—Chicago!

In Health, Sarah

Editor
Sarah Harding Laidlaw, MS, RDN, MPA, CDE
peaknut70@gmail.com

Copy Editor
Holly A Van Poots, RDN, CSP, FAND
hollynpog@gmail.com

Associate Editor
Jena Savadsky Griffith, RDN
jenas_mailbox@yahoo.com

CPE Editor
Shari B Pollack, MPH, RDN, LDN
sbthp@gmail.com

Associate CPE Editor
Ruth Goldstein, MS, RD
rgoldstein1234@gmail.com

Biochemistry/Nutritional Genomics Co-Editors
Olivia M Dong, MPH, RD, LDN
odong@email.unc.edu
Janie Jacoby
Janie.Jacoby@colorado.edu

NYCU/Resource Reviews/Members In The News/Spotlight
Raquel Praino, Dietetic Intern
raquelpraino@yahoo.com

Student Member Co-Chairs
Staci Belcher, RDN
difmsstudentchair@gmail.com

Anita Davila
anita.davila@ame.com

Attention News You Can Use Editor
Tarah Allen
tarah.allen@bastyr.edu

Botanicals/Functional Foods/Supplements
Dina Ranade, RDN, LD
dranade@comcast.net

Associate Botanicals, Functional Foods, and Supplements Editor
Ceci Snyder
ceciwsnyder@gmail.com

Mind-Body
Doris Piccinin, MS, RD, CDE, LDN
dpicce100@gmail.com

Editors
Linda Lockett Brown, ABD, MAg, RDN,
LDN, CLC
Christian Calaguas, RD

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.

We invite you to submit articles, news and comments. Contact us for author guidelines.

Send change-of-address notification to the Academy of Nutrition & Dietetics, 120 South Riverside Plaza, Ste 2000, Chicago, IL 60606-6995.

Copyright © 2017 Dietitians in Integrative and Functional Medicine, a Dietetic Practice Group of the Academy of Nutrition & Dietetics. All material appearing in this newsletter is covered by copyright law and may be photocopied or otherwise reproduced for noncommercial scientific or educational purposes only, provided the source is acknowledged. For all other purposes, the written consent of the editor is required.

Annual Subscription Rates (payable in US funds):
- Non-members ........................................ $60/year
- Academy members .............................. $40/year
- Student members ................................ $20/year

For international orders, please add $5 shipping and handling for each printed issue. Make checks payable to The Academy of Nutrition and Dietetics and mail to Dietitians in Integrative and Functional Medicine, PO Box 3624, Pittsfield, MA 01202.

ISSN 1524-5209
Resource Reviews: Cauliflower Fried Rice With Roasted Cashews Recipe

Lauren McNeil

Lauren McNeil has just completed her dietetic internship at Lenoir-Rhyne University. Lauren is currently pursuing an MS in Nutrition at Meredith College, which she will complete this August. She earned her BS in Food Science and Human Nutrition from the University of Florida in 2015. She has a passion for functional medicine nutrition and cultivating a mind-body approach towards disease prevention. Contact Lauren at lauren.mcneil@my.lr.edu.

This filling meal is made almost entirely from vegetables and is high in fiber, sulforaphanes, antioxidants, allicin/diallyl disulfide, and catechins. These compounds act in a way that encourages the prevention of cellular damage, tumor growth, and formation of cancer-causing substances. The liquid aminos used in the recipe are a gluten-free alternative to soy sauce and contain protein.

Ingredients:
- 3 Tbsp coconut or olive oil
- 4 garlic gloves, minced
- 2 Tbsp fresh ginger, chopped
- 1 cup scallions, chopped (separated by light and dark green)
- Riced cauliflower, 16 oz (from Trader Joe's, Whole Foods, or Costco, or see below for making your own)*
- 2 fl oz (4 Tbsp) liquid aminos (Bragg's or coconut) (alternative to soy sauce)
- 1/4 tsp red pepper flakes
- Pinch of salt (omit if premade cauliflower rice has added salt)
- 1 cup peas
- 1 cup combination of chopped carrots, cabbage, green pepper, radish, celery, and onion (feel free to get creative)
- 3 eggs, beaten
- 2 tsp coconut vinegar (may substitute rice wine, apple cider or white vinegar)
- 1/4 cup roasted cashews**
- 1 Tbsp sesame seeds (optional)

Directions:
1. Heat oil in large skillet over medium-high heat. Add garlic, light scallions, and ginger; and cook, stirring often, for 3-4 minutes.
2. Add riced cauliflower, liquid aminos, red pepper flakes, and salt to skillet. Stir often for 3 minutes.
3. Add peas and mixed vegetables to skillet and lower heat to medium. Stir often.
4. While vegetables cook, scramble 3 eggs in separate pan. Once eggs are fully cooked, turn off heat and set aside.
5. Stir in vinegar, dark green scallions, eggs, cashews, and sesame seeds (if using) to skillet.
6. Serve and enjoy!

*To make your own cauliflower rice, take a full head of cauliflower, washed and trimmed of excess leaves and stems, and chop into smaller pieces. Place cauliflower pieces in blender or food processor, and pulse until broken down into rice-size pieces.

**To roast your own cashews, heat oven to 350°F. Cook cashews for 10-12 minutes.

Prep Time: 10 minutes
Cook Time: 15 minutes
Total Time: 25 minutes
Serves: 4
Yoga’s Role in Cancer, Chronic Disease Management, and Health Promotion

Tali (Avital) Mazar Ben-Josef D.M.D, E-RYT

What is yoga?

Yoga, from the Sanskrit word meaning “union,” is a mind-body practice with ancient Indian origins which combines physical postures (asanas), breathing techniques (pranayama), and meditation (dhyana). Asana practice often focuses on alignment with the intent to restore a healthy state of balance in the body and the mind. Yoga helps the physical body to develop a balance of strength and flexibility and the mind to find balance between effort and surrender. Hatha yoga is a general term referring to the physical practice of asana and includes numerous styles or forms of yoga such as Anusara, Ashtanga, Bikram, Iyengar, Kundalini, Power, Restorative, Vinyasa, and Yin among others. Different styles may be best suited for different personalities and health conditions—but all styles of yoga, when taught by a qualified instructor, provide inherent physical and psychobehavioral benefits.

Physical benefits of yoga:1
• Increases flexibility
• Increases muscle strength and tone
• Improves respiration
• Increases energy and vitality
• Reduces pain and fatigue
• Helps to maintain a balanced metabolism and helps with weight control
• Helps cardiovascular and circulatory health
• Helps to protect against injuries by increasing overall balance

Mental benefits of yoga:2,3
• Reduces stress
• Reduces anxiety and depression
• Improves sleep
• Helps with pain management
• Helps mood and general well-being
• Offers a coping mechanism for post-traumatic stress disorder (PTSD)
• Elicits a relaxation response

Yoga and pain

The use of yoga to control pain and manage symptoms has grown significantly in the past decade with 21 million U.S. adults (9.5% of general adult population) practicing yoga.4 Yoga interventions have shown a positive impact on:
• Cancer-related fatigue, both during and post-treatment;
• Chronic low-back pain;7,8
• Arthritis;9 and
• Osteoporosis.10

Starting a yoga practice

Yoga’s versatility enables you to incorporate a practice easily. Choosing a yoga style tailored to your individual needs is recommended. For example, chair yoga or slow flow yoga (poses are held longer) is well suited if you are elderly or have limited mobility, restorative yoga combines slow flow yoga and meditation, and prenatal yoga is ideal for pregnant women.

Like any other physical activity, yoga should be approached with common sense and recognition of one’s strengths and weaknesses; practice should be done carefully and mindfully. Physician clearance is also recommended prior to beginning any new activity. You can search for a yoga teacher or yoga therapist near you by using the search functions available at www.yogaalliance.org or www.iayt.org.

### Executive Committee

<table>
<thead>
<tr>
<th>Committee</th>
<th>Member Name</th>
<th>Email Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chair</td>
<td>Mary Purdy, MS, RDN</td>
<td><a href="mailto:MaryPurdyRD@gmail.com">MaryPurdyRD@gmail.com</a></td>
</tr>
<tr>
<td>Chair-Elect</td>
<td>Danielle Omar, MS, RDN</td>
<td><a href="mailto:2eatwell@gmail.com">2eatwell@gmail.com</a></td>
</tr>
<tr>
<td>Secretary</td>
<td>Denine Rogers, MS, RDN, LD, FAND</td>
<td><a href="mailto:denine@livinghealthy1.org">denine@livinghealthy1.org</a></td>
</tr>
<tr>
<td>Treasurer</td>
<td>Dana Elia, MS, RDN, LDN</td>
<td><a href="mailto:DIFMTreasurer@gmail.com">DIFMTreasurer@gmail.com</a></td>
</tr>
<tr>
<td>Past Chair</td>
<td>Kelly Morrow, MS, RDN, CD</td>
<td><a href="mailto:kmorrow@bastyr.edu">kmorrow@bastyr.edu</a></td>
</tr>
<tr>
<td>DPG Delegate</td>
<td>Mary Beth Augustine, RDN, CDN, FAND</td>
<td><a href="mailto:delegatedifm@gmail.com">delegatedifm@gmail.com</a></td>
</tr>
<tr>
<td>Nominating Committee Chair</td>
<td>Stephanie Harris, PhD, MS, RDN, LD</td>
<td><a href="mailto:stephanie-harris@case.edu">stephanie-harris@case.edu</a></td>
</tr>
</tbody>
</table>

### Leadership Team

<table>
<thead>
<tr>
<th>Committee</th>
<th>Member Name</th>
<th>Email Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominating Committee Chair Elect</td>
<td>Susan Linke, MBA, MS, RD, LD</td>
<td><a href="mailto:susanlinke_rd@verizon.net">susanlinke_rd@verizon.net</a></td>
</tr>
<tr>
<td>Nominating Committee Member</td>
<td>Jessica G Redmond, MS, RD, CSCS</td>
<td><a href="mailto:jess.g.redmond@gmail.com">jess.g.redmond@gmail.com</a></td>
</tr>
<tr>
<td>Network Chair</td>
<td>Alicia Trocker, MS, RDN</td>
<td><a href="mailto:atmsrd@aol.com">atmsrd@aol.com</a></td>
</tr>
<tr>
<td>Network Associate</td>
<td>Mary Therese Hankinson, MBA MS RD</td>
<td><a href="mailto:mthank@aol.com">mthank@aol.com</a></td>
</tr>
<tr>
<td>Connecting Educators Chair</td>
<td>Aarti Batavia, MS, RDN, CLT, CFSP, IFMCP</td>
<td><a href="mailto:aartibatavia@aol.com">aartibatavia@aol.com</a></td>
</tr>
<tr>
<td>Newsletter Chair</td>
<td>Sarah Harding Laidlaw, MS, RDN, MPA, CDE</td>
<td><a href="mailto:peanknut70@gmail.com">peanknut70@gmail.com</a></td>
</tr>
<tr>
<td>Newsletter Copy Editor</td>
<td>Holly Van Poots, RDN, CSP, FAND</td>
<td><a href="mailto:hollypnpg@gmail.com">hollypnpg@gmail.com</a></td>
</tr>
<tr>
<td>Newsletter Associate Editor</td>
<td>Jena Savadsky Griffith, BA, BS, RDN</td>
<td><a href="mailto:jenas_mailbox@yahoo.com">jenas_mailbox@yahoo.com</a></td>
</tr>
<tr>
<td>Newsletter Botanicals Editor</td>
<td>Dina Ranade, RDN, LD</td>
<td><a href="mailto:dranade@comcast.net">dranade@comcast.net</a></td>
</tr>
<tr>
<td>Newsletter Editor News You Can Use</td>
<td>Racquel Praino, BASC, RDN</td>
<td><a href="mailto:prainorr01@mail.buffalostate.edu">prainorr01@mail.buffalostate.edu</a></td>
</tr>
<tr>
<td>Newsletter Mind Body Editor</td>
<td>Doris Piccinin, MS, CDE</td>
<td><a href="mailto:dpic100@gmail.com">dpic100@gmail.com</a></td>
</tr>
<tr>
<td>Newsletter CPE Editor</td>
<td>Shari B Pollack, MPH, RDN</td>
<td><a href="mailto:sbethp@gmail.com">sbethp@gmail.com</a></td>
</tr>
<tr>
<td>Associate CPE Editor</td>
<td>Ruth Goldstein, RDN</td>
<td><a href="mailto:rgoldstein1234@gmail.com">rgoldstein1234@gmail.com</a></td>
</tr>
<tr>
<td>Co-Editor Biochemistry/Nutritional Genomics</td>
<td>Janie Jacoby</td>
<td><a href="mailto:Janie.Jacoby@colostate.edu">Janie.Jacoby@colostate.edu</a></td>
</tr>
<tr>
<td>Co-Editor Biochemistry/Nutritional Genomics</td>
<td>Olivia Dong, MPH, RD, LD</td>
<td><a href="mailto:odong@email.unc.edu">odong@email.unc.edu</a></td>
</tr>
<tr>
<td>Sponsorship Chair</td>
<td>Bridgitte Carroll, MS, RDN, LD</td>
<td><a href="mailto:bridgitte.difm@gmail.com">bridgitte.difm@gmail.com</a></td>
</tr>
<tr>
<td>Sponsorship Associate</td>
<td>Lauren Arnett, BS, RD</td>
<td><a href="mailto:arnettLL18@gmail.com">arnettLL18@gmail.com</a></td>
</tr>
<tr>
<td>Historian</td>
<td>Kathy Moore Gregory, RDN, LD, CCN</td>
<td><a href="mailto:moorenutritiondifm@gmail.com">moorenutritiondifm@gmail.com</a></td>
</tr>
<tr>
<td>Diversity Chair</td>
<td>Miho Hatanaka, RD</td>
<td><a href="mailto:mihoho0k@gmail.com">mihoho0k@gmail.com</a></td>
</tr>
<tr>
<td>Diversity Committee Member</td>
<td>Rita Kashi Batheja, MS, RDN, CDN, FAND, AFMCP</td>
<td><a href="mailto:krbatheja@gmail.com">krbatheja@gmail.com</a></td>
</tr>
<tr>
<td>FNCE Planning CoChair</td>
<td>Mary Alice Gettings, MS, RDN, LDN, CDE</td>
<td><a href="mailto:difmva@gmail.com">difmva@gmail.com</a></td>
</tr>
<tr>
<td>FNCE Planning CoChair</td>
<td>Ann Sukany-Suls, M.Ed, RDN, LD</td>
<td><a href="mailto:ann.suls@gmail.com">ann.suls@gmail.com</a></td>
</tr>
<tr>
<td>Member Services Chair</td>
<td>Monique Richard, MS, RDN, LD</td>
<td><a href="mailto:mmr2v@mtmail.mtsu.edu">mmr2v@mtmail.mtsu.edu</a></td>
</tr>
<tr>
<td>Mentoring and Coaching Chair</td>
<td>Lesli Bitel, MBA, BS, RDN, LD</td>
<td><a href="mailto:Leslibitelk@gmail.com">Leslibitelk@gmail.com</a></td>
</tr>
<tr>
<td>Professional Advancement Chair</td>
<td>Kory DeAngelo, MS, RDN</td>
<td><a href="mailto:kdeangelo@bastyr.edu">kdeangelo@bastyr.edu</a></td>
</tr>
<tr>
<td>Professional Advancement Associate</td>
<td>Therese Berry, MS, RDN, LD, CNSC</td>
<td><a href="mailto:therese.austin@coramhc.com">therese.austin@coramhc.com</a></td>
</tr>
<tr>
<td>Policy Advocacy Leader</td>
<td>Lisa Shkoda, BS, RDN, CNSC, FAND</td>
<td><a href="mailto:lisa.shkoda@gmail.com">lisa.shkoda@gmail.com</a></td>
</tr>
<tr>
<td>Policy Advocacy Committee</td>
<td>Christine Benson</td>
<td><a href="mailto:chrissiebenson@gmail.com">chrissiebenson@gmail.com</a></td>
</tr>
<tr>
<td>Marketing Chair</td>
<td>Michelle Loy, MPH, MS, RDN</td>
<td><a href="mailto:michelle@gowellnessco.com">michelle@gowellnessco.com</a></td>
</tr>
<tr>
<td>Marketing Committee</td>
<td>Malorie R Blake, MS, RDN, LDN, CLT</td>
<td><a href="mailto:mblake822@gmail.com">mblake822@gmail.com</a></td>
</tr>
<tr>
<td>Marketing Committee</td>
<td>Olivia Wagner, MS, RDN, LDN</td>
<td><a href="mailto:oliviawagner28@gmail.com">oliviawagner28@gmail.com</a></td>
</tr>
<tr>
<td>State Coordinator-CA</td>
<td>Danica Cowan, MS, RD</td>
<td><a href="mailto:dcowan57@gmail.com">dcowan57@gmail.com</a></td>
</tr>
<tr>
<td>State Coordinator-CA</td>
<td>Sangeeta Shrivastava, PhD, MS, RDN</td>
<td><a href="mailto:a.sangeeta.aa@gmail.com">a.sangeeta.aa@gmail.com</a></td>
</tr>
<tr>
<td>State Coordinator-NY</td>
<td>Jessica G Redmond, MS, RD, CSCS</td>
<td><a href="mailto:jess.g.redmond@gmail.com">jess.g.redmond@gmail.com</a></td>
</tr>
<tr>
<td>State Coordinator-FL</td>
<td>Marilyn Smith-Gordon, EDD, RDN, CSSD, LDN</td>
<td><a href="mailto:MSGtheRD@bellsouth.net">MSGtheRD@bellsouth.net</a></td>
</tr>
<tr>
<td>Student Member CoChair</td>
<td>Staci Belcher, RDN</td>
<td><a href="mailto:stacibelcher5@gmail.com">stacibelcher5@gmail.com</a></td>
</tr>
<tr>
<td>Student Member CoChair</td>
<td>Anita Davila, BS</td>
<td><a href="mailto:difmstudentchair@gmail.com">difmstudentchair@gmail.com</a></td>
</tr>
<tr>
<td>Volunteer Chair</td>
<td>Kelly Morrow, MS, RDN, CD</td>
<td><a href="mailto:kmorrow@bastyr.edu">kmorrow@bastyr.edu</a></td>
</tr>
<tr>
<td>Executive Assistant/Web Editor</td>
<td>Amy Jarck</td>
<td><a href="mailto:info@integrativeRD.org">info@integrativeRD.org</a></td>
</tr>
<tr>
<td>Academy DPG Manager</td>
<td>Katie Gustafson</td>
<td><a href="mailto:kgustafson@eatright.org">kgustafson@eatright.org</a></td>
</tr>
</tbody>
</table>
Thank You to our SPONSORS!

Thank You to the Following Contributors to the Symposium Swag Bags

Grainful
Simple Mills
Integrative Therapeutics
Biena