Green Tea and Women’s Health

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Objective
After reading this article, the nutrition professional will be able to:
1. Identify at least five health conditions for which green tea may be useful in preventing and/or treating.
2. Discuss the mechanisms by which green tea may be protective against some kinds of cancers.
3. Recommend the appropriate dosage of green tea for at least five health conditions.

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Green tea and cancers

It has become increasingly apparent that green tea has diverse uses in the prevention and treatment of conditions pertinent to women. These include breast cancer, ovarian cancer, cervical dysplasia, genital warts, polycystic ovarian syndrome, uterine fibroids, cognitive impairment, dry mouth and weight management.

Derived from the tea plant Camellia sinensis, green tea is very high in polyphenols, which have potent antioxidant and anti-tumor properties. The major polyphenols in green tea are flavonoids, including catechin, epicatechin, epicatechin gallate, epigallocatechin gallate, and proanthocyanidins. Epigallocatechin gallate (EGCG) is the most abundant and widely studied catechin and appears to be responsible for most of the physiological benefits associated with green tea. Although it is not yet clear, products with higher EGCG content may be more potent. EGCG is of particular interest because it is highly anti-inflammatory and inhibits the production of proinflammatory mediators, including chemokines, prostaglandins and tumor necrosis factor. It also inhibits adhesion molecule expression, mitogen-activated protein kinases and migration of neutrophils. In addition, studies show that green tea is associated with reductions in C-reactive protein and serum amyloid-alpha. Other compounds in green tea include vitamin C and very small amounts of caffeine, theanine, lignins, organic acids, protein and chlorophyll.

Overall Mortality

A study published in the Journal of the American Medical Association (JAMA) investigated the associations between green tea consumption and all-cause and cause-specific mortality. The Ohsaki study, as it is referred to, is a population-based, prospective cohort study that included Japanese adults aged 40-79 without a history of stroke, coronary heart disease or cancer at initiation of the study. Participants were followed for up to 11 years for all-cause mortality and for up to seven years for cause-specific mortality. Green tea consumption was inversely associated with mortality due to all causes and due to cardiovascular disease. This inverse association was stronger in women, among whom there was an even greater inverse association with cardiovascular mortality. There was no beneficial effect of green tea consumption on cancer mortality.
colorectal and breast cancer cells.  

Breast Cancer

There have been three meta-analyses published on the association of green tea and breast cancer risk reduction and recurrence. A 2006 meta-analysis of four epidemiological studies of green tea indicated a reduced risk of breast cancer for women with the highest intake of green tea compared to those with the lowest or no intake. Among case-control studies in a 2010 meta-analysis, there was a statistically significant 19% reduction in breast cancer incidence among women with high green tea intake; however, no association was found in cohort studies. In the same analysis, studies of breast cancer recurrence demonstrated a significant 27% reduction in women consuming greater than three cups of green tea per day compared to non-drinkers. While a 2005 analysis found a non-significant trend toward reduced risk of breast cancer recurrence in all stages, higher green tea consumption was associated with a 44% reduced risk of recurrence of stage I and II breast cancer. When prevention studies were analyzed individually, rather than in meta-analyses, the effect for primary prevention was not significant.

In a population-based cohort study of close to 75,000 women, Dai and colleagues found a time-dependent interaction between green tea consumption and breast cancer onset. The hazard ratio of developing premenopausal breast cancer was 0.69 for women who had been drinking green tea since age 25 or younger compared to non-tea drinkers, while the hazard ratio for postmenopausal breast cancer was 1.61. There have been numerous in vitro and animal studies showing the effects of green tea on reducing as well as preventing breast tumors and inhibiting various enzymes and cell signaling systems. EGCG has demonstrated the ability to inhibit the growth of human breast and prostate tumors transplanted into athymic mice. Green tea extracts given to female rats significantly decreased 7,12-dimethylbenz(a)anthracene (DMBA—a potent laboratory carcinogen), DMBA-induced mammary tumor burden and invasive tumors, and significantly delayed the onset of a first tumor. In another study, feeding Sprague-Dawley rats a diet including 1% green tea catechins was effective in reducing breast tumor promotion, but not the progression of breast cancer. Several in vitro studies have found green tea reduced the rate of proliferation of breast cancer cells.

In addition, green tea extract and EGCG affected angiogenic factor vascular endothelial growth factor (VEGF) expression. The extract or the EGCG significantly decreased the levels of the VEGF peptide secreted into the medium of human breast cancer cells. The green tea extract was also able to suppress the expression of protein kinase C, a VEGF transcription modulator, and decrease the RNA levels of VEGF. Inhibition of VEGF transcription appears to account for the anti-angiogenic effects of green tea. The implication that green tea could inhibit blood supply to breast cancer tumors or breast cancer cell target sites by inhibiting VEGF may have potential use for breast cancer treatment and prevention.

In one clinically relevant study, Nakachi et al. found that the more green tea premenopausal women with stage I and stage II breast cancer consumed, the fewer metastasized lymph nodes they developed. Additionally, postmenopausal women who consumed green tea experienced an increase in progesterone and estrogen positive tumor markers—a finding usually associated with less aggressive forms of breast cancer. No benefit was seen in patients with stage III breast cancer. In stage I and II patients, there was a 17% recurrence rate for those consuming five or more cups of green tea (with an average of eight cups) per day. For those who consumed four or fewer cups per day (with an average of two), there was a 24% recurrence rate. Disease-free survival was also significantly improved in stage I and stage II breast cancer patients who had a greater consumption of green tea compared to those who consumed less green tea.

Ovarian Cancer

Research has raised the possibility that green and black tea may reduce the risk of ovarian cancer. Investigators evaluated the association between tea consumption (mainly black tea) and the risk of ovarian cancer in women aged 40-76. In 61,057 women followed an average of 15 years, tea consumption was inversely associated with ovarian cancer risk. Compared with women who rarely or never consumed tea, those who drank two or more cups daily had a hazard ratio of 0.54 for ovarian cancer. Risk reduction was independent of age of menarche, age at first birth, age at menopause, family history of breast cancer and use of hormone replacement therapy.

A systematic review of the in vitro, in vivo and epidemiological studies of the effects of green tea or green tea constituents on prevention and progression of ovarian cancer was published in 2012. In cell lines from epithelial ovarian cancer, green tea and its constituents were shown to down-regulate the expression of proteins related to inflammation, cell signaling, cell motility and angiogenesis. Green tea and its constituents can induce apoptosis as well as potentiate cisplatin, a chemotherapeutic agent frequently used in ovarian cancer. Two meta-analyses estimated the effect of green tea intake on epithelial ovarian cancer incidence. The more recent of these, a 2011 meta-analysis concluded that green tea intake was associated with a decreased occurrence of epithelial ovarian cancer. While the earlier 2010 study also found an inverse relationship between green tea consumption and ovarian cancer risk, the results did not reach statistical significance.

Although no clinical trial of the effects of green tea on the progression of epithelial ovarian cancer in humans appears to exist, one prospective cohort study did show that post-diagnosis green tea intake of one cup per day was associated with a lower risk of mortality in 244 women.

The cumulative results of these in vitro, in vivo and epidemiological studies demonstrate promising results for decreased ovarian cancer occurrence in particular, and possibly an increase in disease-free survival.

Cervical Dysplasia and HPV

Green tea has been shown to influence numerous mechanisms which are favorable towards preventing and/or treating human papilloma virus (HPV)-related lesions. EGCG has been shown to inhibit the epidermal growth factor receptor (EGFR) signaling pathway. EGFR activation is required for cervical cell proliferation, which suggests agents...
that inhibit EGFR may be of important therapeutic value in the prevention and treatment of cervical dysplasia and genital warts. Two other in vitro studies demonstrated EGCG inhibits the growth of human cervical cancer cell lines, induces apoptosis, inhibits telomerase activity in cervical cell lines and has a role in the regulation of gene expression.37,38

Perhaps the most encouraging of the studies was an investigation of the clinical efficacy of green tea extracts delivered vaginally and/or orally in patients with HPV-infected cervical lesions. Fifty-one patients with cervical lesions ranging from chronic cervicitis to mild dysplasia, moderate dysplasia and severe dysplasia were divided into four groups.39 Twenty-seven patients were instructed to insert a green tea polyphenol product (Polyphenon E ointment) vaginally twice a week. Twenty of the 27 patients using the vaginal green tea product showed an improvement in their degree of abnormality. Six patients took a 200 mg EGCG capsule orally every day for eight to 12 weeks; three out of the six showed an improvement. A third group consisted of eight patients using the vaginal product and the oral capsule. Six of the eight showed improvement. The last group consisted of ten patients using a higher dose EGCG capsule (amount not stated). Six out of the ten patients with this higher dose EGCG oral capsule showed improvement. Overall, a 69% response rate was noted for the subjects using green tea products compared with a 10% response rate in untreated controls. The mechanisms of action involved appear to be apoptosis, cell cycle arrest, modification of gene expression and anti-tumor effects, specifically inhibition of cell proliferation. These results demonstrated that green tea extracts in the form of a vaginal ointment and an oral capsule were effective for treating the form of a vaginal ointment and an oral capsule.

Green tea products compared with a 10% ointment group.40 Progression, which was defined as persistent oncogenic HPV and cytologic evidence of progression, was higher in the Polyphenon E group. This was the largest randomized placebo-controlled trial of a green tea extract for HPV-related cervical disease to date, and after four months, the Polyphenon E did not promote HPV clearance or regression of low grade lesions.

Green Tea and Genital Warts

In order to evaluate the efficacy of a topical green tea extract, researchers conducted a randomized, double-blind, placebo-controlled trial involving 502 men and women aged 18 and older.41 Participants with two to 30 clinically diagnosed external genital and/or perianal warts were randomly assigned to receive sinecatechins ointment 15%, sinecatechins ointment 10%, or placebo. The duration of treatment was a maximum of 16 weeks or until there was complete clearance of all baseline and new warts, whichever occurred first, followed by a 12-week treatment-free phase, at which time wart recurrence was assessed. Complete clearance of all baseline and newly occurring warts occurred in 57% and 56% of patients treated with the 15% and 10% sinecatechins ointment, respectively, compared with 34% for the placebo group.42 Partial responses of at least 50% occurred in 78% of the 15% ointment group, 74% of the 10% ointment group, and 52% of the placebo group.41

This study is one of two independent phase III studies to establish efficacy and safety of sinecatechins ointment. Overall, patients in both the 15% and 10% ointment group had a significantly higher number of complete clearances of baseline warts and a lower number of recurrent lesions during the 12-week treatment-free follow-up period.43 The results were better in women than in men, likely due to the greater keratinization of the skin on the penile shaft. Based on clearance rates of all warts, a 50% success was achieved in almost 80% of patients in both sinecatechins ointment groups. Recurrence rates are higher with conventional treatments such as cryotherapy, imiquimod, and podofilox. The results of this study indicate that a green tea extract ointment standardized to 15% or 10% sinecatechins is a very effective topical treatment to clear warts, inhibit new external anogenital warts and keep patients wart free.41

Weight Loss

Green tea may also play a role in weight management. An increase in fat and calorie metabolism may be caused by the caffeine, catechin, and theanine constituents. They appear to stimulate thermogenesis as a means of increasing fat burning and inhibiting fat absorption. In addition, individuals who take green tea extract have been observed to expend more energy and burn more calories than those who do not.44 In a study demonstrating the thermogenic properties and fat oxidation of green tea conducted in Geneva Switzerland in 1999, the higher dose used contained 50 mg of caffeine and 90 mg of EGCG in two capsules.45 According to this study, dosing is two capsules with breakfast and two capsules with lunch.

Polycystic Ovarian Syndrome

Green tea’s ability to increase the production of sex-hormone-binding globulin (SHBG) and its thermogenic effect also provides a rationale for its use in women with polycystic ovarian syndrome (PCOS).46 By increasing SHBG, some free testosterone can be bound up, thereby reducing some of the testosterone-related problems seen in women with PCOS such as hair thinning, acne and facial hair. Obesity is another consideration in approximately 50% of women with PCOS. Green tea may be helpful in not only increasing SHBG, but also in the thermogenic effects and weight loss potential.

Cognitive Impairment

Dementia, especially Alzheimer’s disease, is more common in women than in men. Considerable in vitro and animal evidence shows green tea may
provide neuroprotection, help to reduce amyloid precursor protein and scavenge free radicals. These effects may offer enhancement of cognitive function, but no human data has existed until very recently. Higher consumption of green tea, in men and women, was associated with a lower prevalence of cognitive impairment in a 2006 cross-sectional study conducted in Japan. This study showed an inverse dose-response relationship between consumption of green tea and the prevalence of cognitive impairment.

**Uterine Fibroids**

Uterine fibroids are one of the most challenging problems in women’s health in terms of options to shrink or resolve them. A double-blind, placebo-controlled randomized clinical trial evaluated the efficacy and safety of decaffeinated green tea extract on uterine fibroid burden and quality of life in reproductive aged women with symptomatic uterine fibroids. A total of 39 women ages 18-50 years with symptomatic uterine fibroids were recruited. Eligible women included those with a follicle-stimulating hormone (FSH) less than 10 mIU/L, at least moderately severe uterine fibroid related symptoms with a score of >25 on the Uterine Fibroid Symptom and Health-Related Quality of Life Questionnaire subscale (UFS-QOL). All the women had at least one fibroid measuring 2 cm or larger based on transvaginal and/or transabdominal ultrasound and a total uterine volume of >160 mL by vaginal and abdominal ultrasound. Twenty-two were randomized to receive green tea extract and 17 to receive placebo. Study subjects were randomized to receive two capsules daily of either oral green tea extract (45% EGCG) or placebo for four months. Each green tea capsule contained 50% polyphenols and 45% EGCG. Uterine fibroid volumes were measured at the beginning and end of the study. The fibroid specific symptom severity and quality of life questionnaires were scored at each monthly visit. The mean change in both the volume and number of uterine fibroids was assessed by transvaginal ultrasound (TVU) and/or transabdominal ultrasound at baseline and at the end of the four-month treatment period.

The secondary measure at each visit was the mean change in symptom severity and health-related quality of life (HRQL). Blood loss was also assessed monthly with a menstrual log and visual assessment of quantity.

Fibroid volume increased by 24% in women in the placebo group, while the women in the green tea extract group experienced a 33% reduction. The green tea extract group also had a significant reduction in fibroid specific symptom severity of 32% and a significant improvement in HRQL of 19%, compared to an increase in symptom severity and a slight non-significant increase in HRQL in the placebo group. Anemia improved significantly by 0.7 g/dL in the green tea group, and the average blood loss significantly decreased from 71 mL/month to 45 mL/month. There were no adverse effects or endometrial hyperplasia or pathology in either group.

**Green Tea and Bone Health**

In a 2012 trial of green tea polyphenols and Tai Chi, postmenopausal women with osteopenia (low bone density) but not osteoporosis were given green tea supplements and/or participated in Tai Chi classes for six months. A total of 171 women were divided into four groups. Women in the placebo group and the placebo plus Tai Chi groups received a total of 500 mg of a placebo per day. Women in the green tea and green tea with Tai Chi groups received 500 mg per day of green tea polyphenols. Subjects in the two Tai Chi groups attended three, one-hour Tai Chi exercise classes each week for six months. Women in the non-Tai Chi groups continued their customary activity levels throughout the six-month study period. Bone density, bone formation markers, bone loss markers, serum and urinary calcium, creatinine, parathyroid hormone and muscle strength were assessed at baseline, one, three, and six months.

In this study, green tea supplementation and Tai Chi exercise increased bone formation biomarkers and improved bone turnover rate. Tai Chi exercise increased parathyroid hormone. Green tea supplementation, Tai Chi exercise and the combination of the two together all had an effect on improving muscle strength in these postmenopausal women with low bone density.

**Green Tea Catechins for Xerostomia (Dry Mouth)**

The perception of dry mouth, known as xerostomia, affects up to 40% of adults in the U.S. and can have a significant effect on quality of life. Causes can include medications, diabetes, Sjogren syndrome and hormonal changes such as menopause. In a double-blind, placebo-controlled, randomized trial comparing green tea to xylitol, 58 women and two men with the complaint of dry mouth and Sjogren syndrome-mediated salivary gland hypofunction were given either green tea formulation or placebo. The green tea proprietary formula contained green tea catechins and other ingredients including xylitol, sorbitol, natural flavors, green tea (leaf), acacia gum, and jaborandi extract (leaf). The placebo contained 500 mg xylitol and other non-plant ingredients. Participants took one lozenge every four hours for a maximum of six lozenges per day over an eight-week period. Quality of life assessments and saliva collection with volume determined were used to evaluate response.

After eight weeks of therapy, the xylitol-containing placebo failed to affect saliva output while the green tea catechin-containing formulation resulted in a statistically significant increase in saliva output with a 3.8-fold increase in unstimulated saliva output and a 2.1-fold increase in stimulated saliva output, compared with baseline. This occurred within one week. Both groups experienced a quality of life score demonstrating significant improvement with no significant difference between groups.

**Side Effects and Dosing**

Some individuals are negatively affected by the small amount of caffeine in green tea and its stimulating effect, which can lead to nervousness, insomnia, dizziness, agitation, restlessness, confusion and anxiety. These effects are more common when using higher doses of green tea. Some individuals may also have an increase in blood pressure or heart rate, especially if green tea is consumed in higher amounts and in those who already have even mild hypertension. Allergic reactions can occur and tend to include
Table 1. Green tea dosage recommendations.

<table>
<thead>
<tr>
<th>Health Concern</th>
<th>Dosage &amp; Form</th>
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</thead>
<tbody>
<tr>
<td>Breast Cancer - Stage 1 or 2</td>
<td>2-3 capsules green tea extract per day (95% polyphenols, 80% catechins and 55% EGCG) or 5-8 cups green tea per day</td>
</tr>
<tr>
<td>Ovarian Cancer - Prevention</td>
<td>1 cup green tea per day</td>
</tr>
<tr>
<td>Ovarian Cancer - Treatment Adjunct</td>
<td>2 cups green tea per day</td>
</tr>
<tr>
<td>Cervical Atypia/Dysplasia</td>
<td>Green tea suppositories twice weekly and 1 capsule green tea per day</td>
</tr>
<tr>
<td>Weight Loss</td>
<td>2 capsules green tea extract twice a day with breakfast and lunch (2 capsules = 50 mg caffeine and 90 mg of EGCG)</td>
</tr>
<tr>
<td>Polycystic Ovary Syndrome (PCOS)</td>
<td>250-500 mg of green tea extract per day (95% polyphenols, 80% catechins, 45% EGCG)</td>
</tr>
<tr>
<td>Uterine Fibroids</td>
<td>2 capsules green tea extract per day (95% polyphenols, 45% EGCG)</td>
</tr>
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</table>
cough, dyspnea, loss of consciousness and asthma. Rare anaphylaxis reactions can occur to the caffeine in green tea. Caffeinated green tea consumption can also increase urinary excretion of calcium.

Another consideration is withdrawal from the green tea. Although uncommon, withdrawal symptoms have been known to occur, including anxiety, restlessness, muscle tension, nausea and vomiting. Combining ephedra with caffeine can increase the risk of adverse events including hypertension, seizures, and temporary loss of consciousness.

Green tea should be used with caution during pregnancy and while nursing. Caffeine crosses the placenta and has been associated with spontaneous abortion and intrauterine growth retardation and/or low birth weight.46 Greater than 400 mg/day of caffeine during pregnancy can increase the risk of sudden infant death syndrome; doses above 1100 mg per day have been associated with birth defects.48 Infants whose nursing mothers consume caffeine could suffer from sleep disorders.49

The Natural Medicines Comprehensive Database lists the following commonly prescribed drugs as having potential adverse interactions with green tea: adenosine, alcohol, amphetamines, cimetidine, clozapine, cocaine, oral contraceptives, disulfiram, ephedrine, estrogens, fluconazole, lithium, monamine oxidase inhibitors, nicotine, quinolone antibiotics, theophylline, verapamil and clopidogrel, ticlopidine, heparin and warfarin.49

When dosing green tea, one capsule containing 300 mg of green tea extract with 95% polyphenols, 80% catechins and 55% EGCG is approximately equal to three cups of green tea. The average amount of green tea consumed traditionally by Japanese adults is about three cups per day, providing about 240 to 320 mg of polyphenols. Green tea suppositories are also now available for use in HPV and cervical dysplasia management and best made by a compounding pharmacy by prescription.

Summary of Clinical Concepts

Besides water, tea, made from the dried leaves of Camellia sinensis, is the most widely consumed beverage throughout the world. There are four basic ways of processing tea. Green tea is produced by lightly steaming the freshly cut leaf to prevent oxidation of the polyphenols within the leaves. On the other hand, oxidation is promoted during black tea production so that most of the polyphenols are oxidized. Oolong tea is partially oxidized, and white tea is made from the new bud growths and young leaves, which have been steamed to inactivate the polyphenol oxidation, and then dried. Green tea accounts for only about 20% of the tea consumed worldwide.

Green tea has a long history of usage, dating back to China approximately 5,000 years ago. While it is mostly consumed in China and Japan, a few countries in North Africa and the Middle East consume significant amounts of green tea as well.

One cup of green tea contains approximately 50 mg of caffeine and 80 to 100 mg of polyphenols, depending on the strength of the infusion and the size of the cup. For general cancer prevention, studies have used from one to ten cups per day. For heart disease prevention, 375 mL per day has been used. In capsule form, green tea extract varies and may range from 100 to 750 mg per capsule and may be standardized to contain from 60% to 97% polyphenols.

Based on the studies cited above, recommendations for green tea supplementation for various women’s health concerns can be found in Table 1. In recent years, green tea products containing different amounts of polyphenols, catechins and EGCG have been developed, including dried extract capsules, topical ointments, and intravaginal creams/suppositories. There is a wide degree of variability between products. Whether taken as capsules or as tea (i.e. the beverage), or used in other forms, the amount of total polyphenols and EGCG in particular, are the likely determinants of green tea’s full scope of medicinal benefits. Keep in mind that the goal is a higher polyphenol and EGCG content.

Please note, this biography was inadvertently omitted from the print version of the newsletter. Our apologies for any inconvenience this may have created.

Dr. Tori Hudson, Naturopathic Physician, graduated from the National College of Naturopathic Medicine (NCNM) and has served the college in several capacities, including: Medical Director, Associate Academic Dean, and Academic Dean. She is currently a clinical professor at The National College of Naturopathic Medicine (NCNM), Southwest College of Naturopathic Medicine and Bastyr University. Dr. Hudson has been in practice for more than 30 years, is the medical director of her clinic, A Woman’s Time in Portland, Oregon, and director of product research and education for VITANICA. She is also the founder and co-director of NERC (Naturopathic Education and Research Consortium), a non-profit organization for accredited naturopathic residencies. Dr. Hudson may be contacted at drtori@ix.netcom.com or www.instituteofwomenshealth.
Green Tea and Women’s Health References


27. Nakachi K, Suematsu K, Suga K, Takeo T, Imai K, Higashi Y. Influence of drinking green tea on...


Green Tea Poached Pears; A refreshing, lightly spiced dish, rich in antioxidants from the green tea, the berries and the citrus rind. Use a peeler or zester to remove the rind from the lemon and lime. This is best served warm as a dessert or a breakfast dish, with a little natural yogurt or nut cream.

SERVES 4
400ml/14 fl oz/scant 1 2/3 cups apple juice
2 green tea bags
2 star anise
2 cinnamon sticks
Rind of 1 lemon and 1 lime
4 firm pears, peeled, halved and core scooped out with a spoon
Handful fresh or frozen berries
Natural yogurt or nut cream to serve (optional)

Place the apple juice, tea bags, spices, lemon and lime rind into a big saucepan and bring to a boil. Stir well, then add the pear halves. Cover and simmer for 12-15 min. until the pears are just tender. Lift out the pears, then turn up the heat and add the berries. Boil for a few minutes until syrupy. Discard the tea bags. Serve the pears with the warm syrup poured over. Add a spoonful of yogurt or nut cream if desired.

Nutritional information per serving
(1/2 pear with syrup)

<table>
<thead>
<tr>
<th>Calories 100 kcal</th>
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<tr>
<td>Protein 0.6 g</td>
</tr>
<tr>
<td>Carbohydrates 25.4 g of which sugars 25.4 g</td>
</tr>
<tr>
<td>Total fat 0.3 g of which saturated 0 g</td>
</tr>
</tbody>
</table>

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 page 77.

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.

Instructions for Completing the CPE Activity for Credit

Shari Pollack, MPH, RDN, LDN
4500 Keeney Street, Skokie, IL 60076
sbethp@gmail.com

Questions:

1. Which polyphenolic compound is thought to be the most active component in green tea?
   A. Catechin
   B. Epicatechin
   C. Epicatechin gallate
   D. Epigallocatechin gallate

2. Caffeine and theanine may contribute to the observed positive effects of green tea in
   A. Reducing levels of vascular endothelial growth factor (VEGF) expression
   B. Stimulating thermogenesis
   C. Inhibiting epidermal growth factor receptor (EGFR) signaling pathway
   D. Inducing apoptosis

3. In the study evaluating the efficacy of green tea as a treatment for uterine fibroids, subjects receiving green tea extract experienced significant reductions in all of the following except
   A. Uterine fibroid volume
   B. Follicle-stimulating hormone
   C. Monthly blood loss
   D. Fibroid specific symptom severity

4. For stage I or II breast cancer, which of the following doses of green tea is recommended?
   A. 1 cup per day
   B. 2 capsules with breakfast and 2 capsules with lunch
   C. 5-8 cups per day
   D. 1 capsule daily and suppositories twice weekly

5. Common side effects of green tea include
   A. Nervousness, insomnia, and agitation
   B. Muscle tension
   C. Nausea and vomiting
   D. Low blood pressure

Continuing Professional Education Certificate of Attendance
-Attendee Copy-

Participant Name:  
RD/RDN/DTR Number:  
Session Title:  Green Tea and Women's Health  
CDR Activity Number:  119734  (Expires 4/15/2018)
Date Completed:  
CPEUs Awarded:  1.0
Learning Need Code:  
CPE Level:  2

Provider Signature

*dRefer to your Professional Development Portfolio Learning Needs Assessment Form (Step 2)*

PROVIDER #: AM003

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Session Title:  Green Tea and Women's Health  
CDR Activity Number:  119734  (Expires 4/15/2018)
Date Completed:  
CPEUs Awarded:  1.0
Learning Need Code:  
CPE Level:  2

Provider Signature

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Dr. Sheila Dean, DSc, RDN, CCN, CDE is the owner of Palm Harbor Center for Health & Healing, an integrative medicine based nutrition private practice and wellness center in Palm Harbor, Florida. An educator at heart, she has taught for 18 years as an adjunct nutrition science professor at a variety of universities including the University of Tampa, Maryland University of Integrative Health, Schiller International University, St. Petersburg College and more recently University of South Florida’s Morsani School of Medicine. Additionally, she serves as doctoral research advisor and content expert on integrative and functional medicine and nutrition at Saybrook University. Dr. Dean has received advanced training in functional medicine and nutritional biochemistry through the Institute for Functional Medicine. She has also worked with the Duke University Medical Center’s Endocrinology and Metabolism Disorders Clinic and the Joslin Center for Diabetes as a certified diabetes educator.

An experienced scientific and technical writer, Dr. Dean is a contributing author of the medical textbook Integrative Gastroenterology published by Oxford University Press and has authored the chapter on Medical Nutrition Therapy for Thyroid, Adrenal and Endocrine Disorders in the clinical nutrition textbook Krause’s Food & Nutrition Care Process, 13th and 14th ed.

She is also the author of Nutrition & Endurance: Where Do I Begin? published by Meyer & Meyer Sport.

She has conducted dozens of local and national public presentations, has written continuing education credit functional medicine modules for both nutritionists and nurses, has authored multiple articles and has appeared on television and radio for dozens of interviews.

Dean appeared regularly on WTSP-10 News for her segment entitled “Take 5 with Dr. Dean.”

Dr. Dean currently serves on the advisory board for the nationally acclaimed Center for Mind-Body Medicine’s Food As Medicine professional education course and was the Professional Advancement Director for the Dietitians in Integrative and Functional Medicine dietetic practice group of the Academy of Nutrition and Dietetics as well as the recipient of their 2010-2011 “Excellence in Practice” Award.

**EM: What experiences or beliefs have led you in the direction of integrative and functional nutrition?**

**SD:** I have always believed that Food is Medicine. I went into dietetics in 1993 thinking that this is what I was going to be taught. Much to my dismay, I felt unequipped to handle the cases that were coming my way. I almost left the field in 2000 to become a professional musician! Then about a year later I was invited to hear Jeff Bland, PhD speak. It was quite an experience! I knew right away I had found what I was looking for. From that moment on I was dedicated to learning as much as I could about integrative and functional medicine.

By 2002, I started a part-time functional medicine based private practice and by 2005 it grew into a full-time practice.

**EM: What training/education have you obtained?**

**SD:** I received undergraduate training through Rutgers University, completed my RD internship and graduate training with the University of Rhode Island and Brown University’s teaching hospitals, received doctoral training in nutritional genomics and pharmacology through the University of Medicine and Dentistry of New Jersey (UMDNJ) and completed my Doctorate of Science in Nutritional Science through Hawthorn University.

**EM: How would you like to see the area of integrative and functional nutrition advance?**

**SD:** Most of all, I would like to see more collaboration on the part of various health care professionals for a more inter-disciplinary approach to patient care. I don’t think any one type of clinician can “do it all,” including physicians. It is important for nurses, doctors, and RDNs to work together to improve patient care.

Another positive advance would be the opportunity for RDNs to be able to order labs, whether as the ordering professional or collaboratively with other clinicians. I would also love to see more RDNs receive higher level functional nutrition training.

**EM: What will be in the detoxification module?**

**SD:** This module provides a science-based whole systems approach to hepatic detoxification, biotransformation and elimination of endogenous and exogenous toxins with diet and nutrition interventions, utilizing cofactor micronutrients, phytonutrients, amino acids and antioxidants to support Phase 1 and Phase 2 hepatic detoxification.

**EM: What is the take home message for the detoxification module?**

**SD:** The take home message is that detoxification is an integral component of functional nutrition care. We cannot ignore this. Understanding how to support the patient’s detoxification systems will enhance quality of life dramatically. They will feel better, and that is the major goal.

**EM: What makes detoxification a foundational piece of integrative and functional nutrition?**

**SD:** Everyone detoxifies 24/7. You simply can’t be healthy if you are not detoxifying well. It’s important to understand the different phases of detoxification, what improves it, how food and specific nutrients play a role, and how your patients’ genetics impact their ability to detoxify. Many things can compromise the processes of detoxification. The module addresses how we can keep that process running smoothly or improve it and how genetics are involved. As detoxification is foundational to...
integrative and functional nutrition, it is also important to note that labs are foundational to detoxification. Labs can help us to determine if a patient is genetically a poor detoxifier or good detoxifier and allow us to treat accordingly.

EM: What do you think is poorly understood or not yet understood about detoxification?

SD: At the top of the list, I think that there is a major disconnect regarding the concept that food choices dramatically impact detoxification and inflammation. Many are not even really aware of what sorts of ‘toxins’ are both in food and the environment, other than obvious sources such as cigarette smoke or lead. Additionally, I think that the word ‘detox’ is an elusive term that even dietitians are confused about. Many RDNs will discredit the value of a detoxification program without really understanding the science and research behind detoxification.

Simply put, detoxification is a program or eating plan that supports the body’s, especially the liver’s, ability to detoxify some type of xenobiotic—anything that is foreign to the biologic system—into some type of benign substance that your body can readily excrete through bile, stool, or urine. Even eating a diet with more fruits and vegetables is detoxification because fruits and vegetables help the body to naturally remove toxins.

EM: Can you provide a brief example of how your approach to detox was successful in improving the health of a patient?

SD: Definitely! Post-cancer patients who are trying to stay cancer free are good candidates for genetic panels such as detoxigenomic panels that help me understand how well, genetically, they detoxify. Based on this, I can customize a detoxification program to help them support their ability to detoxify and minimize risk for getting cancer again.

In another example, such as with the cancer patient, genetic panels that identify one’s ability to detoxify can be helpful in making choices about drug therapy. Knowing how someone detoxifies can be helpful in avoiding adverse drug reactions because they may have a good or bad response to drugs. This is a great example of how a detoxigenomic panel can guide us in offering customized medicine.

EM: What other resources would you recommend that our readers review in learning about detox?

SD: Dr. Deanna Minich hosted an excellent Detox Summit with a few dozen RDNs and MDs who are experts in the field. More information can be found at www.thedetoxsummit.com.

Other resources for integrative and functional medicine, but not specific to detoxification would be the educational resources offered by genetic testing laboratories and Dr. Jeff Bland’s functional medicine updates and monthly audio programs. I have learned tremendously from both resources by not only through listening to the audio programs, but also reviewing the literature to thoroughly understand the scientific evidence.

EM: Do you have favorite foods, processes, and/or tests that you use during a detoxification regimen?

SD: Much of this depends on factors such as how aggressive my patient wants to get regarding a detox protocol. Some patients may need an intensive detox but that doesn’t mean all patients are ready for this. This is where a readiness-to-change assessment is helpful. Listen to the patient! If the patient is ready and willing, more aggressive changes can be made. If the patient is less confident, smaller changes are a better start. Knowing how to simply start with basic food and supplement recommendations is a great way to start and patients often feel better with small modifications to their diet. Access to labs such as a detoxigenomic panel or any type of nutrigenetic test can be very revealing if patients don’t feel better within a month of dietary changes. Naturally, recommendations must be customized to the patient’s needs. That’s where training and experience comes in!

EM: What advice would you give to those who are now entering the field of integrative and functional nutrition?

SD: Start simple. Just ask yourself, “What needs to come out of this patient’s diet?” and “What needs to go into this patient’s diet?” Read, research and look up references! Go to as many conferences as possible and take the time to listen to your favorite talks again. Review over and over again. And finally, you must be ready to move out of your comfort zone!

EM: What resources and/or clinical pearls would you recommend to other integrative RDNs?

SD: For those already practicing:
1. If the budget allows, find a great assistant! Although more expensive, you will be more productive!
2. Try to find a few open minded physicians that will refer patients to you and help you with ordering necessary labs for your patients. Even just one is a great start!
3. Do as many talks for the public as possible! It’s a great way to get your name out there!
4. Participate in the DIFM electronic mailing list.
5. Find your local nutraceutical reps and have them educate you about their products. Don’t be afraid to ask for samples of products.
6. Invest in as much training as the budget allows!

This interview was conducted by Emily D. Moore, MS, RDN, LD/N, Copy Editor of the Integrative RDN and Asst. Professor at Daytona State College. Contact Emily at emilydavismoore@hotmail.com.

It was incorrectly noted in the print version that Sheila received her Doctorate of Science in Chiropractic, rather than Doctorate of Science degree. We apologize for this error and any confusion it may have caused.
A Big MNT Headache: Identifying Dietary Migraine Triggers and Integrative Treatments
Dr. Margaret Slavin, PhD, RDN, Asst. Professor, Nutrition and Food Studies, George Mason University
Jan Patenaude, RDN, CLT, Consultant Dietitian, Director of Medical Nutrition, Oxford Biomedical Technologies, Inc.

Dietitians are increasingly called upon to analyze dietary triggers of chronic ailments and recommend dietary modifications to ameliorate these conditions. Margaret Slavin, PhD, RDN, a migraine research scientist, and Jan Patenaude, RDN, CLT, a dietitian specializing in Non-IgE Food Sensitivity Treatment and Therapy (LEAP) shared current research findings along with therapeutic experience for reducing migraine triggers and symptoms.

Dr. Margaret Slavin, Assistant Professor, Nutrition and Food Studies, George Mason University began with a brief description of what does (and does not) constitute a migraine headache, along with signs, symptoms, and diagnostic criteria. According to Dr. Slavin, migraine currently affects 36 million Americans, primarily in their most productive years (25-55 years of age). Migraine affects both genders, though women are affected more than men (18% of US females and 6% of US males are “migraineurs”), and most occur without the classical “aura” (sensory disturbances that precede the headache). Dr. Slavin described migraine as the 8th most disabling condition worldwide, and the 5th most common complaint of patients entering a hospital emergency room (ER). Migraine is distinct from other types of headaches, such as tension or sinus, and is often misdiagnosed and under-diagnosed, possibly because the cause of migraine has not been fully elucidated. The original vascular hypothesis (vasodilatation of meninges of cranium) of migraine origin was developed largely because of the throbbing unilateral nature of the pain. Current research has discredited this explanation as insufficient and unnecessary (up to one-third of patients do not have throbbing pain), and migraine is now considered a neurovascular disorder. According to Dr. Slavin, the key pathway for the pain is the trigeminovascular input from the meningeal vessels. Inflammation at nerve endings causes edema, vascular dilation, and cytokine release, which may or may not cause a migraine, depending on whether a threshold is reached (what causes the threshold to be surpassed is a current area of research). Migraine triggers may be additive, as shown below:

Migraine is diagnosed by the following criteria, according to the Headache Classification Committee of the International Headache Society (HIS): 1. At least five attacks fulfilling criteria B-D 2. Headache attacks lasting 4-72 hours (untreated or unsuccessfully treated) 3. Headache has at least two of the following four characteristics: 1. Unilateral location 2. Pulsating quality 3. Moderate or severe pain intensity 4. Aggravation by or causing avoidance of routine physical activity (e.g. walking or climbing stairs) 4. During headache at least one of the following: 1. Nausea and/or vomiting 2. Photophobia and phonophobia E. Not better accounted for by another International Classification of Headache Disorders, 3rd edition (ICHD-3) diagnosis

Dr. Slavin asserted that patients complaining of headache should be referred to a headache specialist for diagnosis (American Headache Society www.achenet.org, National Headache Foundation www.headaches.org/physicians). Standard treatment includes preventive and acute pharmacotherapy. Preventive therapy includes antiepileptics, beta-blockers, and antidepressants. Dr. Slavin added that 70% of patients abandon the preventive protocols, often because of poor tolerability of side effects. Acute treatment, aimed at aborting the headache episode, usually includes triptans, ergots, and nonsteroidal anti-inflammatory drugs (NSAIDs). Complementary non-dietary treatment strategies such as Cognitive Behavioral Therapy, biofeedback, and physical (acupuncture, chiropractic, physical therapy) therapies have seen some success. The presentation emphasized that the RDN is typically not part of the treatment team for migraine. Dr. Slavin stated that the current Evidence Analysis Library (EAL) and Nutrition Care Manual (NCM) contain nothing about dietary treatment of migraine, though food is often considered an important trigger in the inflammation cascade. Migraine was added to the IDNT in 2011 (PD 1.1.6 headache/migraine), so while evidence for medical nutrition therapy (MNT) is limited for migraine, it is well established for migraine comorbidities (especially type 2 diabetes, hypertension, and obesity). Dr. Slavin emphasized that more evidence-based nutrition therapies are needed before doctors refer their patients for nutritional management of the condition, and to establish the efficacy of nutraceuticals.

Several dietary supplements with clinical evidence supporting their use for episodic management of migraine were reviewed:
- Butterbur (Petasites hybridus, 150mg/day)
- Feverfew
- Magnesium (300-600mg/day)
- Riboflavin (400mg/day)
- Coenzyme Q10 (300mg/day)
Jan Patenaude, RD, CLT, Consultant Dietitian, and Director of Medical Nutrition at Oxford Biomedical Technologies discussed the role of dietary triggers, leaky gut, and chronic inflammation as causes of migraine, along with lifestyle and dietary therapy in migraine treatment. Ms. Patenaude reemphasized the role of inflammatory cytokines in the neurovascular pain response and in migraine, highlighting food sensitivity and dietary inflammation:

Ms. Patenaude discussed the use of elimination diets, such as the:
• Rowe Elimination Diet
• Few Foods Diet (5-10 foods allowed, ex. rice, lamb, pears)
• Food-Specific Elimination Diets (gluten free, dairy free, egg free, etc.)
• LEAP diet

She suggested having a referring physician (MD/DO/ND) order a Mediator Release Test (MRT), to identify food sensitivities. Ms. Patenaude practices LEAP protocols, which require patients to remove reactive and then mildly reactive foods while keeping extensive food diaries (food eaten, time, amount/ingredients, meds, symptoms, weather, stress, hydration). She has seen results in as few as 3-14 days, with some migraineurs eventually exhibiting complete remission of symptoms. Elimination Diet therapy is also successful in reducing co-morbidities.

Through her experience, Ms. Patenaude has identified several common migraine triggers:
• MSG/glutamates, sulfites, and amines
• Tannins
• Sugar substitutes
• Dyes
• Low blood sugar, dehydration
• Stress, poor sleep hygiene, weather changes, allergies, and light changes.

Reviewed by Angela Wolfenberger who graduated in May 2015 from the Kansas State University Didactic Program in Dietetics with a B.S. in Dietetics. Angela currently holds a B.A. in Biology and Secondary Education. She is an Integrative Nutrition Health Coach (International Association of Health Coaches). Contact Angela at linawolf@ksu.edu.

Resources:

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

www.integrativeRD.org
The FNCE® Session “Dietary Nitrates and Nitrites: Prescribing Foods for Nitric Oxide Production” was a fascinating look at Nitric Oxide (NO), (not to be confused with “nitrous” oxide, which is what dentists use to make your root canal more fun). The presenters highlighted this rarely discussed compound that they termed “the most important molecule in the body.” NO plays key roles in numerous biological functions as they relate to immunity, cardiovascular health, the central and peripheral nervous systems, the GI and urogenital tracts, and protect the heart. A depletion of NO is a hallmark of cardiovascular issues. According to the presenters, atherogenesis begins with the accumulation of monocytes and neutrophils, which are normally decreased by NO; when there is endothelial dysfunction, NO is simply not produced. They also noted that as we age, our production and responsiveness to NO is reduced. In fact, many age-related diseases appear to be associated with an age-dependent loss of NO.

However, NO is not attained only through the body’s endogenous production. According to the presenters, 50% is dictated by foods and diets containing nitrates and nitrites, thus the title of the session and the endorsement of including more nitrate-containing foods in our diet. However the conversion to NO from nitrates is dependent upon proper metabolism and activation by oral bacteria. Nitrates are transformed to nitrites, which are then transformed to NO. Interestingly enough, it seems that because NO relies upon oral bacteria, the use of antibacterial mouth wash, achlorhydria (low or no stomach acid), and stress all negatively affect whether NO is produced. One interesting side note: colostrum (the breast milk expelled right after giving birth) is high in nitrites, and not nitrates, seemingly because, as the presenters surmised, the baby may not yet be equipped with the bacteria to reduce nitrites to nitrites.

The presenters talked about how dietary NO has implications for Type 1 & Type 2 diabetes. They cited mice studies that showed a decrease in metabolic syndrome and DM2 with dietary nitrates, which when transformed into NO appears to signal GLUT 4 translocation to enhance glucose uptake.

Foods high in nitrates include beet, celery, spinach, watercress, and chervil. Surprisingly enough, the presenters referred to studies that showed certain organic vegetables to actually contain fewer nitrates than non-organic. Mostly, nitrates were also higher or lower according to geographic locations. Many RDNs may have recently read in the news that “beet juice” enhances performance. It turns out that it does, in fact, increase the production of NO, which can induce mitochondrial genesis and enhance mitochondrial function, both of which lead to better performance.

Why then, you might wonder, are many people trying to avoid nitrites in processed meats when nitrates are purportedly on the road to becoming the protective NO? This was somewhat unclear. The speakers cited that nitrites do reduce the development of Botulism toxin and decrease the risk of rancidity in meat, but they are related to GI cancers. It appears that nitrites may react with acid to produce carcinogenic amines. This may go back to the bacteria needed to reduce the nitrites to NO, which may not be able to act as well on the processed form of nitrite.

Additionally, there is an arginine to NO pathway by way of NO synthase, an enzyme that requires numerous co-factors like folate and Vitamin C. However, it seems that just administering arginine does not automatically guarantee the production of NO.

Overall, this session was a terrific examination of a little known topic in the nutrition field, but one that is guaranteed to get more attention over the coming years. Still curious about this interesting subject? Luckily, our presenters provided a recent Webinar for DIFM on this very topic in November 2014, which you can access in the “archived Webinars” section of the website.

Reviewed by Mary Purdy, MS, RDN, a Registered Dietitian with a Master’s Degree in Clinical Nutrition from Bastyr University. She has a Private Practice at the Bastyr Center for Natural Health where she is also a clinical supervisor with their teaching clinic. She offers an online detox program and regular corporate wellness presentations. Contact Mary at Mary@NourishingBalance.com.
In this concise and informative session, Lisa Dorfman, MS, RD, CSSD, LMHC, FAND, addressed the question “what is integrative sports nutrition?” and provided current research to support how an athlete’s performance can benefit from both a “food-centric” and supplemental approach to nutrition.

Dorfman described an integrative sports dietitian as one who considers all factors for assessing, assisting, and guiding athletes in selecting foods, fluids, and supplements when warranted, to help them to reach their personal best in health, sport, and life. Dorfman also noted six core areas essential to consider as a dietitian practicing integrative sports nutrition; the athlete’s health and longevity, addressing peak physiological function, addressing individual body composition and energy balance, monitoring overall safety of the athlete’s habits and practices during training and performance, examining optimal growth, and addressing individual body composition and energy balance. Dorfman also noted six core areas essential to consider as a dietitian practicing integrative sports nutrition; the athlete’s health and longevity, addressing peak physiological function, addressing individual body composition and energy balance, monitoring overall safety of the athlete’s habits and practices during training and performance, examining optimal growth, and addressing individual habits and practices during training and performance.

On the topic of supplementation, Dorfman proposed barriers athletes may have to obtaining an adequate diet during times of training and events and the subsequent deficiencies that may result. When it comes to supplementation for performance, Dorfman makes it clear that dietary supplements and ergogenic aids are never substitutes for genetics, training, and optimal nutrition. She does however describe how to weigh the potential benefits and risks before initiating supplement use. She recommends using resources like the Australian Institute of Sport’s (AIS) ABCD classification system when evaluating supplement safety. The AIS categorizes supplements as, A (supported in specific institutions using evidenced-based protocols), B (deserving of further research), C (little meaningful proof), and D (banned).

Dorfman elaborated on three of the most popular supplements in sports performance today; creatine, whey, and omega-3 fatty acids (table 1).

### Table 1.

<table>
<thead>
<tr>
<th>Reasons for Use?</th>
<th>Creatine</th>
<th>Whey</th>
<th>Omega-3 Fatty Acids</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Performance Benefits</strong></td>
<td>Helps to rephosphorylate ATP during high intensity exercise.</td>
<td>Convenient way to consume carbohydrate and protein when everyday food is not available.</td>
<td>Exercise can release free radicals, penetrate cell membranes, and cause damage and an inflammatory response.</td>
</tr>
<tr>
<td><strong>Additional Health Benefits?</strong></td>
<td>May reduce carbohydrate oxidation during prolonged steady state exercise.</td>
<td>May reduce carbohydrate oxidation during prolonged steady state exercise.</td>
<td>Protects structural integrity, fights tissue degradation, resolves inflammation, increases blood and oxygen flow to muscles, decreases muscle soreness by 45%, reduces swelling, increases range of motion, improves fuel use and ability to burn fat, reduces reactive oxygen species (ROS), enhances insulin sensitivity.</td>
</tr>
<tr>
<td><strong>Protocols</strong></td>
<td>Loading: consume pre or post workout. 0.25 g/kg fat-free mass for 3-5 days.</td>
<td>Take with carbohydrate 15-20 g 1 hour before exercise or within 30 minutes after training. Carbohydrate:Protein ratio: 1:1 or 2:1 - low intensity, short duration.</td>
<td>1-2 g/day EPA &amp; DHA. Ratio of EPA-DHA. ≤3 g/day is safe.</td>
</tr>
<tr>
<td><strong>Supplement Facts</strong></td>
<td>Creatine stores remain high 4-6 weeks after supplementing.</td>
<td>Consumed before or after workouts.</td>
<td>Increased risk of bleeding and immunosuppression (Ryan et al 2009). High doses may increase LDL by 10%, may lower blood pressure in low pressure individuals (Kris Etherton et al. 2002).</td>
</tr>
</tbody>
</table>
Consumerlab.com, is a website funded solely by subscribers. Their mission is to identify the best quality health and nutrition products in the United States and Canada through independent testing. According to Cooperman, Good Manufacturing Practices (GMP) only ensure that products are consistent from one batch to another; they do not assess the integrity of the product itself. At Consumerlab.com, their expertise is to inspect supplements for accuracy. Their product reviews assess identity, quantity, purity and freshness, disintegration, safety, and label claims. Cooperman has found that 43% of herbal supplements and 21% of vitamins/minerals they have tested have failed their inspections. Just a few of the many products that the site has assessed include vitamin D, glucosamine, coconut water, magnesium, garcinia cambogia, omega-3 and -6 seed oils (e.g. flax), bilberry, red rice yeast, SAMe, and cocoa powders. The most common problems found in those assessed include more or less active ingredients than expected, low-quality ingredients, contamination (with heavy metals, pesticides, manufacturing, byproducts, spoilage, and/or microbes) and unapproved label claims.

Following Dorfman’s discussion on creatine, whey protein, and omega-3 fatty acids, Cooperman chose to share the findings of Consumerlab.com on these popular fitness supplements (table 2).

Reviewed by Olivia Wagner, MS, RDN. Olivia is a Registered Dietitian Nutritionist and ACSM Certified Personal Trainer. She completed her Masters of Science in Nutrition and Physical Performance at Saint Louis University. She is the Student Committee Chair 2014-2015. Contact Olivia at oliviawagner28@gmail.com

<table>
<thead>
<tr>
<th>Product</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creatine</td>
<td>13 products tested</td>
</tr>
<tr>
<td></td>
<td>- all liquid products failed testing, powders were found to be much more stable.</td>
</tr>
<tr>
<td></td>
<td>- prices of powder products that passed testing ranged from $0.09-$1.36 per 5 g of product</td>
</tr>
<tr>
<td>Protein Powders &amp; Drinks</td>
<td>16 products tested</td>
</tr>
<tr>
<td></td>
<td>- 5 failed testing</td>
</tr>
<tr>
<td></td>
<td>- 1 product contained only 31.9% of the listed protein</td>
</tr>
<tr>
<td></td>
<td>- 1 product was contaminated with lead (12.7 mcg/scoop)</td>
</tr>
<tr>
<td></td>
<td>- 2 had higher cholesterol than recorded</td>
</tr>
<tr>
<td></td>
<td>- 1 contained higher sugar than reported (12.2 vs 8 g)</td>
</tr>
<tr>
<td>Fish Oils</td>
<td>30 products tested (krill, algae, calamari, and green-lipped mussel oils)</td>
</tr>
<tr>
<td></td>
<td>- most products passed all testing for omega-3’s, mercury, PCB’s and rancidity</td>
</tr>
<tr>
<td></td>
<td>- some high quality fish oils cost only $0.01-$0.02 cents per 100 mg EPA/DHA</td>
</tr>
</tbody>
</table>
Gastroesophageal reflux disease (GERD) is a chronic condition with symptoms occurring more than twice a week for an extended period of time. According to the American College of Gastroenterology, over 60 million Americans experience heartburn at least once a month and 15 million suffer from it daily. GERD symptoms may affect activities of daily life such as enjoyment of food, ability to sleep and ability to concentrate at work and with family activities. According to a survey conducted by the National Heartburn Alliance in 2000, more than 80% of respondents reported that they had a decreased enjoyment of food. As nutrition professionals, conventional treatment usually focuses on modification of diet and lifestyle factors. This article will discuss some integrative treatment options that may be used in conjunction with conventional methods to help improve outcomes.

**Risk Factors**

Research indicates that smoking, excess alcohol consumption and obesity are risk factors for developing GERD. There are certain medications that may also play a role in the development of GERD, such as anticholinergics, antidepressants, and inhaled bronchodilators. Hiatal hernia is a genetic factor that has been linked with GERD.

Studies suggest that dietary factors may also be involved in the development of GERD. For example, chocolate, caffeine, alcohol, and peppermint cause a decrease in pressure of the lower esophageal sphincter (LES). Other foods have been shown to trigger GERD symptoms in many people, such as fried/fatty foods, carbonated beverages, vinegar, tomato sauce, and citrus fruits/ juice.

**Pathophysiology/Related Conditions**

The main cause of GERD is a malfunction of the LES. Under optimal conditions, the only time the LES should open is when food and beverages move down the esophagus into the stomach. When a malfunction occurs, the LES relaxes and opens up allowing stomach contents to leak up into the esophagus. An increase in intra-abdominal pressure may cause a malfunction of the LES. Several studies have shown that obesity can cause the increased pressure as well as overeating, bending over after eating, lying down after eating, and consuming spicy or fatty foods. A more recent theory on the cause of increased intra-abdominal pressure is low stomach acid, or hypochlorhydria. Adequate stomach acid is needed to break down dietary proteins and fats, activate digestive enzymes in the stomach and pancreas, and inhibit the growth of microorganisms. Therefore, low stomach acid contributes to bacterial overgrowth in the bowel and a decreased production of pancreatic enzymes. This may lead to a malabsorption of carbohydrates.

A related condition is irritable bowel syndrome, which is the most common functional gastrointestinal disorder that affects approximately 10-15% of Americans and is common with GERD. A large study published in 2010 found that 64% of study participants with IBS also had GERD. They also found a much higher prevalence of functional symptoms in the overlapping subjects. Food sensitivities may also be related to GERD. Hypochlorhydria causes undigested food to pass into the small intestine causing inflammation. Bacteria overgrowth can also contribute to inflammation.

Although there are many factors that can play a role in the development of food sensitivities, these are the main factors in common with GERD. The inflammation of the intestinal lining causes it to become porous and the undigested food particles can pass into the bloodstream resulting in an immune response from the body.

Gastritis is a general inflammation and irritation of the lining of the stomach, which may lead to the development of ulcers. There is conflicting evidence about the role that Helicobacter pylori play in gastritis, GERD, and ulcers. An H. pylori infection can occur even in those without ulcers.

**Conventional Treatment**

The main therapy used by physicians in the conventional treatment of GERD is pharmaceutical medications to suppress gastric acid production. In fact, medications are used for both the diagnosis and treatment of GERD. Proton Pump Inhibitors (PPIs) are most commonly prescribed, but are being used for a much longer duration than they were designed, which is 4-8 weeks. A recent study published in Microbiome showed that the extended use of PPIs reduced the overall diversity of the gut microbiome and also increased the risk of contracting Clostridium difficile. Other risks from long-term use include fractures, pneumonia, and malabsorption of calcium, magnesium, vitamin B12, and iron.

Dietary and lifestyle modifications can have a profound impact on improving GERD symptoms. Dietitians have traditionally performed a critical part in the education of patients on modifying diets to exclude trigger foods, how to modify lifestyle factors, and on specific diets targeted for GERD.

**Integrative Treatment**

Dietary supplements may offer patients additional options for integrative treatment of GERD symptoms and the improvement of overall digestion. This list includes some of the more popular supplements that have been found to be effective for GERD and related conditions.

**Digestive Enzymes**

Digestive enzymes can help facilitate the breakdown of dietary protein, carbohydrate, and fat when the body is unable to do so effectively on its own. Digestive enzymes are commonly found in combination products that include amylase, protease, lipase, lactase, phytase, cellulase, sucrose, and maltase. Some patients may benefit from a product that also contains pancreatic enzymes.

**Betaine HCL**

Taking a Betaine HCL supplement may improve digestion by correcting an underlying deficiency in gastric acid. According to Jim English’s article “Gastric Balance: Heartburn Not Always Caused By Excess Acid” in Nutrition Review, Betaine HCL has been used for over 100 years to safely restore normal gastric acidity and help support healthy gut function. Dosing of this supplement depends on the individual and how much gastric acid is being produced as well as the size of the meal being consumed.
Symptoms of low stomach acid may include: bloating/belching after meals, sense of fullness after eating a small amount, constipation, multiple food sensitivities, iron deficiency, or undigested food in stool.

**Probiotics**

GERD and the related conditions can cause an imbalance in the good and bad bacteria in the gut. Preliminary research shows that taking a probiotic that contains *Lactobacillus acidophilus* may help to restore balance in the digestive system, which may relieve symptoms of GERD. The University of Maryland Medical Center currently recommends taking 5-10 billion CFUs per day.\(^{13}\)

**Melatonin**

Melatonin is not only made in the pineal gland of the brain, but nearly 500 times as much is synthesized in the digestive tract, especially in the stomach, small intestine, and colon. A study published in *The Journal of Pineal Research* compared the use of a dietary supplement containing melatonin, l-tryptophan, vitamin B-6, folic acid, vitamin B-12, methionine, and betaine with 20 mg of omeprazole. All of the subjects (100%) taking the dietary supplement had regression of GERD symptoms after 40 days of treatment. Of the subjects taking omeprazole, 66% had regression of symptoms in the same time frame.\(^{14}\) Another study from 2010 showed that using melatonin along with a low dose of a PPI medication provided improvement in 4 weeks compared with 8 week improvement using only melatonin.\(^{15}\)

**D-Limonene**

D-Limonene is derived from the citrus oil contained in orange peel. It has been shown to be effective in relieving heartburn and GERD due to its ability to neutralize gastric acid and support normal peristalsis. Two studies show positive results with no adverse effects. In the first small study, 89% of the subjects achieved complete relief of GERD symptoms after 14 days of treatment with 1,000 mg d-limonene once a day. In a second small study, 86% of subjects achieved relief by day 14 with the same dosage.\(^{16}\)

**DGL (deglycyrrhizinated licorice)**

DGL is an extract of licorice root that studies have shown to be beneficial in decreasing symptoms of acid reflux, soothing the lining of the esophagus and stomach, and helping to protect against ulcers. DGL works by stimulating the production of mucin that protects the lining of the stomach. It also helps promote the growth of new cells that line the stomach as well as inhibit the growth of H. pylori from growing in the stomach. A study published in *Gut* showed that DGL was as effective as antacids in healing gastric ulcers.\(^{17}\) Another study showed that DGL was a safe and effective long-term maintenance therapy for preventing recurrence of ulcers.\(^{18}\)

**Zingiber officinale (Ginger)**

Ginger has been used medicinally for over 2,000 years. Studies show that ginger can stimulate the emptying of the stomach for those with dyspepsia. It can also inhibit H. pylori, which may help prevent ulcers. It also protects the gastric mucosa. Ginger is a versatile supplement that is available in a variety of forms. Fresh ginger root can be grated and used in food or tea, it comes in a powdered form, or in a capsule. The recommended daily dosage is 1 teaspoon of freshly grated ginger root, \(\frac{1}{4}\) teaspoon ginger powder, or 1000 mg in capsule form. There are some contradictions with this supplement. It should not be used by those taking certain medications such as: blood thinners, aspirin, heart medications, NSAIDs, or diabetes medications.\(^{19}\)

**Magnesium**

Magnesium deficiency is commonly found in those with GERD. Since magnesium requires stomach acid in adequate amounts in order to be absorbed, those with hypochlorhydria will likely be deficient. Magnesium helps relieve esophageal spasms of the LES at the junction of the stomach. Since it can be difficult to absorb magnesium as an oral supplement, another option is to use a topical form such as magnesium oil, lotion, or Epsom salts in a bath. The recommended dosage for magnesium is 3.0-4.5 mg/lb of body weight per day. It is usually best to split the dose and take half in the morning and the other half at bedtime.\(^{20}\)

**L-Glutamine**

As the most abundant free amino acid in the body, L-glutamine is the preferred fuel source for the cells of the small intestine. Supplementing with L-glutamine has been shown to help protect the mucosal breakdown in the gut and enhance the gut barrier function.\(^{21}\) L-glutamine can be used to repair the intestinal lining or as a supplement when needs increase, such as during times of high stress or trauma (i.e. surgery).

**Zinc Carnosine**

Zinc is critical in maintaining a strong intestinal lining. Zinc carnosine has been shown in studies to be effective in healing the gastrointestinal lining and shows promise for gastric ulcers. A study done on 258 patients with confirmed gastric ulcers compared the use of 150 mg daily zinc carnosine with 800 mg daily cetraxate hydrochloride (mucosal protective agent). After 8 weeks, the endoscopic cure rate in the zinc carnosine group was 60.4% compared with 46.2% in the cetraxate hydrochloride group.\(^{22}\)

**Take Home Message**

GERD is a common digestive disorder that may have a variety of origins. The nutritional management should target the underlying cause(s) of the disorder and aim to improve digestion through lifestyle changes, dietary modification, and possibly the use of dietary supplements. Treatment of this disorder is critical to avoid long-term complications and to restore quality of life.

Jody Garlick, RDN, LDN, CLT is an integrative nutritionist in private practice in Pittsburgh, PA specializing in autoimmune and digestive disorders. She also provides food sensitivity testing to clients as a certified LEAP therapist. Contact Jody at jgarlick@verizon.net.


This past November I had the opportunity to attend the 1st Annual Plant-Based Prevention of Disease (P-POD) Conference at the University of North Carolina Asheville (UNCA). The focus of P-POD was on presenting evidence-based research and practice on the efficacy of plant-based diets for chronic disease prevention. The 3-day conference featured 19 fantastic speakers (including seven Registered Dietitian Nutritionists (RDNs)), all of whom are well-respected clinicians, researchers or educators in the field of plant-based nutrition and preventive medicine.

More than 170 people attended P-POD from across the country, and Canada, including at least 35 other students. UNCA was crackling with excitement throughout the weekend, with high energy and a palpable passion for plant-based nutrition from all those in attendance. As a graduate nutrition student focusing on plant-based nutrition within a traditional nutrition curriculum, I was very inspired by this strong sense of shared meaning and purpose amongst conference participants.

P-POD was the brainchild of Bob LeRoy, MS, Ed.M, RDN, and was a collaboration of the Vegetarian Nutrition DPG, the T. Colin Campbell Center for Nutrition Studies and Physicians Committee for Responsible Medicine (PCRM). It was graciously hosted by UNCA’s Department of Health & Wellness. P-POD had no commercial sponsorship or funding.

The conference showcased prime examples of research and practice that embodied the hallmarks of functional medicine and the vision of the DIFM DPG. One of the major take-away messages from P-POD was how whole foods, plant-based nutrition can optimize health and healing by addressing the roots of disease in treatment and prevention.

I had a chance to connect with nutrition experts and plant-based dietitians from the conference and hear their thoughts on the importance of integrative and functional medicine and the role RDNs can play within the field.

- Tim Radak, DrPH, MPH, RDN, Academic Coordinator, Public Health Doctoral Programs, Walden University and former Director of Nutrition for PCRM
- Joseph Gonzales RDN, P-POD speaker, former research dietitian with MD Anderson Cancer Center’s Integrative Medicine Program, Walden Univers
- Monique Richard, MS, RDN, LDN, Certified Yoga Instructor, and P-POD workshop moderator, volunteer, member of P-POD 2015 Board of Directors, and DIFM chair-elect
- Bob LeRoy, MS, Ed.M, RDN, P-POD founder and plant-based dietitian

Below are some of my questions to the experts and their answers:

How do plant-based approaches to nutrition fit within the paradigm of integrative and functional medicine/disease prevention?

Tim: Plant-based approaches can be a solid core element of integrative and functional medicine given the significant research showing positive effects on healing, health, and wellness.

Joseph: Researchers understand the connection between diet and cancer more than ever. Even still, there is never a guarantee to preventing or surviving cancer, but there are many trends we can utilize. The best evidence we have focuses on an abundance of antioxidants and fiber from whole, plant sources. When we zero-in on plant-based approaches—filling our plates with healthful and fibrous foods—our level of protection from cancer greatly increases.

Monique: As was so eloquently stated at the conference by Brenda Davis, MS, RDN “The science is so complex, but the solution is really rather simple.” We have the science, and have had the science for many years regarding the benefits of plant-centric or plant-based diets and I think that is really part of integrative and functional medicine—being involved in how your food is grown, prepared, eaten, and mentally and physically processed. Food is Medicine! It is the fuel to our function. It is nourishment and joy, somewhere along the way it became everything but.

Bob: History of awareness about plant-based approaches:
(Phase 1) Through most human history, the substances found to have therapeutic value have predominantly been extracted from plants.
(Phase 2) Thousands of substances particular to plants, called ‘phytochemicals’ were linked to properties of helping reduce chronic disease risks, with stunning acceleration of this knowledge since 1980.
(Phase 3) The overall proportions in a diet of plant-source whole-food material vs. animal-source material vs. refined food material are the greatest determinant of risk for a very wide range of chronic diseases. By fully mobilizing all 3 of these phases, I think integrative &
functional practice can have extraordinary public health impact.

Why do you think integrative and functional nutrition/medicine may be critical in today's healthcare landscape?

Tim: Certainly we have sufficient evidence that the majority of chronic disease as well as the large majority of health care costs have a sizable prevention opportunity, that is currently not being implemented via nutrition and whole-food therapies.

Joseph: At MD Anderson's Integrative Medicine Program I was exposed to research examining methods like acupuncture, nutrition, physical activity, creative writing, music therapy, meditation, and yoga for reducing symptoms associated with cancer. We live in a busy world, and cancer is a frightening diagnosis. Integrative Medicine helps tackle some of the fears and challenges associated with a diagnosis. It helps patients connect to their health, and brings forth important, powerful questions.

Monique: It's critical for us to be advocates for our clients and patients—to look for real, authentic results, not magic pills, quick fixes, or harmful combinations. IFM nutrition pulls from a variety of areas to help us really get to the root of the problem and end the 'Band-Aid' fix.

Bob: Over the last 3 generations or so, there has been pretty much a revolution in generating evidence about lifestyle-based causes of all society's major chronic diseases. Actual health care practice has mostly not kept up. The future role of integrative & functional practice is crucial. Why? IFM is oriented toward sustainable healing results, rather than staving off symptoms, drawing upon a broad spectrum of evidence-based peer-reviewed research documenting the role of nutritional factors in the prevention/causation of chronic disease, and of nutritional measures in disease remediation.

What changes would you like to see happen in the area of integrative medicine, nutrition and disease prevention?

Tim: More promotion of importance and need for plant-based approaches to nutrition.

Joseph: I want to see more efforts targeting preventive messages. I love the work that the American Institute of Cancer Research (AICR) does in promoting prevention. In my past work as a diettian at Physician's Committee for Responsible Medicine (PCRM) I greatly appreciated the opportunity to be able to conduct research in the field of disease prevention and risk reduction.

Monique: I would like to see more acceptance of both the application of integrative medicine and of the positive outcomes of complementing traditional methods with alternatives like Yoga/meditation/ qi gong/Tai Chi, the power of herbs, the understanding of Ayurveda, Chinese medicine, and the healing properties of food.

Bob: • Requiring a substantial amount of nutrition education as part of the training of physicians and various kinds of allied health professionals.
  • Building a vast array of affordable continuing education resources for physicians and dietitians and other professionals that deal with the evidence-based subject matter of preventing or reversing chronic diseases via nutritional measures.
  • Lobbying for vastly greater investment, within the government sector's medical/health area budgeting in preventive medicine and nutrition, both on a research and clinical resources level.
  • Raising consciousness within the entire range of health professionals that a multi-faceted team-oriented approach, involving diverse skill sets & specialties from a broad spectrum of healing practitioners, offers the best prospects for effective patient service.

How do you think Dietitians/Nutritionists in integrative medicine can build better presence, relationships, and collaborations with other healthcare professionals/physicians in integrative medicine?

Tim: Always be professional, particularly at conferences, and stay vocal about the importance of integrative medicine as a core solution to our health care problems.

Joseph: Any form of communication is important. Creating a multi-disciplinary dynamic where RDNs and MDs are comfortable discussing integrative methods is important for the patient. We become so caught up in a battle of who is right or wrong. We must work together, find areas of agreement, keep a respectful tone, and focus on how we can help our patients. I encourage all RDNs in any field to work with their doctors and RDN colleagues and always focus their energy on what is best for the patient. If that is happening, our code of ethics as RDNs is being upheld.

Monique: Challenge the status quo. Repeated introduction
and exposure piques curiosity. Whether it is my colleagues, clients, physicians, family or students I am bringing up new research in the area of IFM Nutrition to spark conversation, interest, and familiarity.

**Bob:** The number one goal might be to become the smartest person in the room about evidence for nutritional factors in prevention and treatment of particular diseases. Could there be any more valuable future resource for helping address lifestyle-related chronic diseases, than the comprehensively educated integrative nutritionist/dietitian, who is able to influence the entire direction of patient care and advisement?

**What is your advice to current nutrition students who want to do work in the field of disease prevention and lifestyle/integrative medicine?**

**Tim:** Try to obtain practical work experience either through a practicum, summer job, or internship with those currently practicing disease prevention and lifestyle/integrative medicine. If you find someone who doesn’t currently advertise for offering a practicum or internship: do not be afraid to ‘create what you need’ and be willing to pitch to an organization or medical professional the value in what you have to offer. As famous hockey player Wayne Gretzky once said, and which is my personal motto “you miss a 100% of the shots you never take.”

**Joseph:** Check out the research out of MD Anderson’s Integrative Medicine Program. Become involved with DIFM. Don’t be afraid to ask questions and email researchers about their work. Ask your professors in school what additional books or literature exists on Integrative Medicine.

The field is growing. Stay up to date on the epidemiological and clinical research.

**Monique:** Dive in! Don’t be intimidated by what you may not understand. Practice by listening, asking, reading, attending conferences, volunteering (maybe with DIFM!), and strive to know more today than you knew yesterday! DIFM’s website is an excellent place to get started. We need all hands on deck for the complex health problems we face, but I have no doubt we can do anything—together!

**Bob:** Critical thinking is your greatest asset in this field. Is a typical treatment paradigm or dietary approach based on habit & superstition, or else on evidence? Has commercial bias or conflict of interest influenced it? When possible, look at an actual journal article someone cites. Did the study test what it said it would? Were confounding factors controlled for? Did the stated conclusions fairly reflect the data? Was it cited in an accurate & useful way? You’re the detective!

**Eliza Mellion** is a graduate student at the University of Massachusetts pursuing a Masters in Nutrition and Dietetics. Her areas of interest include plant-based nutrition, chronic disease prevention, and nutritional epidemiology. Eliza is the DIFM incoming Student Member Services Chair 2015-2016 and an active student member in the Vegetarian Nutrition DPG. Contact Eliza at emellion@umass.edu.

**Save the Date—Next P-POD is scheduled for September 11-12, 2015 and April 2016 in Raleigh, NC!**
News You Can Use

Upcoming Conferences and Meetings


June 11-14, Food as Medicine. Minneapolis, MN. http://cmbm.org/professional-trainings/food-as-medicine/


DIFM Member Benefits Update
Integrative Health Journals: DIFM members have free digital access to Integrative Medicine: A Clinician's Journal (IMCJ), Alternative Therapies in Health and Medicine (ATHM) and Advances in Mind-Body Medicine (Advances). Members may purchase print subscriptions at $20.00/each or $50.00 for all three journals. This option is available on each journal's digital issue site. Go to: http://integrativeverd.org/members-only/learn/integrative-health-journals/

Databases: Free access to both Natural Standard database and Natural Medicines Comprehensive Database Professional Version: http://integrativeverd.org/members-only/nmcd/

Archived Webinars: DIFM offers numerous webinars, at no or minimal cost, to our members. Enjoy the vast collection of archived webinar recordings. Recent webinars include, "The Science, Art & Practice of Dietary Supplementation" presented by Mary Beth Augustine, RDN, CDN, FAND available for 1 CPEU, code 175; and, "How to use genetic information for nutritional guidance" presented by Martin Kohlmeier, MD, PhD. http://integrativeverd.org/members-only/learn/archived-webinars/

Electronic Mail List (EML): Several threads discuss treatment of thyroid conditions and concurrent symptoms, including: Hashimoto’s and adrenal fatigue, leaky gut with Hashimoto’s, ileitis and acid reflux. Other hot topics include: MTHFR gene mutation and gastric pain, diet recommendations for severe acne, supplements and diet for blepharitis, recommendations for breastfeeding mother with endometriosis, treatment of fibromyalgia and celiac disease. One member shared a helpful resource for egg substitutions in cooking and baking: http://chefinyou.com/egg-substitutes-cooking/

Join the EML here: https://groups.yahoo.com/neo/groups/DIFM_Listserv/info

What’s New - Journal Reviews and Resources
iHerb.com offers free access to a number of databases, including supplements and herbs, diet and homeopathy: http://healthlibrary.epnet.com/GetContent.aspx?token=e0498803-7f62-4563-8d47-5fe33da65dd4

Man in the Maze, one of five winners of the Sundance Short Film Challenge, is a powerful story of the food system of the U.S.-Mexico border, the largest inland port of entry for food in the world and the third largest port of entry for fresh produce in the U.S. The 8-minute documentary tells the story of the border towns, the rescuing and redistribution of thousands of pounds of fresh produce dumped into the Rio Rico landfill, the effort to preserve seed diversity and the communities in southern Arizona working to grow their own produce. Watch online: http://tucson.com/sundance

Daily Blueberry Consumption Lowers Blood Pressure and Improves Arterial Stiffness
Two recent postmenopausal women with pre- and stage 1- hypertension participated in this eight-week randomized controlled trial. Subjects consumed daily either 22 g of freeze-dried blueberry powder (equivalent to one cup of blueberries) or 22 g of placebo powder. At the study’s end, compared to baseline, the treatment group had significantly lower systolic and diastolic blood pressure and brachial-ankle pulse wave velocity, as well as significantly higher levels of nitric oxide. There were no changes in any measures in the placebo group. The improvement in blood pressure and arterial stiffness was potentially due to enhanced nitric oxide-mediated vasodilation. The authors caution their findings do not indicate blueberry powder matches the effectiveness of antihypertensive medications, as mean systolic blood pressure, "remained in the prehypertensive range at the end of the treatment period. It is possible that higher doses and/or longer intervention time may result in further reductions in SBP to that of the normal range." Johnson SA, Figueroa A, Navaei N, et al. Daily Blueberry Consumption Improves Blood Pressure and Arterial Stiffness in Postmenopausal Women with Pre- and Stage 1-Hypertension: A Randomized, Double-Blind, Placebo-Controlled Clinical Trial. J Acad Nutr Diet. 2015 Jan 2. pii: S2212-2672(14)01633-5. doi: 10.1016/j.jand.2014.11.001. [Epub ahead of print]

American Botanical Council (ABC) Says New York Attorney General Misused DNA Testing for Herbal Supplements, Should Also Have Used Other Test Methods as Controls
The crucial theme in this statement from ABC is that "media coverage does not mention known limitations of DNA testing protocols." The NY Attorney General’s office conducted testing on store-brand herbal supplements from Target, Walgreens, Walmart, and GNC, including echinacea, gingko, ginseng, saw palmetto, St. John’s wort, garlic, and valerian. The DNA barcode technology used revealed many of the products did not contain DNA of the botanical supplement, but instead contained unlabeled fillers. The retailers received letters from the Attorney General’s office demanding the products be removed from sale. A press release was published in the New York Times on February 3, 2015, which highlighted ongoing safety concerns regarding dietary supplements. ABC, one of the international leaders confronting the problems of adulteration of botanical ingredients (through the ABC-AHP-NCNPR Botanical Adulterants Program), respectfully questions the scientific evidence supporting the testing as well as the resulting actions. Botanical material is often subjected to long heat treatments during extraction and processing, which destroys DNA. This would explain the negative findings of DNA testing done by the NY Attorney General’s office. The argument from ABC is that “adulteration does not exist, but that proper testing must be conducted using a range of appropriate methods, which are then subject to peer review for validation of results. With this premise, the concern is that the action taken by the NY Attorney General was premature and requires further substantiation. http://cms.herbalgram.org/press/2015/ABC_Says_NY_Atty_Misused_DNA.html

Perspectives on the Potential Hepatotoxicity of Various Herbs, Including Green Tea Extract.
This viewpoint on botanical hepatotoxicity responds to a New York Times article that reported on a November 2014 liver toxicity conference. At the conference, Dr. Victor Navarro spoke on the risks of dietary supplements and implicated botanicals as dangerous to the liver. The authors question the benefit of sensational media reporting. Herbal dietary supplement use (HDS) has risen consistently but actual

Compiled by
Jacqueline Santora Zimmerman, MS, RDN, Associate Newsletter Editor
studies vary depending on the source. No reliable population-based statistics on the incidence of liver toxicity related to HDS in the US exist. Statistics often include bodybuilding products as well as drugs that are marked as dietary supplements, such as over-the-counter sildenafil (Viagra) analogs, and do not account for possible adulteration of botanicals. The authors point to problems identifying dosage, concurrent use of other potentially liver-toxic medications such as acetaminophen, and pre-existing liver conditions. While some botanicals such as those containing pyrrolizidine alkaloids are known to potentiate liver toxicity, accumulating more data on the safety of HDS use will benefit consumers and those in the herbal products industry. Contamination and adulteration must be considered prior to pointing a finger at HDS as unsafe.


Study Shows Ginger May Be Effective in Preventing Anti-retroviral-Induced Nausea and Vomiting
This randomized, double-blind, placebo-controlled study examined the efficacy of ginger significantly reduced nausea in the treatment group, and had a greater effect on reducing vomiting. However, several study limitations existed including poor study design, possible bias in results (subjects could smell the ginger, thus were not blinded), and decision not to analyze treatment failures. Evaluation of ginger dose and optimal time to take ginger therapy would be prudent subjects of future studies as ginger has the potential to interact with protease inhibitors used in the treatment of HIV. Oliff HS. Study Shows Ginger May Be Effective in Preventing Anti-retroviral-Induced Nausea and Vomiting. HerbalGram. 2014;104:3. http://cms.herbalgram.org/herbalgram/issue104/HG104-resrvw-ginger.html

Acerola: An Herb Profile
Native to South and Central America and known as the acerola cherry, the fruit of the Malpighia glabra tree has been classified as a “super fruit.” Botanical, historical, and cultural information, as well as current uses and research, highlight the astringent and anti-inflammatory benefits of the fruit. Few botanicals are higher in vitamin C (ascorbic acid) than acerola cherry. The amount of ascorbic acid depends on time of harvest. For 100 g of fruit, ascorbic acid ranges from 4500 mg if harvested when green to 2000 mg if harvested when ripe. In the United States, acerola is used in juice form, or as an extract in vitamin C supplements. The increasing numbers of organic acerola growers are primarily in Brazil, Costa Rica and Peru. However, there remains a significant supply of conventionally grown acerola, which may be adulterated with synthetic, genetically engineered ascorbic acid. Organically grown acerola powder or extract rivals acerola cherries as a natural, plant-based source of vitamin C. Engels G & Brinckmann J. Acerola - Malpighia glabra. In: HerbalGram. 2014;104:1-6. http://cms.herbalgram.org/herbalgram/issue104/HG104-herbpro.html


Greater adherence to a Mediterranean-type diet was associated with reduced risk of breast cancer among women who carry variants of the following genes: MTHFR, and MTR.


The Pro12Ala polymorphism of the PPARγ2 gene interacts with a Mediterranean diet to prevent telomere shortening in the PREDIMED-NAVARRA Randomized Trial. Circ.Cardiovasc Genet. 2014 Nov 18. pii: CIRCGENETICS.114.000635. [Epub ahead of print] PubMed ID: 25406242. Carriers of the Pro12Ala variant of the PPARγ2 (also known as PPARδ2) gene were found to benefit more from a Mediterranean diet than non-carriers. This seems consistent with reports that carriers of this variant are more responsive to lifestyle changes for cardioprotection.

Meat-derived carcinogens, genetic susceptibility and colorectal adenoma risk. Genes Nutr. 2014;9(6):430. doi: 10.1007/s12263-014-0430-6. Epub 2014 Sep 18. PubMed ID: 25231222. Increased colorectal risk was associated with the rs10012 and the rs1056827 variants of the CYP1B1 gene, and with the rs13181 and the rs1799793 variants of the XPD gene, when combined with higher intakes of cooked meat with higher levels of doneness.


Maternal dietary intake of folate, vitamin B12 and MTHFR 677C>T genotype: their impact on newborn’s anthropometric parameters. Genes Nutr. 2014;9(5):429. doi: 10.1007/s12263-014-0429-z. Epub 2014 Aug 31. PubMed ID: 25173112. Women who carry two copies of the 677C>T variant of the MTHFR gene may benefit from vitamin B-12 supplementation during pregnancy. Among such women, a vitamin B-12 deficiency was associated with increased risk of giving birth to babies with significantly reduced length (including length for age).

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The Disease Delusion: Conquering the Causes of Chronic Illness for a Healthier, Longer, and Happier Life
Dr. Jeffrey S. Bland
Hardcover: $26.99
ISBN: 978-0-06-229073-1

Dr. Jeffrey Bland, distinguished as father of functional medicine, presents this book as education on better chronic illness solutions. His delusion theory is that naming or diagnosing a disease is not enough to lead to the cure. Bland describes the unique genetic responses that over time threaten normal functioning of tissues or organs, progressing to impairment of health and feeling unwell. For healing, functional medicine seeks individual causes, different for each person, not pausing at pharmaceutical treatment of symptoms. With this functional medicine approach, the treatment result is that disease goes away. The treatment is designing personal health management, including diet, lifestyle, and environment modifications.

In his forward, Dr. Mark Hyman points to modern medicine failures as contributing to the chronic disease health crisis. He labels this book a manifesto of a new medicine and calls for all medical students to read it. Any healthcare practitioner should as well.

Divided into three parts, the first offers explanation. Our medical system works perfectly for acute illness, but not for chronic conditions. Dr. Bland distinguishes functional medicine as using new biomedical and genomic discoveries. He explains that human genome research dictates a change in medical practice that targets the individual rather than treatment of a particular disease. As a longstanding professor, Dr. Bland deciphers difficult concepts into understandable explanations and reveals seven possible imbalances leading to health problems.

One chapter is devoted to each of these “seven core physiological processes.” This second part includes self-assessment questions and interconnectedness of each process. The physiologic mechanisms are described with progression to dysfunction, including research on effective therapies.

Part three offers a basic guide for lifestyle change, a place to begin, and an “I can do this” message. Throughout are a smattering of specific recommendations and an appendix with a 7-day eating plan. More an invitation to delve further into the benefits of modifications than a manual, Dr. Bland encourages consultation with practitioners supporting his theories and offers resources on finding them.

The delusion is not the existence of health problems, but that the current medical model is alleviating them. What this book does extremely well is define the reason. In a personal yet professional way, Dr. Bland offers years of experience and research, his methods and own life habits. There is no doubt he believes wholeheartedly and offers research-based evidence in support.

This is an exciting book for the nutrition profession. Dr. Bland emphasizes research on epigenetics, confirming diet alteration as critically affecting health. Whether considering the pursuit of integrative nutrition, already immersed in this sphere, or concerned about your own health challenges, this book is an empowering read. Dr. Bland offers the public and healthcare professional his vast wisdom, expertise, and hope—with nutrition at the core.

Reviewed by Dina Ranade, RDN, LD; DIFM Resource Reviews/Networking Editor 2014-2015. Contact Dina at dranade@comcast.net.
The Functional Nutrition Cookbook:
Addressing Biochemical Imbalances Through Diet
Lorraine Nicolle, MSc and Christine Bailey, MSc
Paperback: $39.95

The authors of this extraordinary cookbook are British nutrition practitioners, educators, food writers, and one a trained chef. Together they have created far more than a recipe collection. As much an information-packed diet manual as a cookbook, this is bursting with delectable promise of healthful eating.

The Institute of Functional Medicine opens the forward with a statement from Dr. Jeffery Bland citing nutrition as a modifiable influence on chronic disease. Using functional nutrition principles, this cookbook ushers in modification and change. It is not glossy, fancy, or full of photographs, but holds potential for inspiring the creation of food that feels good to eat. It is a primer by the end of which fundamental principles can be learned and applied for improved nutritional health. Moreover, it offers recipes that may become favorites.

The book is organized into chapters not by food categories or disease states, but by body functions and physiological processes: gastro-intestinal function, detoxification, fatty acid metabolism, glucose and insulin control, thyroid and adrenal function, hormone balance, immunity and inflammation, antioxidant processes, and balanced brain chemistry, culminating with healthy aging. Each chapter describes imbalances created by diet, providing interventions to support return to balance. Each includes foods to eat, foods to avoid, and a 3-day meal plan supported by the recipes in the section. Recipes contain detailed introductions with alternative uses and information on calorie, protein, carbohydrate, and fat content.

Review of a cookbook demands trialing the food. The more I experimented with recipes from each chapter, the more I loved this cookbook. It solves the puzzle of what to eat and how to make it taste delicious. The recipes are clear, varied, and reliable. Several ingredients may be inaccessible at common groceries, but online shopping solves this problem. Some preparation techniques are unusual and a bit laborious; both minor hurdles to jump to eating well. Ultimately, this book breaks down functional nutrition concepts into tangible diet choices.

At first glance, because of the vast information and details, the cookbook seemed geared for health professionals rather than clients. But upon reading and using it, my opinion changed. The suggestions are clear and easy to understand. Although there are references to discussing recommendations with a nutrition advisor, the book is written for anyone. Still, for the integrative nutritionist this is a gold mine of help for your practice. A CD with all 130 recipes is included to download, print and share, adding solid ideas and action to recommendations. Descriptions of biochemical processes are comprehensive and highly referenced. Practical, nutrition-oriented, detailed, and full of flavor, it is an excellent resource to reference often, both in the kitchen and the office.
Roasted Garlic and Bean Dip with Crudités

This creamy homemade dip makes a delicious alternative to hummus and is an ideal snack or lunch option with salad. Roasting the garlic mellows and sweetens its flavor.

SERVES 8

1 garlic bulb
Olive oil for drizzling
400 g/14 oz can cannellini beans or butter beans, drained
Zest and juice of ½ lemon
½ tsp smoked paprika
2–3 tbsp. extra virgin olive oil
Sea salt and freshly ground black pepper

Selection of vegetable crudités to serve (e.g. carrots, peppers, cucumber, celery, mange tout/snow peas, cauliflower and broccoli florets)

Preheat the oven to 350°F. Place the garlic bulb on a large piece of foil, drizzle on a little olive oil and tightly seal the foil. Roast for 45 minutes. Remove from the oven, open the foil and allow to cool slightly.

Squeeze out the garlic pulp and place in a food processor. Add the remaining ingredients and process until smooth and creamy. Season to taste. Serve with a selection of vegetables. The dip can be stored in the fridge for 2–3 days or frozen for up to 1 month.

Balsamic and Soy Marinated Veggies

This is a great way to serve vegetables. Pouring the marinade over the warm vegetables allows them to soak up the lovely tangy flavors. This is best prepared the day before you wish to eat it to really let the flavors develop.

SERVES 4

Marinade
6 tbsp. extra virgin olive oil
3 tbsp. balsamic vinegar
2 tbsp. tamari soy sauce
2 cloves garlic, crushed
Freshly ground black pepper

Vegetables
1 head of broccoli, broken into florets
1 head of cauliflower, broken into florets
150 g/5 oz green beans, trimmed
225 g/8 oz button mushrooms, halved

Mix all the marinade ingredients together.
Steam the broccoli, cauliflower and green beans for 2–3 minutes until only just tender but still crunchy.
Place in a large bowl with the mushrooms and pour over the marinade. Toss to coat thoroughly. Marinate overnight. Serve at room temperature.


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<tr>
<th>Roasted Garlic and Bean Dip with Crudités</th>
<th>Balsamic and Soy Marinated Veggies</th>
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<td>Total fat 4.3 g of which saturates 0.6 g</td>
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De-stressing with Diet: DOs and DON'Ts

What is stress?
A normal psychological and physical reaction to demands or threats, accompanied by increased hormone (adrenaline and cortisol) levels.¹

Is stress bad?
Long-term exposure to stress can cause hormone levels to remain elevated.

Chronic stress can lead to:
- Anxiety
- Depression
- Digestive problems
- Heart disease
- Sleep problems
- Weight gain
- Memory & concentration impairment²

What do stress hormones do?
A short-term stress response helps us react to a demand or threat.
- Adrenaline
  - Increases heart rate
  - Elevates blood pressure
  - Boosts energy
- Cortisol
  - Increases blood sugar
  - Enhances brain’s use of glucose
  - Increases resources for repair
  - Alters immune response
  - Suppresses digestive and reproductive systems
  - Suppresses growth response
  - Communicates with brain re: mood, motivation, and fear²

Did you know?
Practicing mindful eating can reduce cortisol levels.³

References:
<table>
<thead>
<tr>
<th>Benefit from...</th>
<th>When you DO fuel with foods like...</th>
<th>And DON’T rely on foods like...</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Magnesium: helps to balance cortisol⁴</td>
<td>• Nuts like almonds, pecans, and cashews</td>
<td>• Processed junk foods like chips, pretzels, cheese snacks, etc.</td>
</tr>
<tr>
<td>• Tryptophan: reduces cortisol &amp; improves mood under stress⁶</td>
<td>• Steel-cut oats</td>
<td>• Refined carbohydrates like white bread, pasta, and rice</td>
</tr>
<tr>
<td></td>
<td>• Lean proteins like turkey breast, eggs, pork loin, and chicken breast⁵</td>
<td>• Fried and processed meats like fried chicken, chicken fingers or wings, pepperoni, hot dogs, etc.</td>
</tr>
<tr>
<td>• Vitamin C: counteracts cortisol⁷</td>
<td>• Blueberries, strawberries, and other berries</td>
<td>• Sugary, processed, low-nutrient foods</td>
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<td></td>
<td>• Citrus fruits</td>
<td></td>
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<td></td>
<td>• Peppers, leafy greens⁵</td>
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<tr>
<td>• Omega-3 fatty acids: reduce the release of adrenaline &amp; cortisol in response to stress⁸</td>
<td>• Salmon, mussels, soy, walnuts, flax seeds and oil, chia seeds⁵</td>
<td>• Trans fats such as those found in stick margarines, shortening, fried foods, and the hydrogenated oils in processed foods</td>
</tr>
<tr>
<td>• Theanine: reduces cortisol levels⁹</td>
<td>• Green and Black Teas ⁹,¹⁰</td>
<td>• Excess alcohol (more than the moderate amount of 1 drink for women or 2 drinks for men per day)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Excess coffee or other highly caffeinated beverages (moderate amounts are okay)</td>
</tr>
<tr>
<td>• Flavonols: Reduce stress hormones, including cortisol¹¹</td>
<td>• Dark chocolate</td>
<td>• Sugary desserts</td>
</tr>
</tbody>
</table>

References:
Spring has sprung—or so the calendar says! I cannot believe how quickly time passes—whether you are having fun… or not. It is time to think about getting the garden ready for all the seedlings I have planted in little pots around the house. Fresh tomatoes will not be far behind.

This issue is packed with useful information for professionals and students alike. From the CPE topic on Green Tea and Women’s Health to The Truth About Acid Reflux—a topic that many of us deal with in our practices. Students are becoming more visible in the newsletter as well with an article written by Eliza Mellion on the Plant Based Prevention of Disease Conference at the University of North Carolina Asheville. The fact sheet on the previous page is a member benefit and may be reproduced for educational purposes. Keep our eye out for more fact sheets in future issues. No matter what your focus, this issue has something for you and your practice.

Please be sure to see the announcement on recent DIFM and Academy elections and congratulate our newly elected leaders. Our Executive Committee (EC) promises to continue working in DIFM members’ best interests to move our DPG forward. We are becoming strong in numbers with over 3700 members at this writing. Please encourage those RDNs practicing in Integrative and Functional Medicine who are not members to join our ranks this coming year. And, we cannot forget our student members—hooray for over 600 of you joining this year! If you are a student and are interested in helping out with the newsletter, please contact Olivia Wagner, our current Student Committee Chair, at oliviawagner28@gmail.com, or Eliza Mellion, DIFM’s 2015-2016 Student Committee Chair, at ebmellion@gmail.com. Planning for 2015 FNCE® is beginning and we hope to see many of you in Nashville. More details will follow in the summer issue of the newsletter.

As always, I encourage you to email me at peaknut70@gmail.com with topics you would like covered in the newsletter or if you have an article you would like considered for publication. Many of you tell me or other EC members that you feel you do not have the experience or do not know how to write about integrative and functional medicine, but it is one of the best ways to improve your knowledge and have something to add to your resume to boot.

Sarah Harding Laidlaw, MS, RDN, CDE
Dear DIFM Members,

Great news—the future of integrative and functional medicine (IFM) practitioners is bright! ACEND recently published a seminal document for the future of the profession: Rationale for Future Education Preparation of Nutrition and Dietetics Practitioners (ACEND, 2015). If you haven’t yet read it, read on for highlights of the 125-page document that are of relevance to IFM practitioners...

PURPOSE

The purpose of this project was to gather information from various stakeholders on the importance of specific skills for future practice in nutrition and dietetics.

ENVIRONMENTAL SCAN

The environmental scan data collected revealed an emergence of many non-traditional practice settings for the field of nutrition and dietetics and an expanding scope of practice for those working in the profession. There is an increased focus on disease prevention and integrative healthcare and the need for more knowledge in emerging areas such as nutritional genomics, telehealth, nutritional pharmacology, case management, behavioral counseling, diet order writing, coding and reimbursement, evidence-based practice, and informatics.

Surveyed Academy members and employers rated the following skills as a 3 or above on a scale of 1-4, with 1 being not important and 4 being very important for future practice in nutrition and dietetics:

- Clinical Client Care Skills
- Apply integrative nutrition principles to nutrition care and Medical Nutrition Therapy (MNT), including the use of nutritional genomics, dietary supplements and/or herbal remedies
- Write nutrition orders for nutrition supplements, vitamins and minerals
- Order nutrition related laboratory tests
- Conduct nutrition focused physical exams as part of assessment
- Community and Population Health
- Provide nutrition and lifestyle education to well populations
- Conduct culinary demonstrations to teach cooking skills, safe food handling practices and promote consumption of healthy foods (Ranked 3.25 by Academy members and 2.77 by employers)

Integrative and functional medicine is recognized within the Scope of Nutrition and Dietetics Practice as a focus area and practice setting, among others. More significantly, attention is paid to integrative health care and integrative medicine in the following section from the ACEND document, Future Needs in Healthcare Education section.

FUTURE NEEDS IN HEALTHCARE EDUCATION

Integrative health care, often referred to as interprofessional health care, is an approach characterized by a high degree of collaboration, and communication among health professionals. The sharing of information among team members related to patient care and the establishment of a comprehensive treatment plan to address the biological, psychological and social needs of the patient is what makes integrated health care unique.

As interest in integrative health care and the use of complementary and alternative therapies by the public continues to grow, concern has increased as to whether health professionals are sufficiently educated about integrative health so that they can safely and effectively care for patients. Integrative health topics recommended include relationship-based care, whole person care (i.e., mind, body and spirit), complementary and alternative medicine (CAM) and self-care. As a result, the 2005 IOM Committee on CAM recommended that all conventional health professions training programs incorporate sufficient information about CAM into the standard curriculum to enable licensed professionals to competently advise their patients about CAM.

The Bravewell Collaborative, a philanthropic organization that works to improve health care, defined integrative medicine as “an approach to care that puts the patient at the center and addresses the full range of physical, emotional, mental, social, spiritual, and environmental influences that affect a person’s health.” The Bravewell Collaborative identified integrative medicine as having the following characteristics: the patient and practitioner are partners in the healing process; all factors that influence health, wellness and disease are taken into consideration; the care addresses the whole person, including body, mind and spirit in the context of community; practitioners use all appropriate healing sciences to facilitate the body’s innate healing response; effective interventions that are natural and less invasive are used...
whenever possible; because good medicine is based in good science, integrative medicine is inquiry driven and open to new models of care; alongside the concept of treatment, the broader concepts of health promotion and the prevention of illness are paramount; care is individualized to best address the person’s unique conditions, needs and circumstances; practitioners of integrative medicine exemplify its principles and commit themselves to self-exploration and self-development.

The Consortium of Academic Health Centers for Integrative Medicine uses the following definition: “Integrative medicine is the practice of medicine that reaffirms the importance of the relationship between practitioner and patient, focuses on the whole person, is informed by evidence and makes use of all appropriate therapeutic approaches, health care professionals and disciplines to achieve optimal health and healing.” Suggested content on integrative medicine in health professional education includes: patient-centered and whole person care; personal responsibility for health and wellness; lifestyle choices, behaviors and outcomes including but not limited to diet, exercise and stress reduction; health promotion and disease prevention; and knowledge, principles, practices and processes that facilitate the integration of conventional biomedical care with CAM.

The ACEND document states that changes in the medical and academic environments require high-level knowledge, skills and attitudes commensurate with graduate education at the master’s and/or doctorate level. Consequently, ACEND makes the following recommendations:

- Master’s degree preparation for entry level, generalist, registered dietitian nutritionists.
- Bachelor’s degree preparation for entry level nutrition and dietetics technicians.
- Associate’s degree preparation for community nutrition and health assistants.
- Each degree level has competencies identified.
- Experiential learning integrated into each degree program.
- Each degree level prepares graduates for employment.
- Completing one part of the educational model would not be a requirement to enter a program at a higher degree level in the model, but each degree level would build on the preceding degree level knowledge and competence.
- Future exploration of high school and doctoral level programs.

It appears that stakeholders, employers, and ACEND view IFM-specific skills very important to future practice in nutrition and dietetics!

Cheers to a future so bright we gotta wear shades!

Mary Beth Augustine, RDN, CDN, FAND
DIFM DPG Chair, 2014-2015

For more information, click on the following links:
- Rationale for Future Education Preparation of Nutrition and Dietetics Practitioners
  http://www.eatrightacend.org
- Webinar About the Recommended Education Model
  https://eatright.webex.com
- ACEND Model for Future Education in Nutrition and Dietetics, Webinar Slides
  http://www.eatrightacend.org

REFERENCE:

Congratulations to…

The DIFM nominating Committee and current Executive committee are pleased to announce the results of the 2015-2016 election.

Chair-Elect: Kelly Morrow
Secretary: Jessica Redmond
Nominating Chair-Elect: Aarti Batavia
Nominating Committee Member: Lisa Dorfman
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Secretary 2013-2015
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For the full Executive Committee list and contact information, please see the online version of the newsletter.

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