BHNewsletter

Behavioral Health Nutrition
a dietetic practice group of the Academy of Nutrition and Dietetics
eat right.

BHN: Fuel Your Brain, Feel Your Best!

Essential Fatty Acids in Behavioral Health

by Ruth Leyse-Wallace PhD, RD

CPE

Ruth Leyse-Wallace PhD, RD

Functions of EFA

Essential fatty acids are involved in both biological and biochemical structure and function of the central nervous systems. As such, they potentially influence behavioral health. Essential fatty acids may influence neurotransmitter production, degradation, release, reuptake and binding, as well as being essential in the structure of cell membranes.

The ratio of O-6:O-3 influences neurotransmission related to serotonin and catecholamine. A healthy ratio decreases the over-activity of a phospholipase enzyme that breaks down phospholipids. Phospholipids and essential fatty acids are depleted in red cell membranes of schizophrenic patients and family members. A genetic alteration results in removal of EPA, DHA, AA, and GLA from phospholipid structure.

O-3 fatty acids have been accepted by the American Psychiatric Association as helpful in treating depression (1), generally used in conjunction with other treatment modalities. EFA may help with depressive symptoms of Bipolar Disorder, but seemingly not the manic symptoms (2). O-3 supplements have few side effects and have shown some promise in the treatment of ADHD (3). Intake of both EPA and DHA reduces plasma AA.

Exhaled ethane from cerebral O-3 oxidation of PUFA can serve as a biomarker of DHA peroxidation of cerebral membrane phospholipids in humans (4).

Symptoms of Deficiency

Skin lesions reflect an O-6 deficiency; O-3 deficiency is not associated with skin lesions (5). Fat-free TPN can yield dermatological signs in three weeks. Deficiency signs include scaly dermatitis, impaired growth in children, fatty liver, abnormal platelet function, delayed wound healing, neurological abnormalities and impaired resistance to infection (6).

Lab reports may show reduced concentration of linoleic acid. An elevation of the triene:tetraene ratio are suggestive of a nutritional deficiency in essential fatty acids. N ratio = <0.4 or between 0.010-0.038.

Ratios and Supplements

Ratio O-6:O-3 (LA:ALA) or (AA:O-3 fatty acids)

Historically the ratio of O-6:O-3 fatty acids has been of 2:1 or 1:1.3. In the recent U.S. ratio has been estimated to be 15:1 to 17:1 (7). Benefits can result by decreasing intake of O-6 or increasing O-3 fatty acids. O-6 and O-3 fatty acids compete for desaturase and elongase enzymes, which influences tissue saturation levels.

EPA:DHA

An intake ratio of 2 or 3 EPA:1 DHA is thought to be advantageous. Natural fish oil has a ratio of EPA:DHA 2:1. Fish oil supplements commonly provide ~ 300-900 mg of O-3 fatty acids/recommended dose/day, divided between EPA and DHA. Since

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Abbreviations:

AA	Archidonic Acid
ADHD	Attention Deficit Hyperactivity Disorder
ALA	Alpha α-Linolenic Acid
CLA	Conjugated Linoleic Acid
DGLA	Dihomo-gamma γ-Linolenic Acid
DHA	Docosopentaneoic Acid
EFA	Essential Fatty Acid
EPA	Eicosapentaenoic Acid
GLA	Gamma-linolenic Acid
HUFA	Highly Unsaturated Fatty Acid
LA	Linoleic Acid
LCFA	Long Chain Fatty Acids
MUFA	MonoUnsaturated Fatty Acid
PUFA	PolyUnsaturated Fatty acid

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INSIDE this issue

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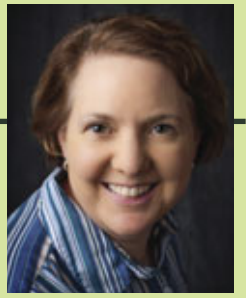
From the Chair



Mary E Kuester, MA, RD

Greetings! By the time you receive the Fall Newsletter fall will be settling in. Fall is my favorite season. I love the crisp, cool air, crunching leaves under my feet, and colorful fall foliage. Another great part of fall is the Academy's Food & Nutrition Conference & Expo that is just around the corner and will be held from October 19th- October 22nd in Houston, Texas. It is a great opportunity to refuel, connect, and learn. We hope that you are planning to be there and participate in the activities that we have scheduled for you.

Our annual Member Breakfast and Reception is scheduled for Monday, October 21st from 7:30am-9:00am (Meeting Room 335BC at the Hilton Americas Houston). You will have the opportunity to meet Executive Committee members, connect with colleagues, learn from our Resource Professionals, and enjoy a great breakfast. The presentation will include case study presentations from each area of practice as well as a Question and Answer period for you to challenge/stump the panel. Panelists include two of our Resource Professionals: Jo Martins, PhD, RD (Addictions) and Karen Wetherall, MS, RD, LDN (Eating Disorders) as well as our Chair Elect Sharon Lemons, MS, RD, CPS (IDD) and our Public Policy Liaison April Winslow, MS, RDN (Mental Health). This reception is free for members, but you will need to sign up in advance. In addition, you will receive a CPEU credit for attending this event.

Please plan to stop by the DPG/MIG Showcase on Monday October 21st from 10:30am to 1:00pm (Booth 4). You will have the opportunity to connect with Executive Committee members, share suggestions and/or concerns as well as receive a complimentary luggage tag made on the spot using your business card.

Lastly, we are honored to have a Spotlight Session at FNCE® on the relationship between food, nutrition and psychotherapy. Speakers include Mark Schwartz ScD, and April Winslow, MS, RDN who will provide education on the impact of malnutrition on a person's ability to engage in therapy and how improving nutrition will change this. This session is scheduled for Tuesday, October 22, 2013 from 9:45am-11:15am in Room 351 at the George R. Brown Convention Center. You won't want to miss this!

I look forward to meeting you at FNCE® at any of our events. If you are not able to make it to the conference, we have plenty of resources and opportunities available to you in the coming months including webinars on nutrient deficiencies in mental health, men and eating disorders, nutritional management of clients in group homes and a free webinar on learning. I would also encourage you to join our EML (electronic mailing list) to help stay connected to peers. You can also connect with us on Facebook, Twitter and Pinterest.

Food Matters: The Connection between Nutrition and Psychotherapy

Come join your fellow BHN members at FNCE® for a spotlight session entitled, *Food Matters: The Connection between Nutrition and Psychotherapy,* on Tuesday, October 22, 2013 from 9:45am - 11:15am in the George R. Brown Convention Center; Room 351. Nutrition Level: 3; CPE Credit: 1.5. Learning Codes: 5200, 5320, 2100

This dynamic session will teach you the psychological characteristics that are consistent with malnutrition, the significance of the interpersonal relationship between client and clinician to enhance motivation for change, and food-based interventions to restore cognitive homeostasis. This session will leave you empowered to consider the nutritional roots of many psychological issues.

Fuel your Brain, Feel your Best!

Essential Fatty Acids in Behavioral Health

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products vary widely it is important to read the labels.

Krill is similar to fish oil, except it contains naturally-occurring phospholipids and more EPA than standard fish oil (240 mg/g EPA in krill vs.180 mg/g in standard fish oil) (8,9).

Two grams/day DHA gives maximal plasma and tissue response. With supplementation DHA equilibrates in plasma ~ 1 month (10).

Food Sources of Fatty Acids

As found in nature, oils and fats are generally a mixture of various fatty acids. Table 1. lists the fatty acids and common food sources of EFA. A systematic search by Ulbricht et al (14) found three clinical studies investigating effect of chia seeds and concluded further rigorous examination is warranted pertaining to the use of *Salvia hispanica* as a dietary supplement, as well as in the treatment or prevention of human disease. A report on the fatty acid composition of four genotypes of chia by Ayerza and Coates found that seed oils provide 11% Sat fats; 80% PUFA; (60% α-linolenic acid and 20% linoleic acid) (15). Fifteen grams of chia seed oil would provide 12 grams α-linolenic acid and 3 grams of linoleic acid.

A Case Report

A suspected essential fatty acid deficiency in a patient was confirmed by Natalie Harris, RD, CD, a BHN member. The patient was being treated for anorexia nervosa (16,17). Selected laboratory findings are outlined in Table 2.

Recommendations for EFA Intake

Recommendations for intake of essential fatty acids vary with age, gender, health situation (such as pregnancy), and the ratio of fatty acids, keeping in mind that fish, (a major food source of EPA and DHA) may also contain mercury. Table 3 provides the recommendations of individual experts and organizations.

Recommended intakes, percentage of energy, and ratios can be met using different combinations of food sources. A calculation and example of an adult female intake of various fats which approximately meet the recommendations is given in Table 4. Figures are imprecise due to the form in which fatty acid content is provided in various data sets, (%, g, mg., servings size, reversal of

Table 2. Laboratory Findings in A Case Report of EFA Deficiency

Laboratory Analyses[a]	Patient Findings		Normal/Expected Level
Linoleic Acid	1268 nmol/L	Lo	2270-3835 nmol/L
Triene:Tetraene ratio [O-9:O-6]	0.089	Hi	0.010-0.038
Arachidonic Acid	517 nmol/ml	Lo	520-1490 nmol/ml
Arachidic acid (C20:0) compared to Arachidonic Acid (C20:4w6)	18 nmol/ml	Lo	50-90 nmol/ml
Total fatty acids	6.5mmol/L	Lo	7.3-16.8 mmol/L
Total Omega 6	1.9 mmol/L	Lo	3.0-5.4 mmol/L
Lauric acid	4 nmol/L	Lo	6-90 nmol/L
Stearic acid	505 nmol/L	Lo	590-1170 nmol/L
Mead acid (a triene acid)	46 nmo/ L	Hi=def	7-30 nmol/L
Compliment C3 [b]	76		83-193

[a] The interpretation on the lab report from Mayo Medical Laboratories stated; "The concentration of linoleic acid was reduced. The triene/tetraene ratio was elevated. These findings are suggestive of a nutritional deficiency of essential fatty acids."

[b] Complement C3 is a blood test that measures the activity of a specific protein that is part of the complement cascade. The proteins work with the immune system and play a role in the development of inflammation. Decreased complement activity may be seen in several conditions, including malnutrition. Deficiencies in the complement cascade can lead to infection and sepsis. (18)

Table 1. Summary of EFA Types and Food Sources

O- 6 PUFA	O-3 PUFA	Arachidonic AA (11)	HUFA O-3 EPA & DHA	MUFA	Saturated
Linoleic LA Converted to GLA, then to AA or DGLA; Oils: >50% LA Safflower, Evening Primrose, Poppyseed, Sunflower, Grape seed, Hemp, Corn; Wheat germ, oil, Soy, Cottonseed; (CLA - Conjugated LA) = LA isomers; in Beef, Milk	**Linolenic ALA** <10% conversion to EPA (12) Flax seed, Pumpkin seed, Chia seeds; Flax seed oil, Canola oil; English Walnuts 2.5 g ALA/oz	Butter, Lard, Egg yolks (390mg/yolk), Beef Liver; Chicken, turkey, beef, lamb, pork ~30-100 g / 100 g of food:	Fatty Fish (>1 g/100 g) Salmon, Oysters, Mackerel, Sardines, Herring, Trout; Fish Oil; Krill; Enriched Eggs (13) Supplements	Olive Oil (an O-9 oil); Macadamia nuts; Peanuts, peanut oil; Safflower oil	Meat; Dairy; Chocolate; Coconut

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O-6:O-3 ratio, etc.). Food sources vary (Atlantic, Chinook and Sockeye salmon vary substantially in EPA & DHA content) and fats and oils are mixtures of fatty acids.

Caution/Contra-indications

Large Doses: Possible symptoms include nausea, diarrhea, belching, bad taste in mouth.

Bleeding: Intakes up to 3 g/day of long-chain omega-3 fatty acids (EPA and DHA) are Generally Recognized as Safe (GRAS) (33).

Oregon State University advises that high doses of black currant seed oil, borage seed oil, evening primrose oil, flaxseed oil, and fish oil may inhibit platelet aggregation; therefore, these supplements should be used with caution in people on anticoagulant medications (34). Web MD advises that EPA and DHA differ in this respect, and that DHA has not been associated with bleeding problems (24).

Taking fish oil with herbs that slow clotting might cause bleeding in some people. These herbs include angelica, clove, danshen, garlic, ginger, ginkgo, Panax ginseng, red clover, turmeric, willow, and others (2).

Toxicity: *Vitamin A:* Natural fish oil sources may provide toxic levels of Vitamin A.

Mercury: Shark, swordfish, king mackerel, or tile fish (also known as golden bass or golden snapper) are more likely than other fish to have higher levels of mercury, PCBs, or other toxins. This is especially important for children, who are still developing the CNS. Sardines are low in the food chain and have less chance of accumulating toxins.

Seizures: Because of case reports in 1980 that supplementation with evening primrose oil induced seizure activity in people with undiagnosed temporal lobe epilepsy, people with a history of seizures or seizure disorder, and those on selected psychiatric medications, are generally advised to avoid evening primrose oil and other gamma-linolenic acid-rich oils (35). Further assessment in 2007 reported by B.K. Puri has concluded that such precaution is not necessary (36).

Sensitivity: Individuals with allergies to fish or fish oil or specific nuts should avoid supplements derived from their allergen.

Diabetes: The NIH drug information website reports that taking omega-3 fatty acid supplements does not increase fasting blood sugar levels (2).

Table 3. Recommendations for Intake of Essential Fatty Acids

Source	Intake Recommendation
Dietary Reference Intakes (DRI) Adequate Intake (AI); AMDR (Acceptable Macronutrient Distribution Range)	Linolenic Acid (ALA) 0.6 - 1.2% of kcal Adult males - 1.6 grams/day Adult females - 1.1 grams/day LA Children (0-18 yr) males - 0.5-1.6 g/d Children (0-18- yrs) females – 0.5-1.1 g/d Linoleic Acid (LA) 2-3% of kcal Adult males – 14-17 grams/day Adult females – 11-12 grams/day Children (0-18 yrs) males - 4.4- 16.0 g/d Children (0-18 yrs) females - 4.4-12.0 g/d
Hibbeln et al.(19)	A healthy dietary allowance for n-3 LCFAs for current U.S. diets was estimated at 3.5 g/d for a 2000 kcal diet. This allowance can likely be reduced to one-tenth of that amount by consuming fewer n-6 fats.
Hibbeln, Joseph R.(20)	O-3 Fatty Acids: 500 mg/day are inadequate, 750 mg/day is possibly adequate, 1,000 mg/day (1 gram) is clearly adequate for lowering risk of psychiatric disorders.
The American Heart Association (21)	1 gram (1,000 mg) of O-3 in enriched foods daily. 1.5-3 g/day of EPA+DHA for beneficial health effects.
The National Institutes of Health (2)	Foods that provide 650 mg per day of O-3 fatty acids.
World Health Organization-North Atlantic Treaty Organization (22)	0.3-0.5 g/day of EPA+DHA.
Joint FAO/WHO Expert Consultation on Fats and Fatty Acids in Human Nutrition Final report of the expert consultation March 17, 2011 (23)	The total diet should provide infants with at least 3–4.5% energy from LA and 0.4-0.6% energy intake from ALA to meet EFA requirements. Very high intakes of EFA confer no advantage and are associated with potential health risks. Intake of LA and other n-6 fatty acids should be limited to <10% of energy and intake of total polyunsaturated fatty acids should be limited to <15% of energy.
Web MD (24)	Experts recommend 1 gram (1,000 milligrams) of combined DHA and EPA from fish oil daily for those with heart disease. Doses of up to 4 grams a day for specific purposes, under a doctor's supervision.
Bloch MH and Qawasmi A. (25)	"Given its relatively benign side-effect profile and evidence of modest efficacy, it may be reasonable to use omega-3 fatty supplementation to augment traditional pharmacologic interventions for ADHD for families who decline other psychopharmacologic options."
Andrew Weil, MD (26)	Fish oil has been used at one to three grams daily to help alleviate the symptoms of ADHD in children, but Dr. Weil believes the evidence is clear that all children can benefit from eating cold-water, oily fish at least twice weekly or from supplementing with one gram of fish oil daily.

Conclusion

Essential fatty acids influence structure and function of the brain, nerves, cell membranes, as well as enzyme levels and function. The American diet has typically not been balanced in type or amounts of these fats. Imbalances have potential for influencing mood and behavior across the life span. Dietitians in Behavioral Health can impact patient's mental and physical health by including essential fatty acids in nutritional assessments and recommendations.

About the Author

Dr. Wallace practiced clinically for 30 years in the field of nutrition and mental helath. She has published several books, the most recent in January 2013 entitled *Nutrition and Mental Health* (for more information see http://www.crcpress.com/product/isbn/9781439863350). She can be contacted at rthlys@cox.net.

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Calculation of EFA goals used in Table 4:

Goal: **2000 kcal; 25% fat** = 500 kcal Total fat; = 500/9 = **55 grams total fat/day;**
15g of 55 as Sat & MUFA fat (~1/4 of fat intake), leaves **40 grams fat to be used from EFA.**
66% of 40 grams as O-6 : need **26 Grams O-6**
33% of 40 grams as O-3 : need **13 g O-3 fat** [26g:13g = 2:1 ratio]
With total of **1 gram EPA+DHA, with ratio of 2:1.**

Table 4. One Example of Food Selections to Meet EFA Goals for Adult Female

Goals	**2000 kcal**	**500**	**55**		**26 g Ratio 2:**	**1 13 g**	**Ratio 2:**	**1**
Food	**Serving**	**% kcal from fat**	**g Total fat**	**g PUFA (27)**	**g O=6 (28) Linoleic GLA**	**g O-3 Linolenic ALA**	***EPA***	***DHA***
Olive oil	1 tsp	41	4.5	0	1.8	3.56	0	0
Lean beef	1 oz	33	3.6	0.14	0	0	0	0
Sunflower oil	6 tsp	234	25.7	21.4	16.2	0		
Walnuts (29)	0.5 oz (7 halves)	79	8.8	6.6	5.3	1.3		
Wild type Salmon (30)	6 oz.	78	8.6	2.16	0.096	0.094	0.341	0.559
Flaxseed oil (31,32)	3 tsp	132	15	0	2.25	8.26		
Fish oil supplement Nordic Ultimate Omega-3 w/D_3	1 soft gel	18	2				0.325	0.225
Totals		**615**	**68**	**30.3 g**	**25.6**	**13.2 g**	**.666 g**	**.784 g**
		31% of calories			Ratio 1.9:	1	Ratio 1:	1.2
A I-Adult Females					LA 11-12 g	ALA 1.1 g		

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CPE credit (1 hour) is available from BHN for the full text version of the article, Essential Fatty Acids in Behavioral Health. Access the article at http://bhndpg.org/index.asp and http://www.bhndpg.org/cpes.asp for reading/taking the quiz.

Caterina Ciavattella

Violence and Aggression Linked with Diet: Scientific Evidences Demonstrate Beneficial Effects of Food on Aggressive Behavior

By Caterina Ciavattella, Dietitian

Introduction

Our modern society is characterized by a worrying high rate of violence and excessively aggressive behavior: bullying, physical and verbal maltreatment, crime, homicide, suicide are the most striking manifestations. Many factors may influence behavior, such as environment, culture, family attitudes, society, and neurobiology. It has been suggested that deficiencies of some nutrients, such as omega-3 polyunsaturated fatty acids (PUFAs) and micronutrients, of which modern Western diet is often low, may play a role in pathophysiology of a wide range of psychiatric disorders, such as depression, suicidal tendencies and aggressive disorders (1,2), due to their effects on structure and function of the brain.

A large number of supplementation trials investigating whether improving diet may improve behavior have been conducted in the recent years, nevertheless the same authors admit that results are sometimes controversial and there are few well-designed studies. Moreover, a proper assessment of the effects of food or nutrient on behavior is more difficult than a pharmaceutical drug, which is a substance foreign to the body and generally more potent, pharmacologically speaking.

In light of the seriousness of the problem, and because of the low cost and innocuity of food, further research into the role of nutrition in brain and behavior should be supported and commissioned.

As the use of food, even in the light of scientific uncertainty, cannot be as dangerous as to use a drug, more attention by health care professionals should be given to this field, at least considering the possible preventive function of nutrition on brain health, especially with regards to pregnant women and children.

Omega-3 and Omega-6 PUFAs

Omega-3 and omega-6 PUFAs are called "essential" because humans (and other mammalians) cannot synthesize them. Fish, vegetable oils, seeds, walnuts and leafy vegetables (in particular wild plants) are the principal food sources of essential fatty acids. Both short-chain omega-3 and omega-6 PUFAs linoleic acid (LA) 18:2ω-6 and alpha-linolenic acid (ALA) 18:3ω-3 use the same enzymes for desaturation and elongation in arachidonic acid (AA) (from LA), eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) (from ALA), which are very long-chain PUFAs (LC-PUFAs), active in the brain (3).

Since omega-6 PUFAs and omega-3 PUFAs have opposite effects, the balance of omega-6 and omega-3, not only the amount of their intake, is important for homeostasis and normal development. The healthy omega-6/omega-3 ratio should be about 1:1, as during evolution, when our genetic constitution was selected (4). Modern Western diets provide a larger amount of omega-6 PUFAs, with ratios of between 10:1 to 30:1 (5), due to both the higher intake of omega-6 PUFAs and lower intake of omega-3 PUFAs. Western diets are also rich in *trans*-fatty acids, which interfere with aforementioned enzymatic pathway (6). Considering these limitations, the intake of pre-formed EPA and DHA seems to be better. Oily fish is the main dietary source, and just fish consumption and fish oil supplementation are often considered in studies.

As recently reviewed by Hamazaki & Hamazaki (7), both intervention and observational studies indicated that fish oil supplementation, in the major part of trials considered, improved aggression/hostility (both in healthy and non-healthy children and adults) and there was inverse relationship between fish consumption and/or plasma fatty acid composition and aggression/hostility.

A cross-national ecological analysis correlating seafood intake and rates of homicides showed that these were higher in countries where fish consumption was lower (8). It is also interesting that another study showed positive correlation between higher LA consumption and homicide mortality (9).

The research area of omega-3 PUFAs consumption and aggression is promising but results are often controversial. Furthermore, experimental conditions are often too etherogeneous from each other, and thus it is difficult to generalize results. For example, Hibbeln et al. estimated that healthy dietary allowance of omega-3 LC-PUFAs for current US diets should be 3.5 g/d (for 2000 Kcal diet) (5), but the amount of them administrated in supplementation trials is generally lower.

An example in which this estimation was considered is a placebo-controlled, randomized, double-blind supplementation trial in a group of substance abusers at risk for high-frequency and high-severity aggressive behaviors (10)

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and for nutritional deficiencies (11) in which 3 g of omega-3 PUFAs or a placebo were administrated for three months. Notably, at the start of this trial (among other data) a one-month diet questionnaire was obtained and both omega-6 and omega-3 PUFAs intakes were calculated. Both groups consumed less than 500 mg/d of LC-PUFAs, as recommended by the *International Society for the Study of Fatty Acids and Lipids* (12). There were no changes in PUFA intake over time. Interestingly at its baseline, patients with history of assaultive behavior had lower fish consumption. Result of this trial was that anger and anxiety scores decreased more significantly in PUFA group than placebo group, and it was associated with decreases in omega-6 LC-PUFAs and increases in omega-3 LC-PUFAs plasma levels. Even though the patient number was small (n=24), calculated effect size was large (f=0,53) (13) (14). The authors stated that this study needs to be replicated in larger samples, however they believe that omega-3 supplementation could be already considered in subjects presumably deficient in these nutrients, for instance substance abusers, because of their low costs, high tolerability and other beneficial effects on health as in cardiovascular disease prevention (15).

Hamazaki & Hamazaki (7) observed that there are some factors that may determine behavior improvements correlated with omega-3 PUFAs supplementation: the presence of stressor, or physical/environmental conditions that may be considered as a stressor, and the intake of omega-6 PUFAs. Furthermore, it is likely that omega-3 PUFAs may be ineffective in non-deficient subjects, which could explain some controversial results. Simopoulos also suggested that behavioral factors as smoking, alcohol consumption, and poor sleep quality can decrease omega-3 PUFAs availability due to the increased free radical production (4). Buydens-Branchey noted that plasma increase in EPA was mainly associated with low anxiety scores, whereas DHA increase was mainly associated with low anger scores (14). Hibbeln suggested that dietary allowance of omega-3 LC-PUFAs for current US diets should be about 3.5 g/d (for 2000 Kcal diet), reducible if omega-6 PUFAs intake decreases (5). These are some important suggestions to be taken into account for future research.

How omega-3 PUFAs may improve behavior may be explained by their role in development and maintenance of the brain. This topic is beyond the scope of this work, however something about links between omega-3 PUFAs and serotonergic function can be mentioned. Altered serotonergic function has been implicated in aggression, impulsivity, and other aggression-related conditions (i.e. 16). Hibbeln et al. observed that higher concentrations of 5-hydroxyindole acetic acid (5-HIAA), the most important serotonin's metabolite, in cerebrospinal fluid (CSF) were associated with higher plasma DHA in healthy subjects, late-onset alcoholics, and violent individuals (17,18).

Membrane fatty acid composition may be implicated in the activity of tryptophane hydroxilase, serotonergic reuptake pump and serotonergic receptors. Furthermore, early omega-3 PUFAs deficiency may decrease serotonergic neurons and synapses (19).

These findings suggest that one way in which omega-3 PUFAs supplementation may improve aggression could be the normalization of serotonergic neurotransmission, or at least its improving. Another interesting way may be anti-inflammatory effect of omega-3 PUFAs, particularly on stress-induced proinflammatory response (20).

Micronutrients

Western diets are often low in micronutrients. It has been estimated that in spite of the high availability of food, U.S. diet is low in fruit consumption, variety of vegetables is limited, deficiencies in iron and zinc are relatively common, and food fortification largely contributes to excess micronutrient intake (21). However, it is worrying that from 2000 to 2006 fruit and vegetable intake and also levels of some micronutrients decreased, for example, potassium and vitamin A (22). Furthermore, over time mineral content of vegetables decreased, i.e. calcium, magnesium, iron, copper, sodium, potassium, and phosphorus (23).

This situation could be more serious in some conditions; multiple dietary deficiencies have been observed in a sample of young prisoners: 0% of them had adequate intake of selenium and LC-omega 3 PUFAs, and only 17-33% had adequate intake of vitamin B2, iodine, folic acid, zinc, calcium, iron and magnesium (24).

Reasonably, this is more likely for alcohol and other substance abusers, because of their poor dietary habits, symptoms such as nausea and vomiting, organ damage, decreased appetite, and toxic effect of some substances on micronutrient metabolism (25).

Vitamin and mineral deficiencies are widely linked with mental disorders (i.e.2), and Benton pointed out that often the first symptoms of micronutrient deficiency are psychological (mood, memory, attention) (26), likely because the brain is the most complex and metabolically active organ in the body, thus small changes in micronutrient status, that don't cause clinical symptoms, may instead be enough to cause psychological effects (27).

Schoenthaler et al. noted that in the presence of violence, conduct disorders, low non-verbal intelligence and poor academic performance in children, subclinical malnutrition could exist, defined as precursor of overt malnutrition characterized by observable behavioral abnormalities but lack of physical signs. They pointed out that vitamin and mineral Recommended Daily Allowance (RDA) goals should be rethought in order to ensure not only absence of clinical signs of deficiency, but optimal health and behavioral performance (28).

Because micronutrients don't work singularly, and deficiencies due to diet are rarely selective, a multi-vitamin and mineral supplement is likely the most suitable solution. There have been positive results of open trials in which diet improvement or micronutrient supplementation were followed by reduction of violence and rule infractions among prisoners, reviewed by Schoenthaler et al. (28), and more recently double-blind trials have been conducted in order to overcome methodological limitations.

In young prisoners with diagnosis of "Aggressive" (using DSM-III criteria, then in force) violence decreased significantly in those receiving a supplement for three months. It contained 300% of US RDAs of most vitamins and 100% or less of US RDAs for minerals. One of the most remarkable results was that positive results were appreciable only in

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those showing ameliorations in blood micronutrient concentrations, hence not in all subjects receiving supplementation (29). Similar findings were reported with lower doses of vitamins and minerals (50% of US RDAs) in American schoolchildren in which violent and antisocial behavior were tested (30).

Another well designed trial was conducted in United Kingdom among young adult prisoners using a vitamin-mineral and essential fatty acid supplement. The most remarkable improvements occurred for the most serious offences, including violence (31), but because of the presence of essential fatty acids in the supplement, it is difficult to establish which of the two classes of nutrients has had the greatest impact.

A criticism that has been argued to this type of research is that institutions are an atypical context in which behavioral measurement may be influenced by many other factors than nutritional status, and it means that the usefulness of an hypothetical preventive use of diet on antisocial behavior or aggression may be overestimated. The authors noted, however, that observed effect on behavior is physiological, not psychological, and that nutritional requirements, as far as it is known, don't change depending on the environmental context (31).

More recently another trial (Dutch) was conducted among young adult prisoners, but the results were less striking, perhaps because some limitations may be encountered, for example blood samples were not collected and thus there are no data about blood vitamin and mineral concentrations at the start and at the end of the trial. However, no data on dietary habits was available, and it seems that at some point the participants would become able to distinguish active capsules from placebo (32).

Discussion

An ongoing trial (24), from which highly significant results are expected, may be an important confirmation of the role of diet on prevention and treatment of violent and aggressive behaviors that cannot be ignored by psychologists, psychiatrists, physicians and also by Departments of Justice and Departments of Health. Moreover, if results are positive (as expected), dietitians should be considered in prevention and treatment of behavioral disorders, to identify and treat both individuals and groups at risk for or showing aggression and violence, as is currently the case in the treatment of cardiovascular desease and diabetes.

Unfortunately very few mental health professionals ask patients about their diet, or consider the restoration of nutritional status as important as pharmacological and psychological therapy, although often it is evident or presumable that nutritional deficiencies may occur.

If the role of nutrition in aggression and violence becomes more widely accepted, and its preventive and therapeutic use more widespread, there will be some issues to be taken into account. For example, will there be a need to use supplements or will it be possible to use only food?

In their early studies, Schoenthaler et al. only modified the diet of young prisoners (33,34), but it was enough to have improvement in behavior. Gesch et al. in their supplementation trial pointed out that food could provide sufficient amount of micronutrients, but use of nutritional supplement was needed because of its known quantity of vitamins and minerals and because of possible administration to a control group of a placebo resembling in appearance and in taste (31).

However, experience shows that it is not always simple to replace some nutrients only with food when there is an overt deficiency, as with iron. It is likely that the better approach is personalized for each case. Likely, if subclinical deficiencies are considered, improving diet may be effective, whereas in the presence of general malnutrition, substance abuse or anorexia the use of a supplement may be more appropriate. As might be expected, regarding the omega-3 PUFAs intake, an important factor that must be considered is also the estimation of omega-6 PUFAs intake, and in order to normalize the omega6/omega3 ratio it will be evaluated only if food intake is sufficient.

With regard to omega-3 PUFAs intake, two important questions have been raised: one is about chemical contaminants on fish, whose risk may be greater for pregnant and nursing women and children. Although the beneficial effects of fish consumption seem to be greater than the risks (35), it is more prudent to eat fish low in mercury, such as anchovies, crowfish, herring, mackerel, salmon, and sardines (36). Unfortunately, mercury is not the sole chemical contaminant, also dioxin, for example, is a contaminant detrimental for health. However, meat and dairy products also contain dioxine and other contaminants (37).

The second question concerns the vegetarian and vegan diets, in which neither fish nor fish oil could be considered as sources of LC-PUFAs. The first consideration is to increase attention to omega-6 PUFAs intake in order to control competition of omega-6 PUFAs with elongation of short chain omega-3s, which are contained in vegetable sources. Moreover, vegetarian and vegan people may eat food enriched with microalgae DHA.

In conclusion, in healthy people and in certain contexts in which the risk is high, nutrition therapy in prevention and treatment of aggressive disorders and violence, is a cost effective, safe and useful approach. Nutritional assessment and treatment for these purposes may easily be carried out, for example in school, prisons and in substance abuse recovery, as well as in individuals showing aggression and violence. Dietitians in the behavioral health arena should advocate for and demonstrate the value of nutrition therapy in the treatment of aggressive behavior.

About the Author

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Scott E. Moseman, MD

This Is Your Brain, This Is Your Brain on Food

Scott E. Moseman, MD

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Sports, Cardiovascular, and Wellness Nutrition (SCAN), Academy of Nutrition and Dietetics, Chicago, IL.

With more than 100 million neurons supporting trillions of connections, processes of the human brain are a manifestation of genetic variation, natural selection, and the environments in which our ancestors lived. Due to the essential relationship of food to our survival and the ensuing evolutionary pressures, a significant portion of the human brain is dedicated to the motivational, emotional, hedonic, and cognitive information processing that supports decisions about when, what, and how much we eat.[1] Given the complexity of these neural systems, it should come as no surprise that aberrations in their activity and neuroarchitecture can lead to a variety of pathologic eating behaviors that can take many forms, including overfeeding (e.g., obesity), dysregulated feeding (e.g., binge eating and bulimia nervosa), and feeding that fails to meet the body's energy needs (e.g., anorexia nervosa). Although it is not the intention of the author to claim that these disorders form a continuous spectrum of illness with common pathophysiologies, it may be useful to think about how the complex manifestations of certain eating pathologies may illuminate the breadth and depth of the neural circuitry that underlie feeding behavior. To this end, this article examines the neural bases of food reward processing in obesity and anorexia nervosa.

Mechanisms of Food Regulation

Most models of food regulation offer two parallel systems that interact to influence eating behaviors.[2] One system is a homeostatic system comprising hormonal regulators of hunger, satiety, and adiposity levels. The primary role of this system is to maintain appropriate levels of energy balance through a complex process of metabolic signaling via neuropeptides (e.g., leptin, ghrelin, and insulin) that act on hypothalamic and brainstem circuits to stimulate or inhibit feeding.[3] This system controls feeding to meet the body's energy needs.

In addition to these homeostatic mechanisms, brain reward systems also play an important role in feeding behavior.[4] It is these systems that drive us to eat because foods taste good and offer hedonic pleasure. Although it is not proposed that obesity and anorexia lie solely at opposite ends of a reward spectrum, it is nevertheless interesting to note how differences in food reward mechanisms appear to at least partially underlie the different unhealthful behaviors observed in obesity and anorexia.

Obesity and Reward

Easy access to palatable, energy-dense foods is a major environmental risk factor of obesity. For many individuals, the positive reinforcing nature of these foods is a powerful motivator that easily overrides homeostatic signals of satiety.[5,6] As a result, much of the recent surge in the prevalence of obesity is thought to be due to overconsumption of palatable food. The macronutrients in palatable foods can stimulant brain reward systems in similar ways to drugs of abuse such as cocaine and nicotine.[5] For example, mice will voluntarily expose themselves to extreme cold, noxious heat pain, or aversive shock in order to obtain palatable food items, similar to findings from studies involving addictive drugs.[5,7] As a result, some researchers have speculated that certain forms of overeating in obesity and excessive drug use in addiction are parallel disorders.[5]

From an evolutionary perspective, the seeking out of simple sugars and carbohydrates as a fast, easy way to obtain energy led to improved survivability, so it was advantageous to have the activity of brain reward systems closely tied to the consumption of these types of foods. This close coordination made sense in an environment where energy-dense foods were scarce, particularly among more nomadic populations whose daily activity levels were much higher, thereby placing a premium on instant fueling. This close coordination, however, can be disastrous in a world with ubiquitous access to fast food drive-through restaurants and frequent opportunities to spend a day sedentarily watching football.

The neural circuits most often implicated in reward are the mesocorticolimbic dopamine circuit and associated limbic structures, most notably including regions of the midbrain, the orbitofrontal cortex, ventral and dorsal stratium, ventral pallidum, amygdala, hypothalamus, and insula.[8] All of these areas encode some aspect of the hedonic pleasure or motivation for diverse reward stimuli (e.g., food, sex, drugs). In addition, certain regions of the orbitofrontal cortex play a prominent role in the valuation of specific rewards including palatable foods. Importantly, the activity of the described food reward neurocircuit is subject to at least some influence from the homeostatic feeding system. Brain reward regions are more active for palatable foods in hungry subjects versus satiated subjects.[9] Similarly, activity in brain reward regions can be downregulated by metabolic signals such as leptin and ghrelin, and by gastric distention (which can be artificially produced through gastric bypass or other gastric reduction procedures).

An important and as-yet unresolved question is whether stimulation of brain reward circuitry can actually cause obesity in some individuals. Obese individuals demonstrate increased activation of brain reward regions compared with lean controls.[10] It has also been proposed that striatal reward responses to acute food pleasure undergo accommodation with increasing weight, making greater amounts of palatable food necessary to obtain the same effect and thereby perpetuating the cycle of overeating and weight gain.[11] Certainly more research into these circuits, their genetics, and propensity to override

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homeostatic systems will be important if we are to address the personal and public health consequences of obesity.

Anorexia Nervosa and Reward

Unlike the common condition of obesity, anorexia nervosa affects about 1% of the population and presents as a more homogenous disorder, characterized by individuals with a high-achieving, harm-avoidant temperament who, generally during their adolescent years, begin the pursuit of food restriction and weight loss to the detriment of their health and livelihood.[12] Many neural systems have been implicated in this complex, multidimensional illness, including serotonergic systems that regulate anxiety as well parietal circuits that appear to underlie the representation of body image. This article, however, focuses on the reward and hedonic properties of food, and their relationship to this disorder.

There appear to be multiple ways in which food reward processing is abnormal in anorexia. For example, evidence demonstrates that patients with anorexia may experience food as less rewarding because of heightened viscerosensitivity. It has been noted that individuals with anorexia have high rates of premorbid digestive problems and childhood picky eating, which might interfere with the normal dopaminergic reward responses associated with food.[13,14] Alternatively, research has also shown that there are decreased dopamine levels generally in the cerebrospinal fluid of individuals with anorexia.[15] Finally, those with anorexia may experience palatable taste differently, thereby leading to different reward responses.[16]

Research demonstrates that areas such as the insula, amygdala, anterior cingulate cortex (ACC), and striatum are implicated in reduced food reward in individuals with anorexia nervosa. For example, results from one functional magnetic resonance imaging (fMRI) study revealed that recovered individuals with anorexia who were administered sucrose or water exhibited reduced activation in the insula, ACC, and striatum compared with healthy controls. It is interesting to note that individuals with anorexia also reported that they experienced the sucrose solution as less pleasant than did healthy control subjects.[16]

Finally, the literature provides solid research on the roles played by the insula in reward representation in anorexia. The insula is crucially involved in diverse sensory, cognitive, and affective functions, including interoceptive awareness, taste perception, and emotion regulation. There is evidence that individuals with anorexia may have a premorbid propensity for gastrointestinal distress. The resulting aversive visceral sensations they may experience when exposed to food or food-related stimuli may thus fundamentally alter the reward-related properties of food and result in a negative emotional bias towards food. Over time, this conditioned behavior could lead to food avoidance, thereby altering the reward responses normally experienced by most individuals when exposed to palatable food.[12]

Concluding Thoughts

The scientific findings highlighted in this article barely scratch the surface of the complex neurocircuitry involved in regulating appetite, weight, and reward. Clearly, the pathophysiologies of obesity and anorexia cannot be solely accounted for by aberrations within the brain's reward regions. It is hoped that by considering how reward neurocircuitry contributes to these disorders, health practitioners will better understand the complex ways in which the human brain regulates food-related decision making and feeding behaviors, and will find paths toward better treatment for those who struggle daily with these conditions.

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Contribute an article or topic for future BHN*ewsletter* issues!

Contact www.newsletter@bhndpg.org or one of the BHN leaders listed in this newsletter.

Food Insecurity—Raising Awareness and Finding Solutions

Harriet H. Cloud, MS, RD, BHN-DPG Delegate

Harriet H. Cloud, MS, RD

The House of Delegates of the Academy of Nutrition and Dietetics chose the topic of Food and Nutrition Insecurity for the Spring Virtual Meeting of the House with a goal of increasing entire membership awareness of this timely subject.

Defining the problem

Food insecurity is defined as "the uncertainty within a household of having enough food to meet the needs of all its members because of insufficient money or other resources" (1). Nutrition security is when "all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (2).

History and Development of Programs

Food insecurity, which has always existed in the United States, has long been addressed by churches, volunteer groups, food banks, shelters, and food pantries. The first governmental assistance program began in 1946 with the National School Lunch Program, followed by the Supplemental Nutrition Assistance Program (SNAP, formerly Food Stamps) and other special programs for vulnerable groups. During the Kennedy administration, hunger as a policy issue was a priority, and legislation led to doubling of the Surplus Commodity Program and restoration of the Food Stamp program, which had been terminated during the Eisenhower administration (3). In 1969, Congress responded to a group of physicians who reported stunning evidence of childhood hunger and sickness (4), by passing legislation to expand the Food Stamp Program, and implement the School Breakfast program, free and reduced price meals, summer feeding programs and the Supplemental Nutrition Program for Women, Infants and Children (WIC). Significantly, all of these programs, with the exception of the WIC program, were entitlement programs, meaning that if the need of a state or locality increased, funding would increase to meet that need. In contrast, senior nutrition programs such as Meals on Wheels, Supplemental Commodity programs and congregate feeding and dining programs are discretionary programs and their funding has not increased to keep up with the need.

How Great is the Problem?

In recent years, high unemployment rates in the United States, coupled with decreased government funding of programs designed to address food insecurity has brought this issue to the forefront. The prevalence of food insecurity rose from 11.9% of households in 2004 to 14.9% in 2011. During that time period very low food security increased from 4% to 5.7% causing 50 million Americans, including 8.6 million children, to meet food insecure criteria. Highest rates of food insecurity occurred in the southern tier of states and among Hispanic and African American populations. Very low food insecurity is most prevalent in the following groups:

- Households with children headed by a single woman 11.5%
- Households with children headed by a single man 7.5%
- Women and men living alone 7.9%
- Black, non-Hispanic households 10.5%
- Hispanic households 8.3%
- Households with incomes below 185% of the poverty line 14.2%
- Households located in principal cities of metropolitan areas 6.8%

As a result of concern for the implications of food insecurity on health, education, learning capacity in children, and crime rates, one of the government's public health initiatives is to reduce and/or eliminate U.S. food insecurity by 2015 (5). One of the US Department of Health and Human Services Healthy People 2020 goals is to reduce food insecurity from 14% to 6% of the US population and to eliminate very low food security among children (6).

Health and Nutrition Implications of Food Insecurity

Food insecurity is part of a complex of potentially serious health and developmental conditions including overweight and weight gain; adverse health outcomes of infants and toddlers; behavior problems in preschool-aged children, low achievement in kindergarteners and depressive disorder and suicidal symptoms in adolescents (7). Several studies have demonstrated a relationship between food insecurity and poor nutrient intake. The relationship between obesity and food insecurity has been identified as complex and research studies have published mixed results. Common factors which can lead to increased weight include wide swings in calorie consumption caused by irregular periods of food availability; family stress related to concerns about housing, employment, health care, finances, and unsafe neighborhoods (8); and lack of transportation to stores that offer a variety of healthy foods. Low-income neighborhoods are more likely to have fast-food restaurants and convenience stores that sell inexpensive, high-calorie foods.

Individuals with Disabilities

Among the groups most food insecure are adults unable to work due to disability. An estimated 38 percent of households with very low food security included an adult with a disability e.g. hearing, vision, mental illness, mental retardation, physical, self-care or going-outside-home disability (9). Disabilities often lead to reductions in earnings for the person with the disability as well as household members who care for the disabled individual. Individuals with disabilities may have difficulty shopping for food, preparing healthy meals and managing food resources.

Infants, children and adolescents with developmental disabilities and

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special health care needs (including Down syndrome, Cerebral Palsy, Spina Bifida, prematurity, spinal cord injuries, and metabolic disorders which require special formulas) make up approximately 17 % of the population. Although programs exist to provide nutrition and counseling, many families require guidance in being included in the program. Furthermore, studies have shown that inclusion in these programs does not guarantee higher dietary quality. This may be related to utilizing assistance unwisely, such as providing excessive amounts of the formula provided under the program and purchasing lesser amounts of fruits and vegetables to improve the nutritional quality of the diet (8).

Other Vulnerable Groups

Studies have indicated that elderly adults, living alone or dependent on home delivered meals, have inadequate intake of many key nutrients and individuals living with poor access to food may consume diets deficient in particular food groups and nutrients, thus increasing the risk of poor health (10). In 2008 the Food Research and Action Center reported that 8.1% of households with elderly members were food insecure. The rates doubled when seniors on low incomes were raising children. It was estimated that 1 in 5 seniors had incomes below 150% of the federal poverty line. Food insecurity among the elderly increases disability, decreases resistance to infection and extends hospital stays (10). Only an estimated 35% of eligible seniors participate in SNAP compared to 85.8% of eligible children and 67% of the overall eligible population. Because numerous programs exist for children under age five, food insufficiency is more prevalent among older children and adults.

Table 1. Partnerships

The following table lists the organizations that the Academy is currently partnered with to address food insecurity. A description of the organization's work is provided. Each organization collaborates with the Academy in legislative and public policy efforts to provide adequate and healthy food to Americans.

Organization	Background
Feeding America http://feedingamerica.org	Feeding America is the nation's leading domestic hunger-relief charity. Our mission is to feed America's hungry through a nationwide network of member food banks and engage our country in the fight to end hunger.
Food and Research Action Center (FRAC) http://frac.org/	The Food Research and Action Center (FRAC) is the leading national nonprofit organization working to improve public policies and public-private partnerships to eradicate hunger and undernutrition in the United States.
Bread for the World www.bread.org	Bread for the world is a collective Christian voice urging our nation's leaders to end hunger at home and abroad. As a non-profit, Bread for the World works in a bipartisan way. Our network of thousands of individual members, churches, and denominations ensures Bread's presence in all U.S. congressional districts. Together, we build the political commitment needed to overcome hunger and poverty.
Congressional Hunger Center http://www.hungercenter.org	The Congressional Hunger Center (CHC) is a 501(c)3 nonprofit that works to make issues of domestic and international hunger a priority to policymakers in the U.S. government, and to raise a new generation of leaders to fight against hunger and poverty.
National Association of Aging and Nutrition Programs http://www.nanasp.org	NANASP is proud to be a leading organization advocating for community-based senior nutrition programs and their staff. NANASP was instrumental in the recent reauthorization of the Older Americans Act.
Meals on Wheels Association http://www.mowaa.org/	The Meals on Wheels Association of America is the oldest and largest national organization composed of and representing local, community-based Senior Nutrition Programs in all 50 U.S. states, as well as the U.S. Territories.
Share Our Strength http://www.nokidhungry.org/	Share our Strength's No Kid Hungry campaign is ending childhood hunger in America by ensuring all children get the health food they need, every day. The No Kid Hungry campaign connects kids in need with nutritious food and teaches their families how to cook healthy, affordable meals. The campaign also engages the public to make ending childhood hunger a national priority.

Role of the Academy of Nutrition and Dietetics

The Academy's 2010 revision of the 2006 position paper on food insecurity reads as follows: "It is the position of the American Dietetic Association that systematic and sustained action is needed to achieve food and nutrition security for all in the United States. To eliminate food insecurity, interventions are needed, including adequate funding for and increased utilization of food and nutrition assistance programs, inclusion of food and nutrition education in such programs and innovative programs to promote and support individual and household economic self-sufficiency" (7).

In the spring of 2013, the House of Delegates held a virtual meeting with an objective of raising Academy members' awareness of the prevalence and consequences of national food and nutrition insecurity as well as current Academy initiatives. The second objective was to demonstrate commitment and inspire members to support and promote the Academy's policy and advocacy program and take action at local and state levels.

The first discussion, which related to interest and concern about this topic, was amazing. Many Academy members recognized their limited awareness of food insecurity and how to address it. In the second discussion members identified the unique qualities and contributions which position the dietetic professional to lead efforts to end local, state and national food and nutrition insecurity. Suggestions for local efforts included volunteering at food banks; teaching at farmers markets; developing food pantries for special diets (e.g. gluten free, allergies, diabetes); and offering more referrals to available resources in our clinical and counseling practice. Suggestions for the state level included serving on state hunger

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organizations and building relationships with legislators to be included on committees looking at food insecurity. At the national level increased work is needed toward educating members and students in food policy and advocacy and promoting recognition of RD/RDNs as the food and nutrition experts.

The third area of discussion involved one's ethical and/or social responsibility to share knowledge and create solutions. The discussion clearly challenged delegates to creatively work within their constituency to increase awareness and develop projects with existing groups at the local association level. A major conclusion of this HOD meeting was to develop a task force on food insecurity to continue discussion and share information with Academy members.

Solutions and Challenges

Food insecurity is an issue which requires participation of the Academy, as an organization, as well as individual dietetic practitioners to provide opportunities for solutions. One solution has been partnering with organizations that primarily address food insecurity e.g. food banks, public policy groups and advocacy groups (Table 1).
Another solution is addressing the lack of knowledge of federal food and nutrition programs by making familiarity with the utilization of those programs an inherent part of dietetic practice and dietetic student education.

Food insecurity is a major, somewhat overwhelming issue; however raising awareness among Academy members and challenging them for solutions at the state and local level is possible. Many ideas were expressed during the Spring Meeting and activities by dietitians are an inevitable outcome. Nevertheless, working to find solutions for food insecurity remains a remarkable challenge for this profession and the Academy of Nutrition and Dietetics.

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Collaborative Webinar Coming Soon!

Behavioral Health Nutrition & Hunger and Environmental Nutrition Dietetic Practice Groups

Topic: Many of our clients who struggle with mental illness have nutritional deficiencies and it can be challenging to identify ways for clients to improve their health through good nutrition. This webinar will help practitioners identify nutrient deficiencies among their clients as well as identify creative strategies to help improve health, including individual gardens, community gardens, facility gardens as well as utilizing farmers markets and grocery stores.

Date: TBA

Time: TBA

Cost: $25.00 for BHN and HEN members/ $35.00 for non members

Watch your e-mail, BHN's social media and Web site for details on how to register.

Take your passion for Behavioral Health Nutrition to the next level: Become an officer or volunteer for BHN!

With one simple commitment, you can grow your skills for communication, advocacy and leadership on a national level. Connect with amazing colleagues while making a real impact in promoting the dietitian's role in behavioral health.

Officer nominations needed for the following 2014 positions:

Chair-Elect • Secretary
Nominating Committee

Volunteers are needed for publications, public relations, social media and student committees.

If you would like to volunteer or nominate a fellow BHN member, please contact Wendy Wittenbrook, MA, RD, CSP, LD, Nominating Chair at Wendy.Wittenbrook@tsrh.org.

Deadline for officer nominations is October 31, 2013.

Student Corner:

Health and Nutrition Disparities of People with Serious Mental Illness and Associated Opportunities for Dietetic Students and Professionals


Cynthia Johnson, BS, BA

By Cynthia Johnson, BS, BA

A dietetic student or professional may wonder what avenues exist in behavioral health nutrition in serving people with Serious Mental Illness (SMI) in the community. Recent research into the area reveals that it may require creating opportunities in the system when it comes to food and nutrition among people with SMIs. It's been determined that people with a SMI have a lifespan decreased by 25 years compared to people without SMI, with average age of death at 53 (1). They also have diet-related health issues such as obesity, diabetes, hypertension and cardiovascular disease in disproportionately higher numbers than the general population. It has been described as "an epidemic within an epidemic" (1).

Currently, most people with a SMI do not have regular check-ups with a primary physician due to various barriers related to their SMI. Some of the contributing factors to their chronic illnesses other than diet are lack of physical activity, smoking, weight gain from psychotropic medications and lack of access to health care services (2).

Several organizations have advocated for a standard among community healthcare providers that integrates behavioral and primary care health, and subsequently the Primary and Behavioral Healthcare Integrated Project was created in 2009 (3). It federally funds community centers integrating primary and behavioral health, with the goal of preventing and treating many of the preventable common chronic illnesses, currently with 100 grantees (4). A recent Substance Abuse and Mental Health Services Administration (SAMHSA) Semi-Annual Reporting Template (7-12/2012) details how grantees spend the funds (5).

The report summaries detail the planned wellness, cooking and nutrition education classes and how they will be provided. These classes and programs are currently being run by other health professionals and students, or non-professionals, with no mention of dietitians or dietetic students.

Additionally, many people with SMI live in board and care homes, otherwise known as Adult Residential Facilities (ARF), dependent on operators and staff to buy and prepare their food. The licensing and certification of these homes is at the discretion of each state, with some states not requiring licensing. The homes range from single-family tract housing with a handful of residents, to apartment buildings housing 50 or more. There is an application process to becoming licensed, but no particular requirements from a nutritional standpoint for homes with less than 50 residents.

For homes with more than 50 residents, the requirement is to have a consultation with a nutritionist, dietitian or home economist for batch cooking safety. This was confirmed by the Community Care Licensing Division Program Analyst for Sacramento, CA, Amanda Blesi (5,6). According to Blesi, the California licensing application requirement for nutrition (and other states) is for the applicant to submit a menu consisting of 3 meals and 2 snacks with their application packet, which is then reviewed by her. Blesi also does the on-site inspections. She does not have a background in nutrition, and relies on "whatever the guidelines from the Food Pyramid are" and looks for food "adequacy" in the kitchen when doing home inspections and application menu review. The inspections are not scheduled, although the facilities are given a 3-month window of when they will occur. Blesi explained that there is no other oversight or criteria as far as nutrition for Adult Residential Facilities (ARF). No nutrition education classes are offered to owners, operators or staff, nor required of them in menu planning (6).

A walk-through of several board and care homes in California from a nutritional perspective ranges from somewhat disappointing to dismal, with some bright spots. Depending on the motivation and knowledge of the owner/operator, there are many opportunities to not just make nutrition "adequate," but rather offer a solid foundation of wholesome, healthy and beneficial forms of nutrition for recovery and health. Considering the effect food has on mood, behavior and overall health, this seems even more important for people with SMI. It is worth noting that some owner/operators plant gardens for their residents, and this would have a therapeutic benefit as well as nutritional.

Although facilities are not allowed to have locked refrigerators, it is a practice that is used. Blesi explained that owner/operators can obtain waivers in certain instances to be able to lock the refrigerators adding, "in cases like pica." Plain hot dogs and peanut butter and jelly sandwiches are a common menu item. Blesi confirmed a high frequency of noticing hot dogs on her inspections (6).

It's clear that a higher standard of nutrition could be afforded people with SMIs in our communities. It seems that is not the current reality, but rather a possibility. As future dietetics and nutrition professionals with an interest in behavioral health in nutrition, we may need to be proactive in creating a place for ourselves at the table in advocating for and meeting the special needs of this underserved and vulnerable population.

About the Author

Cynthia Johnson is a dietetic intern in Sacramento, CA. She can be contacted at sandycyn@yahoo.com

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In the BHN Pipeline!

From the BHN Membership Chair

David A. Wiss, MS, RDN, CPT

As of August 2013, BHN currently has 1512 members, with the highest representation in Clinical Nutrition, followed by dietitians working in Consulting and Private Practice. BHN has 271 students and 14 international members! For those student members, are you aware that BHN has a Facebook group designed to prepare students and interns to become Behavioral Health Nutritionists? Currently there are 32 members in "BHN Students" and we are looking to build this network! Several members of the BHN executive committee are also in this group, and have agreed to be available for mentorship. For more information on how to join, contact our Student Liaison Committee Chair Kelsey Wallour at krunr20@gmail.com.

One of the main benefits of BHN membership is our electronic mailing list (EML). Recently we undertook the annual process of confirming BHN membership for all users of the EML. Thank you to everyone who cooperated with this verification process. For those BHN members who are not members of the EML, I want to encourage you to consider joining! To subscribe, simply send a message to BHN-DPG-subscribe@yahoogroups.com and once confirmed as a current BHN member, you will be added to the yahoo group! You do not need a yahoo address to join. However, if you log in to yahoo with your yahoo, Google, or Facebook account, you can explore the message archives and even access files that have been uploaded over the years. You can also adjust the frequency of the messages you receive to either: individual email, daily digest, or you can set it to receive special notices from the moderator, or to receive none but maintain access to messages via the web.

Recent threads on the EML include: high fiber foods for someone on a pureed diet, intellectual/developmental disability low calorie tube feed, weight manipulation for eating disorder patients, dysphagia videos, emotional fullness, Down Syndrome nutrition resources, and many more! BHN dietitians also use the EML to find a referral for clients in other locations. The EML can be a very effective referral tool as well as an opportunity for members to share resources and information about upcoming learning events. Good communication is critical to advancement of our field. Why not join the conversation? Subscribe to the EML today and reap all of the benefits of BHN membership! Once subscribed, you can post a message to the EML by sending to BHN-DPG@yahoogroups.com and you can unsubscribe at any time by sending a message to BHN-DPG-unsubscribe@yahoogroups.com. If you have any questions, contact the BHN Membership Chair at DavidAWiss@NutritionInRecovery.com.

BHN Honors 50 Year Members

BHN honors member, Ruth Foiles Brunet, of Lansing, MI for her 50th year of Academy membership. Ruth will receive a personalized certificate and complimentary registration to attend the Food & Nutrition Conference & Expo (FNCE) in Houston. The Academy Membership Team and Foundation are planning special activities and honor ceremonies for 50 Year Members to take place at FNCE.

BHN's 51 or more members are:

- Thelma Anderson, RD, CD, Indiana, 1960
- Evelyn Bartlett, Utah, 1959
- Bettie Brigman, BS, California, 1959
- Nancy Casad, MS, RD, LDN, Tennessee, 1961
- Harriet Cloud, MS, RD, Alabama, 1946
- Rita Connelly, RD, Texas, 1953
- Shirley Ekvall, PhD, RD, LD, Ohio, 1957
- Barbara Gaffield, MS, Virginia, 1959
- Anne Hatcher, EdD, RD, Colorado, 1962
- Patricia Hennessey, MS, RD, Montana, 1947
- Lourdes, Labrador, Philippines, 1959
- Dorothea Meagher, RD, LD, Oregon, 1950
- Carol Nealon, RD, Massachusetts, 1960
- Sandra Pechous, RD, LD, Illinois, 1962
- Elizabeth Schenck, RD, CD, Indiana, 1961
- Helen Shannon, MA, RD, LDN, Rhode Island, 1955

Almost Anorexic

Is My (or My Loved One's) Relationship with Food a Problem?

By Jennifer J. Thomas, PhD, and Jenni Schaefer **Book review by: Reba Sloan, MPH, LRD, FAED**

When I read the title of this book, my first thought was would this be one of those shallow self-help books? I found Jenni's other books, Life Without Ed and Goodbye Ed, Hello Me to be wonderfully supportive resources for my clients and their families. I didn't think she could top those efforts. This is one time I am proud to say that I was wrong on both accounts. By co-authoring with Jennifer Thomas, PhD who is a researcher and treats clients with eating disorders, Jenni has indeed hit another home run!

This book clearly depicts how someone might not fit any criteria in a text book or The Diagnostic and Statistical Manual of Mental Disorders, 5th ed., yet reside in the very same mental prison as a patient diagnosed with anorexia nervosa, bulimia nervosa or binge eating disorder. Living in the gray area of what is now called "Feeding and Eating Disorders not Otherwise Classified" (formerly called Eating Disorders not Otherwise Specified) keeps many from seeking help. Often medical professionals let suffering patients slide under the radar because they are not "sick enough". This book is an important read for dieters, any medical professional, parents of adolescents and all registered dietitians. I am personally providing a copy of this book to many of the physicians with whom I collaborate. Unfortunately I have seen far too many patients walk into my office entrenched in severe eating disorders who might have received treatment earlier if a parent or a medical professional had recognized an "almost anorexic" case.

This book is written in an intriguing manner that captivates interest. The graphs, tables and self-tests are practical and valuable. Jenni's insights are spot-on and Dr. Thomas shares many cases and much research that are useful to any clinician working with eating disorders. Most importantly, the book is full of hope and encouragement.

Reba Sloan, MPH, LRD, FAED has a private practice working with clients with eating disorders in Nashville, TN. rf_sloan@msn.com, www.rebasloannutrition.com

In Search of Evidence . . . . .

Genomic and Epigenomic Insights into Nutrition and Brain Disorders

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Received: 25 January 2013; in revised form: 28 February 2013 / Accepted: 8 March 2013 / Published: 15 March 2013; *Nutrients* 2013, 5(3), 887-914; doi:10.3390/nu5030887

Abstract: Considerable evidence links many neuropsychiatric, neurodevelopmental and neurodegenerative disorders with multiple complex interactions between genetics and environmental factors such as nutrition. Mental health problems, autism, eating disorders, Alzheimer's disease, schizophrenia, Parkinson's disease and brain tumors are related to individual variability in numerous protein-coding and non-coding regions of the genome. However, genotype does not necessarily determine neurological phenotype because the epigenome modulates gene expression in response to endogenous and exogenous regulators, throughout the life-cycle. Studies using both genome-wide analysis of multiple genes and comprehensive analysis of specific genes are providing new insights into genetic and epigenetic mechanisms underlying nutrition and neuroscience. This review provides a critical evaluation of the following related areas:

(1) recent advances in genomic and epigenomic technologies, and their relevance to brain disorders;
(2) the emerging role of non-coding RNAs as key regulators of transcription, epigenetic processes and gene silencing;
(3) novel approaches to nutrition, epigenetics and neuroscience;
(4) gene-environment interactions, especially in the serotonergic system, as a paradigm of the multiple signaling pathways affected in neuropsychiatric and neurological disorders.

Current and future advances in these four areas should contribute significantly to the prevention, amelioration and treatment of multiple devastating brain disorders.

Interventions for Feeding and Nutrition in Cerebral Palsy

Ferluga ED, Archer KR, Sathe NA, Krishnaswami S, Klint A, Lindegren ML, McPheeters ML. Comparative Effectiveness Review No. 94. (Prepared by the Vanderbilt Evidence-based Practice Center under Contract No. 290-2007-10065-I) AHRQ Publication No. 13-EHC015-EF. Rockville, MD: Agency for Healthcare Research and Quality. March 2013.
http://effectivehealthcare.ahrq.gov/index.cfm/search-for-guides-reviews-and-reports/?productid=1425&pageaction=displayproduct

Background: Individuals with CP frequently have feeding and swallowing problems that may lead to poor nutritional status, growth failure, chronic aspiration, esophagitis, and respiratory infections. Across the cerebral palsy spectrum, poor nutritional status is caused by distinct pathways ranging from inadequate intake, oral dysphagia, oral-pharyngeal dysphagia, gastroesophageal reflux (GER), chronic aspiration, and behavioral etiologies. A number of feeding and oral-motor intervention strategies have been developed to address difficulties with sucking, chewing, swallowing, and improve oral-motor skills, including oral sensorimotor management, positioning, oral appliances, food thickeners, specialized formulas, and neuromuscular stimulation. These interventions address different aspects of feeding difficulties, reflecting the range in specific problems associated with feeding and nutrition in CP. Despite a range of potential feeding interventions for patients with CP, synthesis is lacking on the efficacy, safety and applicability of these interventions. Limited information is available on the impact on health outcomes, including quality of life.

Objectives: The Vanderbilt Evidence-based Practice Center examined the effects of available interventions for feeding and nutrition problems that have been evaluated in individuals with cerebral palsy (CP).

Data sources. MEDLINE® via the PubMed® interface, PsycINFO® (psychology and psychiatry literature), the Educational Resources Information Clearinghousesm, OTSeeker, REHABDATA, and the Cumulative Index of Nursing and Allied Health Literature (CINAHL®) database. Additional studies were identified from reference lists and technical experts.

Review methods. We reviewed studies providing effectiveness data for feeding interventions in populations of any age with CP. We included studies focused on nonsurgical and surgical interventions for feeding and nutrition difficulties. Nonsurgical interventions included positioning, oral appliances, oral stimulation, sensorimotor facilitation, and caregiver training. Surgical interventions included gastrostomy or jejunostomy tubes and fundoplication. We assessed both intermediate/surrogate and patient-centered/health outcomes.

Results. Fifteen articles (comprising 13 unique studies) met our inclusion criteria. One good quality systematic review on behavioral interventions for feeding issues in individuals with cerebral palsy was published in 2011 and is updated with one additional study on caregiver education in this review. The existing review included 21 studies with conflicting results related to the effects of sensorimotor interventions on short-term improvements in feeding. Eleven studies (nine case series) of surgical interventions met our inclusion criteria. These studies included 309 children. In all nine studies of gastrostomy (with or without fundoplication), gastrostomy-fed children gained weight. Baseline weight z-scores ranged from −3.56 to −0.39; followup z-scores ranged from −2.63 to −0.33, relative to typically developing populations. Two studies assessed fundoplication for reflux: in one RCT both Nissen fundoplication and vertical gastric plication reduced reflux (reduction in symptoms of 57% and 43%, respectively), while in one case series, reflux recurred within 12-months postfundoplication in 30 percent of children. The highest rates of reported harms in any study were minor site infection (59%), formation of granulation tissue (42%), gastric leakage, recurrent reflux (30%), and aspiration and pneumonia (29%). Even though the reported death rates ranged from 7 percent to 29 percent, the underlying cause of death was most likely not due to the surgical treatment.

Conclusions. Evidence for behavioral interventions for feeding disorders in CP consists of mostly small, short-term, pre-post studies, with strength of evidence ranging from insufficient to moderate. Some studies suggest that interventions such as oral appliances may enhance oral sensorimotor skills, but there is a clear need for rigorous, comparative studies. Evidence for surgical interventions is insufficient to low. All studies to date demonstrate significant weight gain with gastrostomy. Results for other growth measures are mixed, and

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In Search of Evidence...

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substantial numbers of children remained underweight, although given a lack of appropriate reference standards for the CP population, these results should be interpreted cautiously. Longer term, comprehensive case series are needed, as are prospective cohort studies. More research is needed to understand potential harms in the context of benefits and potential risks of not treating.

BHN PUBLICATIONS

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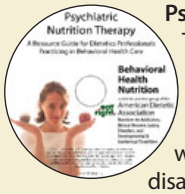

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