Food as Brain Medicine
The Science of PsychoFarmacology

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Disclosures

- National Kale Day, co-founder 501c3
- Even Hotels/Intercontinental Hotel Group
- Medical Review ShareCare
- I will not discuss the off-label use of any medications
- I will be discussing kale and dark chocolate.
Eat Complete
The 21 Nutrients That Fuel Brainpower, Boost Weight Loss, and Transform Your Health

Drew Ramsey, M.D.
Clinical depression, where sad mood and/or lack of interest in usual activities persists among other symptoms to lead to inability to function in normal life, substance abuse, and...
“Although the determinants of mental health are complex, the emerging and compelling evidence for nutrition as a crucial factor in the high prevalence and incidence of mental disorders suggests that diet is as important to psychiatry as it is to cardiology, endocrinology, and gastroenterology.”
Slides and Materials

DrewRamseyMD.com/FBH
Clinical depression, where sad mood and/or lack of interest in usual activities persists among other symptoms to lead to inability to function in normal life, substance abuse, and...
Survival of the Fattest

Australopithecus robustus
Homo habilis
Homo erectus
Homo sapiens neanderthalensis
Homo sapiens sapiens
Your Brain & Food

Consumes 420 calories/day
60% daily glucose
20% of daily calories
Composed of 60% Fat
High concentrations of PUFAs
Largest deposit of cholesterol
A Smarter, Happier Planet?

• Intake of iron & omega-3 fats help determine IQ
• Iodine deficiency is the top cause worldwide of mental retardation – 37% of American women 18-44 don’t meet the RDA
• 75% of people in India have a deficiency of a major mood regulating nutrient (B12, B9, etc.)
• The Risk of Depression, Dementia, ADHD, and Anxiety of strongly correlated with diet pattern
“Nutritionism”

Vitamin B-12

DHA – Omega-3
Top Brain Food Nutrients

- Omega-3s
- Folates
- Fiber
- Vitamin B12
- Vitamin D
- Vitamin B1 (thiamine)
- Magnesium
- Calcium
- Vitamin E (Tocopherols & Tocotrienols)

- Choline
- Iron
- Zinc
Mechanisms

1. Nutrient deficiency/Insufficiency
2. Neuroplasticity and BDNF
3. Inflammation
4. Visceral fat
5. Plants and phytonutrients
6. Microbiome
7. Toxic Diet Effects – *trans*-fats, food dyes, increased medication load
Top Iron Foods (per 100 grams)

- Clams: 28mg (155%)
- Littleneck Clams: 23mg (129%)
- Cashews: 6.1mg (34%)
- Pumpkin Seeds: 15mg (83%)
The Brain Food Scale

B12 + B9 + LC-PUFA + Fe + Zn
+ Mg + Vit C + Fiber

100 Calories
## The Brain Food Scale

**B12+B9+EPA+DHA+Fe+Zn+ Mg+Fiber**

### Calories

<table>
<thead>
<tr>
<th><strong>Top Animals</strong></th>
<th><strong>Top Plants</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Oysters</td>
<td>1. Mustard Greens</td>
</tr>
<tr>
<td>2. Clams</td>
<td>2. Spinach</td>
</tr>
<tr>
<td>3. Spleen</td>
<td>3. Red Cabbage</td>
</tr>
<tr>
<td>4. Liver</td>
<td>4. Cauliflower</td>
</tr>
<tr>
<td>5. Mussels</td>
<td>5. Red Pepper</td>
</tr>
<tr>
<td>7. Crab</td>
<td>7. Lemon</td>
</tr>
<tr>
<td>8. Octopus</td>
<td>8. Strawberry</td>
</tr>
<tr>
<td>10. Kidney</td>
<td>10. Asparagus</td>
</tr>
<tr>
<td>11. Elk</td>
<td>11. Dandelion Greens</td>
</tr>
</tbody>
</table>
Brain Food Basics – Build A Better Brain

- What is a Brain Food?
- Nutrient Density
- Dietary Patterns
- Neuroplasticity
- Top foods for brain health

TARGETS
- Mood, Memory, Focus, Energy, Sleep, Cognitive Function
What’s for dinner?

Nutrients & Mechanisms

Epidemiology & Brain health

Sustainability & Feasibility
“I Eat a Healthy Diet.....”

Count Calories
No Cholesterol
Avoid Fat
No Red Meat
Coaching in Healthy Dietary Practices in At-Risk Older Adults: A Case of Indicated Depression Prevention

Sarah T. Stahl, Ph.D.
Steven M. Albert, Ph.D.
Mary Amanda Dew, Ph.D.
Michael H. Lockovich, L.C.S.W.
Charles F. Reynolds, III, M.D.

Prevention of major depressive disorder is a common clinical practice. In this study, we examined the program within the context of the care of at-risk older adults. The authors found that coaching in healthy dietary practices was potentially effective in protecting at-risk older adults from developing incident episodes of major depression. The authors describe the dietary coaching program (highlighted in a case example) as well as the feasibility and cost of the program. The authors also discuss the potential of lifestyle interventions like coaching in healthy dietary practices to hold promise as effective, practical, nonstigmatizing interventions for preventing episodes of major depressive disorder in older adults with subsyndromal depressive symptoms.

5.5 Hours over 2 Years
Healthy Choices, Meal Planning, Cost
N= 95 (77% completion 2 year study)
40-50% Reduction Depression Symptoms
Beck 9.9 → 5.9
Fig. 1.

Predicted left hippocampal volume (with standard errors represented by error bars) at baseline and 4-year follow-up for respondents classified with poor, average and good quality diet based on scores on the Western and prudent dietary factor scores (poor defined as 1 SD below mean on prudent and 1 SD above mean on Western dietary factor scores; average defined as mean/0 on both prudent and Western dietary factor scores; good defined as 1 SD above mean on prudent and 1 SD below mean on Western dietary factor scores).

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin B-12</td>
<td>17.2</td>
</tr>
<tr>
<td>Niacin</td>
<td>25.9</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>27.4</td>
</tr>
<tr>
<td>Riboflavin</td>
<td>30.0</td>
</tr>
<tr>
<td>Thiamine</td>
<td>30.2</td>
</tr>
<tr>
<td>Folate</td>
<td>33.2</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>37.5</td>
</tr>
<tr>
<td>Iron</td>
<td>39.1</td>
</tr>
<tr>
<td>Vitamin B-6</td>
<td>53.6</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>56.2</td>
</tr>
<tr>
<td>Magnesium</td>
<td>61.6</td>
</tr>
<tr>
<td>Calcium</td>
<td>65.1</td>
</tr>
<tr>
<td>Zinc</td>
<td>73.3</td>
</tr>
</tbody>
</table>

1 Values are the 2-d average of data collected from 1994 to 1996 (23).
Percentage of U.S. Population NOT meeting the RDA

Source: United States Department of Agriculture (2009)
Dietary Change in last 100 years

- Whole Food to Processed
- Sugar and Refined Carbs
- Animal to Vegetable Fats
- Omega-3 to Omega-6
- New Molecules: Food Dyes, Preservatives, Trans-fats
Nutrients in Whole Wheat Flour, Refined Flour, and Enriched Flour

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>% of Nutrients Remaining in Refined Wheat Flour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin E</td>
<td>8%</td>
</tr>
<tr>
<td>Vitamin B6</td>
<td>11%</td>
</tr>
<tr>
<td>Vitamin K</td>
<td>16%</td>
</tr>
<tr>
<td>Magnesium</td>
<td>16%</td>
</tr>
<tr>
<td>Manganese</td>
<td>17%</td>
</tr>
<tr>
<td>Fiber</td>
<td>25%</td>
</tr>
<tr>
<td>Zinc</td>
<td>27%</td>
</tr>
<tr>
<td>Potassium</td>
<td>29%</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>30%</td>
</tr>
<tr>
<td>Copper</td>
<td>35%</td>
</tr>
<tr>
<td>Calcium</td>
<td>44%</td>
</tr>
<tr>
<td>Selenium</td>
<td>55%</td>
</tr>
<tr>
<td>Protein</td>
<td>78%</td>
</tr>
<tr>
<td>Riboflavin (B2)</td>
<td>24%</td>
</tr>
<tr>
<td>Niacin (B3)</td>
<td>25%</td>
</tr>
<tr>
<td>Thiamin (B1)</td>
<td>24%</td>
</tr>
<tr>
<td>Iron</td>
<td>33%</td>
</tr>
<tr>
<td>Folate</td>
<td>59%</td>
</tr>
<tr>
<td>Calories</td>
<td>107%</td>
</tr>
</tbody>
</table>

Original Nutrients in Whole Wheat Flour
Whole grains start with 100% of the nutrients Mother Nature intended them to have, as represented by the black bars here.

% of Nutrients Remaining in Refined Wheat Flour
Refining wheat flour removes the bran and germ, decreasing essential micronutrients to levels ranging from 8% (Vitamin E) to 59% (Folate) of the level naturally occurring in whole wheat – while increasing calorie density, as shown by the gray bars.

Nutrients added to Enriched Wheat Flour
Enriching wheat flour adds back five of these nutrients, in amounts different from their levels in whole grain flour, as shown by the white bars. All other nutrients in enriched flour stay at the levels shown by the gray bars.
Sugar on the Rise
**Kilocalories per day**

- **All**: 178 (Male 1103, Female 71)
- **2-5**: 141 (Male 112, Female 70)
- **6-11**: 273 (Male 171, Female 138)
- **12-19**: 252 (Male 138, Female 86)
- **40-59**: 159 (Male 86, Female 71)

*Significantly different from males.

*Significant quadratic trend for both males and females.

Inadequate intake of vitamins and minerals is most common among?
14-to-18-year-old teenagers
The Mediterranean Diet
Does Good Food = Good Mood?

Sánchez- Villegas A et al.  *Arch of Gen Psychiatry* 2009

- 10,094 healthy participants
- Followed for 4.4 years
- Mediterranean Dietary Pattern
  - Vegetable, fruits, nuts, olive oil, legumes, fish, meat, dairy
- Role in preventing depression
- 42% Decreased Risk
- (51% for cheaters?)
The Mediterranean Diet
Does Good Food = Good Mood?

- Sánchez- Villegas A et al. *Arch of Gen Psychiatry* 2009

### Table 2. Association Between Adherence to the Mediterranean Dietary Pattern and Risk of Depression

<table>
<thead>
<tr>
<th>Variable</th>
<th>0-2 (2)</th>
<th>3 (3)</th>
<th>4 (4)</th>
<th>5 (5)</th>
<th>6-9 (6)</th>
<th>P Value for Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of cases per person-years</td>
<td>126/8866</td>
<td>91/8253</td>
<td>97/9240</td>
<td>67/8131</td>
<td>99/9715</td>
<td></td>
</tr>
<tr>
<td>Crude rates per 10^3 (95% CI)</td>
<td>14.2 (11.8-16.9)</td>
<td>11.0 (8.9-13.5)</td>
<td>10.5 (8.5-12.8)</td>
<td>8.2 (6.4-10.5)</td>
<td>10.2 (8.3-12.4)</td>
<td></td>
</tr>
</tbody>
</table>

**Model 1**
- HR (95% CI): 1 [Reference] 0.74 (0.57-0.98) 0.66 (0.50-0.86) 0.49 (0.36-0.67) 0.58 (0.44-0.77) <.001

**Model 2**
- Excluded Participants w/depression dx in first 2 years
- No. of cases per person-years: 67/8748 48/8167 46/9138 32/8061 44/9605 <.001
- HR (95% CI): 1 [Reference] 0.73 (0.50-1.06) 0.56 (0.38-0.83) 0.42 (0.27-0.66) 0.50 (0.33-0.74)

**Model 3**
- Excluded Participants with antidepressant on f/u, No DX
- No. of cases per person-years: 86/8726 65/8155 61/9116 50/8075 75/9631 .007
- HR (95% CI): 1 [Reference] 0.79 (0.57-1.09) 0.67 (0.48-0.93) 0.56 (0.39-0.80) 0.69 (0.50-0.96)
<table>
<thead>
<tr>
<th>Dietary Pattern</th>
<th>Lowest tertile</th>
<th>Intermediate tertile</th>
<th>Highest tertile</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
</tr>
<tr>
<td>Whole food dietary pattern</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Model 1b</td>
<td>1</td>
<td>0.63 (0.46–0.87)</td>
<td>0.005</td>
</tr>
<tr>
<td>Model 2c</td>
<td>1</td>
<td>0.70 (0.50–0.96)</td>
<td>0.03</td>
</tr>
<tr>
<td>Model 3d</td>
<td>1</td>
<td>0.68 (0.50–0.94)</td>
<td>0.02</td>
</tr>
<tr>
<td>Processed food dietary pattern</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Model 1</td>
<td>1</td>
<td>1.44 (1.02–2.02)</td>
<td>0.04</td>
</tr>
<tr>
<td>Model 2</td>
<td>1</td>
<td>1.41 (1.00–2.00)</td>
<td>0.05</td>
</tr>
<tr>
<td>Model 3</td>
<td>1</td>
<td>1.38 (0.98–1.95)</td>
<td>0.06</td>
</tr>
</tbody>
</table>

CES-D, Center for Epidemiologic Studies – Depression scale.

a. Participants defined as having depression using the General Health Questionnaire depression subscale (n = 374) or those taking antidepressant drugs (n = 81).
b. Model 1: adjusted for gender, age and energy intake.
c. Model 2: model 1 plus adjustment for marital status, employment grade, level of education, physical activity and smoking habits.
d. Model 3: model 2 plus adjustment for hypertension, diabetes, cardiovascular disease, self-reported stroke, use of antidepressive drugs and cognitive functioning.
Growing Brains Need Brain Food

7,114 adolescents
Diet ranked by quintiles of “healthy” and “unhealthy”
Teens with lowest quality diet were 79% more likely to get depressed
Linear relationship of dietary quality and risk of depressive symptoms

Jacka FN Aust N Z J Psychiatry 2009
Mechanisms

1. Nutrient deficiency/Insufficiency
2. Neuroplasticity and BDNF
3. Inflammation
4. Visceral fat
5. Plants and phytonutrients
6. Microbiome
7. Toxic Diet Effects – *trans*-fats, food dyes, increased medication load
Food Insufficiency is Positively Associated with **Dysthymia & Suicide** in Adolescents

- Food-insufficient Adolescents:
  - 4X more likely to have had dysthymia
  - 2X more likely to have thoughts of death
  - 5X more likely to have attempted suicide

The INCA Trial: Food and ADHD

- 100 Children (4-8 yrs) with ADHD
- Elimination Diet - Rice, turkey, lamb, vegetable, fruits, margarine, vegetable oil, tea, pear juice and water.
- After 6 weeks - 32 of 41 responded (78%) children showed behavior improvement

Pelsser LM et al. (INCA study). *The Lancet* 2011
Simple Food Assessment

- Let’s talk about what you eat?
- What is your typical Breakfast? Lunch? Dinner?
- Snacks? Favorite Foods? Problem Foods?
- Any restrictions? Allergies? Aversions?
- High Yield Foods: Seafood, Meat, Snacks
  - Ex: Brain Food Shift: Fish Hater, Mussel Lover
DAY 1
- Breakfast: 1 plain bagel
- Lunch: Ham sandwich on a plain hero
- Snack: 1 package of freeze dried ice cream
- Dinner: 3 pulled pork tacos with corn salsa

DAY 2
- Breakfast: 3 scrambled eggs blueberry toast with avocado
- Lunch: 2 servings of penne arrabbiata
- Snack: 2 cranberry & white chocolate cookies
- Dinner: Roasted pork with corn & white rice

DAY 3
- Breakfast: Scrambled egg whites with 2 English muffins
- Lunch: 1 slice of cheese pizza
- Snack: Sour gummy candy
- Dinner: Roasted pork & potatoes
Brain Food Swaps

- Fish Hater → Mussel Lover
- Brain Food Swaps
  - Dark Chocolate Almonds for White Chocolate Pretzels
  - Kale Chips for Potato Chips
  - Beef Stew for Hamburger
  - Blueberry Almond Yogurt Smoothie for Cold Cereal
  - Salmon Burger for Fried Fish Sandwich

GOALS: Increase Plants, Nutrient Density, Whole Foods, Seafood
<table>
<thead>
<tr>
<th>Category</th>
<th>Foods</th>
<th>Top Nutrients</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SEAFOOD</strong></td>
<td>Oysters, wild salmon, mackerel, mussels, anchovies, sardines, herring, rainbow trout, wild shrimp, cod, clams, fish eggs, crab, octopus</td>
<td>B1, B12, Iodine, Omega-3s, Zinc, Protein</td>
</tr>
<tr>
<td><strong>VEGETABLES</strong></td>
<td>Kale, arugula, Brussels sprouts, asparagus, cauliflower, sweet potatoes, onions, blue potatoes, carrots, celery, mustard greens, mesclun, beets with greens, cabbage, broccoli, sprouts, butternut squash, bell peppers</td>
<td>Vitamin A, Vitamin C, Fiber, Folate, Phytonutrients</td>
</tr>
<tr>
<td><strong>NUTS &amp; SEEDS</strong></td>
<td>Walnuts, almonds, cashews, pecans, pumpkin seeds, chia seeds, Brazil nuts, macadamia nuts, flax seeds, sunflower seeds, pine nuts</td>
<td>B1, Vitamin E, Iron, Magnesium, Zinc</td>
</tr>
<tr>
<td><strong>FRUITS</strong></td>
<td>Apples, blueberries, raspberries, oranges, grapefruit, tomatoes, cherries, watermelon, avocados, pears, lemons, strawberries, mango, cacao nibs, kiwi, cantaloupe, limes, apricots, peaches</td>
<td>Vitamin A, Vitamin C, Fiber, Folate, Potassium</td>
</tr>
<tr>
<td><strong>GRAINS &amp; LEGUMES</strong></td>
<td>Lentils, quinoa, black beans, red beans, wheat germ, pinto beans, garbanzo beans, hummus, steel-cut oats, brown rice, black-eyed peas, peanuts</td>
<td>Iron, Folate, Fiber, Magnesium, Phytonutrients, Protein</td>
</tr>
<tr>
<td><strong>MEAT</strong></td>
<td>Grassfed beef &amp; lamb, pasture-raised pork, free-range chicken &amp; turkey, venison, bison, rabbit, goat</td>
<td>B1, B3, B12, Iron, Zinc, Protein</td>
</tr>
<tr>
<td><strong>DAIRY &amp; EGGS</strong></td>
<td>Grassfed yogurt, grassfed milk, grassfed cheeses, farm fresh eggs, goat cheese, blue cheese, kefir, feta cheese</td>
<td>B2, B12, Calcium, Phosphorus, Zinc, Protein</td>
</tr>
<tr>
<td><strong>HERBS &amp; SPICES</strong></td>
<td>Turmeric, garlic, black pepper, sea salt, cinnamon, cocoa, ginger, chili flakes, chili pepper, oregano, parsley, cilantro, rosemary, basil</td>
<td>Vitamin A, Vitamin C, Calcium, Iron, Vitamin K</td>
</tr>
<tr>
<td><strong>BEVERAGES</strong></td>
<td>Water, mineral water, green tea, herbal tea (mint, holy basil, rooibos, chai), hot cocoa, coffee, vegetable juices, flavored seltzer, grassfed milk</td>
<td>Vitamin A, Vitamin C, Calcium, Phosphorus, Phytonutrients</td>
</tr>
<tr>
<td><strong>DESSERTS</strong></td>
<td>Dark chocolate, nut tortes, macaroons, Greek yogurt with maple syrup and fruit, whole grain cookies (oats), dried fruit</td>
<td>B2, B12, Calcium, Fiber, Phytonutrients, Zinc</td>
</tr>
</tbody>
</table>
1. Seafood

- Omega-3 Fatty Acids
- B12
- Vitamin D
- Zinc
- Iodine
- Chromium
Clinical depression, where sad mood and/or lack of interest in usual activities persists among other symptoms to lead to inability to function in normal life, substance abuse, and...
Survival of the Fattest

Australopithecus robustus
Homo habilis
Homo erectus
Homo sapiens neanderthalensis
Homo sapiens sapiens
6 Oysters

Seafood

Zinc: 31%
Iron: 245%
B12: 76%
Selenium: 565mg
LC-Omega-3: 509%
Top Nutrients Mussels

Nutrition Facts
Serving Size: 3 oz (5-6 mussels)

Amount Per Serving
Calories: 146

% Daily Value*
Fats
Omega-3: 736mg DHA
Protein: 20g

Top Vitamins & Minerals
Iron: 32%
Selenium: 109%
B12: 340%

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may vary depending on your health and activity level.
Incorporation Into Neuronal Membrane

Increased Membrane Fluidity
Optimal Function of Na+/K+ ATPase
Optimal Function of Neurotransmitter Receptors
Improved Synaptic Plasticity

Fascilitation of Vesicle Production

Increased Membrane Fluidity
Fascilitates Vesicle Production
Improved Synaptic Plasticity

Induction of Gene Expression

Omega-3

BDNF gene
PPAR-γ

Increased BDNF
Decreased Neuronal Apoptosis
Improved Synaptic Plasticity
What to do:

1. Eat 8-12 ounces of a variety of fish a week. That’s 2 or 3 servings of fish a week.

2. Choose fish lower in mercury. Many of the most commonly eaten fish are lower in mercury. These include salmon, shrimp, pollock, tuna (light canned), tilapia, catfish, and cod.

3. Avoid 4 types of fish: tilefish from the Gulf of Mexico, shark, swordfish, and king mackerel. Limit white (albacore) tuna to 6 ounces a week.

4. Caution with fish caught from streams, rivers, and lakes. Check for advisory. If advice isn’t available, adults should limit such fish to 6 ounces a week and young children to 1 to 3 ounces a week and not eat other fish that week.
What’s the perfect fish?
# High Omega-3/Low Mercury Fish

<table>
<thead>
<tr>
<th>Variety of Fish</th>
<th>Milligrams of EPA and DHA Per 4 Ounces of Cooked Fish</th>
<th>Micrograms of Mercury Per 4 Ounces of Cooked Fish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mackerel*</td>
<td>1,350 – 2,100</td>
<td>8 – 13</td>
</tr>
<tr>
<td>Shad</td>
<td>2,300 – 2,400</td>
<td>5 – 10</td>
</tr>
<tr>
<td>Oysters</td>
<td>1,550</td>
<td>2</td>
</tr>
<tr>
<td>Salmon</td>
<td>700 – 900</td>
<td>2</td>
</tr>
<tr>
<td>Herring</td>
<td>2,300 – 2,400</td>
<td>5 – 10</td>
</tr>
<tr>
<td>Sardines</td>
<td>1,100 – 1,600</td>
<td>2</td>
</tr>
<tr>
<td>Anchovies</td>
<td>2,300 – 2,400</td>
<td>5 – 10</td>
</tr>
<tr>
<td>Rainbow Trout</td>
<td>1,000 – 1,100</td>
<td>11</td>
</tr>
</tbody>
</table>

*Avoid king mackerel – high mercury content

*Adapted from Dietary Guidelines for American 2010 USDA & HHS*
THREE DAY SALE
APRIL 18-20
Wild-Caught
Coho Salmon Fillet
Product of USA
Previously frozen
SAVE $8
$9.99 LB
Reg. 17.99 lb
*No rain checks. While supplies last.
Omega-3 deficiency associated with perinatal depression

- 16 depressed and 22 nondepressed women, 3rd trimester
- DHA and total n-3 levels higher in non-depressed group; EPA levels equal
- High DHA, total n-3, and a low n-6:n-3 ratio were associated with a risk of depression after adjustment for parity, age, and education level
- **Women with low DHA were six times more likely to suffer from perinatal depression**

Fish and fat intake and prevalence of depressive symptoms during pregnancy

• Cross-sectional study assessing depressive symptoms and dietary intake in 1745 pregnant women
• Greater intake of fish, EPA, and DHA independently associated with lower prevalence of depressive symptoms
• Higher total fat and saturated fat intake independently associated with higher prevalence of depressive symptoms during pregnancy

Oily Fish Intake during pregnancy
Lower hyperactivity Verbal IQ Increase

• Strengths and Difficulties Questionnaire and Weschler Abbreviated Scale of Intelligence
• 217 nine-year-old children
• Fish intake assessment study during pregnancy
• Reduced risk of hyperactivity in children whose mothers consumed oily fish
• Verbal IQ 7.55 points higher in w/ oily fish
• No significant associations of fish consumption and other behavioral problems or intelligence

## Omega-3 & Omega-3 Content of Common Dietary Oils

<table>
<thead>
<tr>
<th>Oil</th>
<th>Omega-6</th>
<th>Omega-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safflower</td>
<td>77%</td>
<td>0%</td>
</tr>
<tr>
<td>Sunflower</td>
<td>65%</td>
<td>0%</td>
</tr>
<tr>
<td>Corn</td>
<td>60%</td>
<td>0%</td>
</tr>
<tr>
<td>Cottonseed</td>
<td>50%</td>
<td>0%</td>
</tr>
<tr>
<td>Sesame</td>
<td>45%</td>
<td>0%</td>
</tr>
<tr>
<td>Peanut</td>
<td>32%</td>
<td>7%</td>
</tr>
<tr>
<td>Soybean</td>
<td>52%</td>
<td>9%</td>
</tr>
<tr>
<td>Canola</td>
<td>20%</td>
<td>10%</td>
</tr>
<tr>
<td>Walnut</td>
<td>52%</td>
<td>57%</td>
</tr>
<tr>
<td>Flax</td>
<td>14%</td>
<td></td>
</tr>
</tbody>
</table>

Omega-3 – Omega-6

1 - 40

1 - 39
Linoleic Acid in US Body Fat, 1961-2008
Kale
The Rule of Kale

BRAIN FOOD

Nutrient Density

Culinary Versatility

Local Availability
The Flavonoids

ANTHOCYANINS
- Cyanidin
- Pelargonidin

FLAVONOLS
- Quercetin
- Kaempferol

FLAVONES
- Apigenin
- Luteolin

FLAVANOLS
- Epicatechins
- Procyanidins

FLAVANONES
- Hesperetin
- Naringenin

ISOFLAVONES
- Daidzein
- Genistein
- Glycitein

Sources:
- Cyanidin: berries, blueberries, blackberries, blood orange
- Quercetin: Onion, broccoli, tea, apples
- Apigenin: Celery, parsley, tangerines
- Epicatechins: Cocoa, green tea, red wine
- Hesperetin: Citrus fruits
- Daidzein: soy beans, fermented soy products
Rainbow Colors = Phytonutrients
**KALE FACTS**

1 SERVING = 33 CALORIES!

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin A</td>
<td>206%</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>134%</td>
</tr>
<tr>
<td>Vitamin K</td>
<td>684%</td>
</tr>
<tr>
<td>Manganese</td>
<td>26%</td>
</tr>
<tr>
<td>Iron</td>
<td>6%</td>
</tr>
<tr>
<td>Calcium</td>
<td>10%</td>
</tr>
<tr>
<td>Fiber</td>
<td>5%</td>
</tr>
<tr>
<td>Omega-3s</td>
<td>121 MG</td>
</tr>
</tbody>
</table>

#NATIONALKALEDAY
WWW.NATIONALKALEDAY.ORG
New Item Acceptance Survey

Food Item: DAY#3: Greek Salad, Chickpeas, Quinoa
Please fill out so we can better serve your needs!

<table>
<thead>
<tr>
<th>Statement</th>
<th>YES</th>
<th>NO</th>
<th>Neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>This item was visually appealing.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>This item was flavorful.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I would purchase this if it was available.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overall, this is a flavorful food item that I enjoyed tasting.

1  2  3  4  5
strongly agree  agree  neutral  disagree  strongly disagree

Comments (please provide comments on current tasting item only)

YUM!
Happy Dance

Thank you for your participation!
Nuts

22 Almonds

162 Kcals
(120 Kcals)

Vitamin E
37%

Manganese
37%

Magnesium
20%

Protein
6 grams
• Walnuts
• Almonds
• Pecans
• Flax Seeds
• Chia Seeds
• Brazil Nuts
• Pumpkin Seeds
• Sesame Seeds
Mediterranean Diet and BDNF

### Table 3. Risk of very low plasma BDNF concentrations (<13 μg/ml, 10th percentile) after 3 years according to the randomized group Multivariate-adjusted OR and 95% CI

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>OR (95% CI)*</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control group</td>
<td>77</td>
<td>1 (ref.)</td>
<td></td>
</tr>
<tr>
<td>MeDiet + VOO</td>
<td>91</td>
<td>1.02 (0.38–2.76)</td>
<td>0.97</td>
</tr>
<tr>
<td>MeDiet + Nuts</td>
<td>75</td>
<td><strong>0.22 (0.05–0.90)</strong></td>
<td><strong>0.04</strong></td>
</tr>
</tbody>
</table>

MeDiet: Mediterranean diet.

*OR: odds ratios and 95% CI adjusted for sex, baseline age, smoking, prevalent hypertension, diabetes, hypercholesterolaemia, and depression and weight change in 3 years (gain vs. maintenance or lost).

Beans & Legumes

1 Cup Lentils
230 calories
Folate 90%
Fiber 67%
Iron 37%
Protein 18 grams
Meat and Eggs

- Why talk about meat?
- 270.7 lbs eaten per year
- Heme-iron
- Protein
- Grass Fed
- Pasture Centered
# Nutrition Facts

**Serving Size:** 2 eggs, pasture raised

<table>
<thead>
<tr>
<th>Amount Per Serving</th>
<th>% Daily Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories 140</td>
<td></td>
</tr>
<tr>
<td>Fats</td>
<td></td>
</tr>
<tr>
<td>Omega-3 (ask farmer)</td>
<td></td>
</tr>
<tr>
<td>Protein 12g</td>
<td></td>
</tr>
<tr>
<td>Cholesterol</td>
<td>134%</td>
</tr>
</tbody>
</table>

## Top Vitamins & Minerals

<table>
<thead>
<tr>
<th>Vitamin</th>
<th>% Daily Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choline</td>
<td>69%</td>
</tr>
<tr>
<td>Iodine</td>
<td>36%</td>
</tr>
<tr>
<td>B2</td>
<td>40%</td>
</tr>
<tr>
<td>B12</td>
<td>46%</td>
</tr>
</tbody>
</table>

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may vary depending on your health and activity level.

---

**Eggs**

**Top Nutrients**
DO OUR BRAINS NEED MEAT?
TWO LEADING NUTRITION DOCTORS DEBATE
Plant-Based Diets

Do Plants Make People Happier?
Are Vegans and Vegetarians Happier?

• The Powers of Foodcebo Effect
  \textit{Food Rules = Food Happiness}

• Better Mood, Lower BMI

• GEICO Study
  – N= 292, 10 Sites, Overweight or DM2
  – Weekly Instruction Vegan Diet vs No intervention
    • Reported improvement in depression, anxiety, emotional well-being, and decreased impairment

Ulka Agarwal et al (2014) A Multicenter Randomized Controlled Trial of a Nutrition Intervention Program in a Multiethnic Adult Population in the Corporate Setting Reduces Depression and Anxiety and Improves Quality of Life: The GEICO Study. American Journal of Health Promotion
Vegetarians and B12 Deficiency

New Methods of Assessment: MMA, Holotranscobalamin-2

- Review of 18 Studies
  - Pregnancy 62% (one study Ethiopia)
  - Children 25-86%
  - Elderly 11-90%
- Traditional B12 serum levels
  - Review 40 studies
  - Pregnancy 17-39% Deficient
  - Infant 45% Deficient

“Thus, with few exceptions, the reviewed studies documented relatively high deficiency prevalence among vegetarians.”

Plant-Based Blues?

- B12 Deficiency in Pregnancy: 30 Vegan Case Reports
  - 60 percent of these infants had developmental delays
  - 37 percent had cerebral atrophy
  - s/p B12 Treatment, 50% infants w/ developmental delays
    (Dror 2008).
- Strong correlations of eating no meat and higher rates of:
  - depression, anxiety, mental illness,
  - health care utilization
  - worse quality of life (Michalak 2007, Baines 2012.)
- High Rates of B12 Deficiency Even for Vegetarians
  - ↑ risk Depression – Dementia -- Anemia
  - Iron, Zinc, Protein

Meet the New “Meat”
Fermented Foods
Human microbiome
1,000,000+ genes

Human genome
23,000 genes
Modulating Commensals

- Diet
- Fermented Foods
- Probiotics
- Prebiotics
- Antibiotics
- Fecal Transplant
A randomized controlled trial to test the effect of multispecies probiotics on cognitive reactivity to sad mood

Laura Steenbergen\textsuperscript{a},\textsuperscript{b}, Roberta Sellaro\textsuperscript{a},\textsuperscript{b}, Saskia van Hemert\textsuperscript{c}, Jos A. Bosch\textsuperscript{d}, Lorenza S. Colzato\textsuperscript{a},\textsuperscript{b}

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doi:10.1016/j.bbi.2015.04.003
Can You Eat to Build a Better Brain?

• Dietary pattern and Nutrient Density
• Colors – Fats – Flavor – Fun
• Don’t be scared of fish! Remember Clams!
• Whole Foods or MDP
  Protective for Depression, Dementia, and ADHD?
• Learn from History
  Put the Genie Back in the Bottle
Eat to Build a Better Brain

◆ Count Brain Nutrients
◆ Cut Out Processed Food
◆ Fix Fats: Omega-3s
◆ Eat Plants = Phytonutrients
◆ Move to Complex Carbs
Thank You!

Columbia University
Department of Psychiatry
Emily Deans, MD
Laura Lachance, MD
Phil Muskin, MD
Center for Mind Body Medicine
Ariel Suazo-Maler
Joy Tutela
National Kale Day Staff
Harper Wave