FOOD FOR THOUGHT
The MIND Diet
Nasira Burkholder-Cooley, DrPH, RDN
INTRODUCTION

• Alzheimer’s disease (AD) is a neurodegenerative disease [1]
  o Nerve cells (neurons) in the brain gradually lose function
  o Plaques: disruptive protein deposits (beta-amyloid)
  o Tangles: twisted protein fibers (tau)
  o Inflammation to the brain is characteristic

• Dementia (memory loss) results
INTRODUCTION

Source: www.dayrecipe.com
THE MIND-BODY CONNECTION: AD RISK FACTORS [2, 3]

• Age
• Genetics
• Mid-life obesity or malnutrition
• Cardiovascular disease
  o High blood pressure, high cholesterol, stroke
• Diabetes
• Epsilon 4 allele of the apolipoprotein E gene (APOE ε4)
• Smoking
• Depression
THE MIND-BODY CONNECTION: HEALTHY LIFESTYLE IS KEY

- Proper nutrition
- Physical activity
- Maintaining a healthy weight
- Smoking cessation
RESEARCH: NUTRITION AND AD

• No specific “diet” for treatment

• Mediterranean-DASH diet intervention for neurodegenerative delay (MIND) designed to protect brain [6]

• Mediterranean diet has protective benefits [4, 5]
  o Intervention with Med diet resulted in:
    - 28% lower risk of Mild Cognitive Impairment (MCI)
    - 48% lower risk of MCI progressing to AD
RESEARCH: MIND DIET [6]

• Study Population
  o 960 participants
  o 95% Caucasian, 98.5% non-Hispanic
  o 81.4 average years
  o 75% female, 25% male

• Controlled Variables
  o Age, Sex, APOEε4, Education, Physical activity, Low weight
  o Hypertension, Stroke, Myocardial Infarction, Diabetes
  o Depression, Obesity
Participants who adhered most closely to the MIND diet had statistically significant slower rates in cognitive decline.

The difference in rates was the equivalent of being 7.5 years younger.
## MIND DIET: Eat More[6]

<table>
<thead>
<tr>
<th>Diet Component</th>
<th>Servings and Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green leafy vegetables</td>
<td>6 servings per week</td>
</tr>
<tr>
<td>Other vegetables</td>
<td>1+ serving per day (4 is best)</td>
</tr>
<tr>
<td>Berries</td>
<td>2+ serving per week (6 is best)</td>
</tr>
<tr>
<td>Unsalted nuts</td>
<td>5 serving per week</td>
</tr>
<tr>
<td>Olive oil</td>
<td>Primary oil used</td>
</tr>
<tr>
<td>Whole grains</td>
<td>3 servings per day</td>
</tr>
<tr>
<td>Fish (not fried)</td>
<td>1-2 meals per week</td>
</tr>
<tr>
<td>Beans</td>
<td>3 meals per week</td>
</tr>
<tr>
<td>Poultry (not fried)</td>
<td>2 meals per week</td>
</tr>
<tr>
<td>Wine</td>
<td>1 glass per day (5oz.)</td>
</tr>
</tbody>
</table>
## MIND DIET: *Eat Less* [6]

<table>
<thead>
<tr>
<th>Diet Component</th>
<th>Maximum Servings and Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butter, margarine</td>
<td>1 tablespoon per day</td>
</tr>
<tr>
<td>Cheese</td>
<td>1 serving per week</td>
</tr>
<tr>
<td>Red meat and products</td>
<td>4 meals per week at most</td>
</tr>
<tr>
<td>Fried foods</td>
<td>1 time per week</td>
</tr>
<tr>
<td>Pastries and sweets</td>
<td>5 servings per week</td>
</tr>
</tbody>
</table>
NUTRITION MATTERS

What have we learned from the Mediterranean and MIND diet?

• Increase vegetable and fruit intake
  o Variety and color
  o Focus on dark-green leafy vegetables and berries

• Choose whole grains
  o Oatmeal, whole grain bread or pastas, quinoa, brown rice
NUTRITION MATTERS

• **Include a *variety* of protein foods**
  o Fish and poultry, eggs, beans, lentils, soybeans, unsalted nuts

• **Choose unsaturated fats**
  o Olive oil, salmon, unsalted nuts, and avocados

• **Focus on fiber-rich foods**
  o Whole grains, vegetables, beans, nuts, fresh fruit
NUTRITION MATTERS

• Reduce daily sodium (salt) intake to less than 2,300 mg
  o 1,500 mg for those older than 50, with heart disease, high blood pressure, diabetes, or kidney disease
  o 1 tsp. of table salt = 2,300 mg of sodium

• Limit cholesterol to 300 mg per day
  o High fat dairy and meats, shellfish, eggs contain cholesterol
NUTRITION MATTERS

• Limit saturated and *trans* fat
  o Saturated fats are solid at room temperature
  o *Trans* fat: partially hydrogenated oils

• Limit refined grains and added sugars

• Consume alcohol in moderation
  o Maximum of one drink per day for women
  o Max of two drinks per day for men
What is “moderation”?

12 fl oz of regular beer = 8–9 fl oz of malt liquor (shown in a 12 oz glass) = 5 fl oz of table wine = 1.5 fl oz shot of 80-proof spirits (“hard liquor”—whiskey, gin, rum, vodka, tequila, etc.)

- About 5% alcohol
- About 7% alcohol
- About 12% alcohol
- About 40% alcohol

The percent of “pure” alcohol, expressed here as alcohol by volume (alc/vol), varies by beverage.

Source: National Institutes of Health
QUICK FIXES

• Kale or spinach salad instead of lettuce
• Try sweet potatoes in recipes
• Brown rice or quinoa
• Mashed avocado or unsalted nut butter on toast
• Fresh berries with non-fat plain Greek yogurt
QUICK FIXES

• Use fresh herbs and spices or Mrs. Dash
• Use 1 whole egg + 2 egg whites
• Sub whole-grain flour in recipes
• Use olive or canola oil in place of butter, margarine, or shortening
OTHER CONSIDERATIONS: HYDRATION
HYDRATION [7, 8]

• Dehydration is dangerous and can contribute to cognitive decline

• Adequate fluid intake: 1.5 – 2.5 L/d (6 – 8.5 cups)

• Signs of dehydration
  o Dry mouth, thirst
  o Fatigue or dizziness
  o Dry skin
  o Constipation
  o Dark urine
FUNCTIONAL FOODS

- Antioxidants have protective and preventive benefits for AD
  - Natural substance found in plant foods, vegetable oils, nuts, and whole grains
  - Fights damage to nerve cells caused by free radicals
  - Inhibits amyloid plaques deposition between nerve cells
FUNCTIONAL FOODS

Antioxidants \([2, 9]\)

- Vitamin E (\(\alpha\)-tocopherol)
  - Can prevent AD-like changes in mice
  - Sources: wheat-germ, sunflower, safflower oils, leafy green vegetables and asparagus
  - Eat vitamin E and C foods together

- Supplements?
  - Alzheimer’s Disease Cooperative Study Group supports the use of \(\alpha\)-tocopherol at 2,000 IU per day for treatment of AD
FUNCTIONAL FOODS

Antioxidants \[2, 9\]

- Vitamin C (ascorbic acid)
  - Dietary sources are abundant: bell peppers, citrus, berries, papaya, pineapple, kiwis, broccoli, and many more

- Supplements?
  - Deficiency is very rare
  - Quality studies on vitamin C supplementation are lacking
  - Unknown if vit. C supplements are beneficial
FUNCTIONAL FOODS

Antioxidants [2, 9]

• Coenzyme Q10 (CoQ10)
  o Reduce oxidative stress by reducing amyloid plaque deposits in mice models of AD
  o Sources: fatty fish, such as salmon, tuna, and herring; poultry, peanuts, sesame seeds, pistachios, soy bean oil, canola oil [10]

• Supplements?
  o Ask your doctor
  o Recommended if taking statin (30-200 mg/d) [10]
FUNCTIONAL FOODS

Antioxidants \([9, 11]\)

- Resveratrol
  - Decrease amyloid plaque formation in \textit{animal studies}
  - Inhibits inflammation
  - Sources: skins of grapes, raspberries and mulberries, red wine, red grape juice
  - Currently being tested in mild to moderate AD patients
  - No current recommendations
FUNCTIONAL FOODS

Antioxidants [2, 9]

• Selenium
  o Ongoing human clinical trials
  o No current data exists

• Lipoic acid, β-carotene, Bioflavonoids
  o Results from clinical trials have not been sufficient to warrant changes in recommendations for practice
  o Early-stage prevention trials are needed
# ANTIOXIDANT FOODS

<table>
<thead>
<tr>
<th>Fruits</th>
<th>Vegetables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prunes</td>
<td>Kale</td>
</tr>
<tr>
<td>Raisins</td>
<td>Spinach</td>
</tr>
<tr>
<td>Blueberries</td>
<td>Brussels sprouts</td>
</tr>
<tr>
<td>Blackberries</td>
<td>Alfalfa sprouts</td>
</tr>
<tr>
<td>Strawberries</td>
<td>Broccoli</td>
</tr>
<tr>
<td>Raspberries</td>
<td>Beets</td>
</tr>
<tr>
<td>Plums</td>
<td>Red bell pepper</td>
</tr>
<tr>
<td>Oranges</td>
<td>Onion</td>
</tr>
<tr>
<td>Red grapes</td>
<td>Corn</td>
</tr>
<tr>
<td>Cherries</td>
<td>Eggplant</td>
</tr>
</tbody>
</table>

Ranked by Oxygen Radical Absorbance Capacity (ORAC), USDA database.
FUNCTIONAL FOODS

B-vitamins and folate

• Vitamin B12, Vitamin B6, and folate deficiencies associated with lower cognitive function [2]
  o B12 sources: beef, fish, shellfish, dairy, fortified grains
  o B6 sources: meats, whole-grains, vegetables, nuts, and bananas
  o Folate sources: leafy vegetables, okra, asparagus, fruits, beans, yeast, mushrooms, orange juice, and tomato juice, fortified grains

• Supplement only if deficient
FUNCTIONAL FOODS

Omega-3 fatty acids \([2, 9]\)

- Omega-3 fatty acids
- DHA and EPA are polyunsaturated fatty acids (PUFAs)
  - PUFAs decrease oxidative stress
  - Also reduce cerebrovascular disease
  - Food sources: fatty fish, flax and hemp seeds, walnuts, canola oil
FUNCTIONAL FOODS

Omega-3 fatty acids [2, 9]

• Fish Oil supplements
  o Consult your MD
  o Clinical trials do not support omega-3 FA supplementation in treatment of AD

• Considerations
  o APOE ε4 negates benefits of omega-3
  o Optimal omega-6 FA to omega-3 FA ratio is 4:1
FUNCTIONAL FOODS

Omega-3 fatty acids

<table>
<thead>
<tr>
<th>Dietary Fat</th>
<th>Fatty acid content normalized to 100 percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canola oil</td>
<td>7% 61% 11% 21%</td>
</tr>
<tr>
<td>Safflower oil</td>
<td>8% 77% 1% 14%</td>
</tr>
<tr>
<td>Flaxseed oil</td>
<td>9% 16% 57% 18%</td>
</tr>
<tr>
<td>Sunflower oil</td>
<td>12% 16% 1% 171%</td>
</tr>
<tr>
<td>Corn oil</td>
<td>13% 29% 1% 57%</td>
</tr>
<tr>
<td>Olive oil</td>
<td>15% 75% 8% 54%</td>
</tr>
<tr>
<td>Soybean oil</td>
<td>15% 23% 1% 33%</td>
</tr>
<tr>
<td>Peanut oil</td>
<td>19% 48% 1% 33%</td>
</tr>
<tr>
<td>Cottonseed oil</td>
<td>27% 48% 1% 54%</td>
</tr>
<tr>
<td>Lard</td>
<td>43% 47% 1% 39%</td>
</tr>
<tr>
<td>Palm oil</td>
<td>51% 47% 1% 10%</td>
</tr>
<tr>
<td>Butterfat</td>
<td>68% 47% 1% 13%</td>
</tr>
<tr>
<td>Coconut oil</td>
<td>91% 7% 1% 2%</td>
</tr>
</tbody>
</table>

* Trace

<table>
<thead>
<tr>
<th>Saturated Fat</th>
<th>Monounsaturated Fat</th>
<th>Polyunsaturated Fat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Oleic acid (an Omega-9 fatty acid)</td>
<td>Alpha-linolenic acid (an Omega-3 fatty acid)</td>
</tr>
</tbody>
</table>

Source: POS Pilot Plant Corporation
Coconut Oil \[9, 12\]

- Rich in Medium-chain triglycerides (MCT)
  - Caprylic acid supposedly restores brain function
  - *Research does not currently support claims*

- High in saturated fat
  - Increases AD risk
  - Increases LDL $\rightarrow$ CVD risk
SUPPLEMENTS: Decoding the Labels
SUPPLEMENTS: Decoding the LAbeleds

• Points of concern
  o May interact with medications
  o Purity and quality
  o Claims may not be backed by research
  o Actual beneficial dose not known

• Rules of thumb:
  o Let FOOD be your main source of nutrition
  o Multi-vitamin and mineral supplement to “fill in the gaps”
  o Be a conscious consumer
  o Always talk to your doctor, Pharmacist, or Registered Dietitian before taking supplements
SUPPLEMENTS: Decoding the Labels
https://naturalmedicines.therapeuticresearch.com/
SUPPLEMENTS: Decoding the Labels
https://nccih.nih.gov/health/supplements

Dietary and Herbal Supplements

DIETARY SUPPLEMENTS IS OUR FEATURED TOPIC
- 5 Tips: What Consumers Need To Know About Dietary Supplements
- Clinical Digest: Herb-Drug Interactions
- Message From the Director: What We Don’t Know About Supplement-Drug Interactions (09/17/15)

FEATURED:
Understanding Drug-Supplement Interactions
How much do you know about interactions between drugs and dietary supplements? Test your knowledge and learn more about how supplements may affect your medicines in this interactive module from the U.S. National Institutes of Health.

Using Dietary Supplements Wisely
Information on using dietary supplements wisely, including safety, regulations, research, and resources.
SUPPLEMENTS: Decoding the Labels
https://www.nlm.nih.gov/medlineplus/druginfo/herb_All.html

Herbs and Supplements

Browse dietary supplements and herbal remedies to learn about their effectiveness, usual dosage, and drug interactions.

A

Acai (National Center for Complementary and Integrative Health)
Acai (Natural Medicines Comprehensive Database)
Alfalfa (Natural Medicines Comprehensive Database)
Aloe (Natural Medicines Comprehensive Database)
Aloe Vera (National Center for Complementary and Integrative Health)
American ginseng (Natural Medicines Comprehensive Database)
Aristolochic Acids (National Toxicology Program) - PDF
Asian Ginseng (National Center for Complementary and Integrative Health)
Astragalus (National Center for Complementary and Integrative Health)
CONCLUSION

• Eat a well-balanced diet rich in plant-foods, lean proteins, and healthy fats
• Include anti-inflammatory foods
  o Antioxidants and omega-3 fats
• Maintain a healthy weight and stay active
• Use dietary supplements only under the supervision of a health care provider
References

“Let food be thy medicine and medicine be thy food”.

- Hippocrates