Food for the Brain
Me, My Brain, and I
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Seminar in Neuroscience
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Pre-Test!
Overview

- Omega-3 fatty acids
- B Vitamins
- Antioxidants

Objectives

- To develop an increased understanding of the beneficial effects of certain nutrients on the aging brain.
- To share how to incorporate these nutrients into your diet.
- To empower you with this knowledge to prolong healthy cognition!
Important Brain Structures

Grey Matter

- Grey matter is heavily involved in memory, emotions, speech, decision-making and impulse control, it acts as an intermediary to relay information around the brain (Miller, Aiston, Corsellis).

- 20% of all oxygen we absorb goes to the brain, and 95% of the oxygen that the brain gets goes to gray matter (Prezi).

- Smoking increases the amount of decay of grey matter.

Omega-3 Fatty Acids (Fish oil)

# 3 Varieties of Omega-3’s

<table>
<thead>
<tr>
<th>Fish-Sourced</th>
<th>Plant-Sourced</th>
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<tbody>
<tr>
<td>Docosahexaenoic Acid (DHA)</td>
<td>α-linolenic Acid (ALA)</td>
</tr>
<tr>
<td>Maintains function of nervous system, supports cognitive, cardiovascular and visual development and function and acts as an anti-inflammatory</td>
<td>Primarily used to give our cells energy</td>
</tr>
<tr>
<td>Eicosapentaenoic Acid (EPA)</td>
<td></td>
</tr>
<tr>
<td>Also acts as an anti-inflammatory and aids in cardiovascular function</td>
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http://www.dhababy.com/AboutDHA/GoodFatsBadFatsFAQ.aspx
Benefits from Omega-3 Fatty Acids

- Positive effects on mental health and depression. Lack of DHA/EPA contributes to hyperactivity of the pituitary gland, which regulates anxiety level (Barclay, L).

- Delaying the onset of cognitive decline in older adults without Alzheimer’s disease through preservation of gray matter volume.
How do I get Omega-3 fats?

- Fatty fish such as mackerel and salmon contain high levels of EPA and DHA.

- Salmon in particular is a great source because of its year-round availability and affordability!
Additional Sources of Omega-3’s

http://www.eggs.ca/assets/Uploads/egg-sizes2.jpg


https://s-media-cache-ak0.pinimg.com/236x/89/04/a4/8904a4a44249bdee8ebd968bd0e74bcb.jpg
Recommended dosages for Omega-3’s

- According to Mayoclinic.org, the recommended daily intake for Omega-3 fatty acids is 1.6 grams.
- This amounts to roughly two servings per week.
In 2012, the hypothesis that EPA and DHA contribute to gray matter volume and healthy cognitive function was tested by Titova et al.

N=252, all age 70.

Participants split into groups according to education level, physical activity level and were asked to record a dietary journal.

5 Years later, participants were screened for cognitive impairment and risk of dementia.

Results

- Participants who had higher intakes of EPA/DHA scored higher on these cognitive tests.
- MRI scans revealed a higher global grey matter volume for these conditions as well.
Neuroprotective Effects

- In 2008, research was conducted by Yu et. al on rats to test the hypothesis that folic acid and genistein provided protective effects against apoptosis generated by Beta-Amyloid buildup.

### Group Conditions
- No manipulation
- Only exposure to Beta-Amyloid
- Folic acid
- Genistein
- Folic acid and Genistein together


[Image of normal and apoptotic cells]
B Vitamins


Folic Acid (online image). Retrieved on March 21, 2015 from http://superhealthsprays.co.uk/wp-content/uploads/2012/01/Folic-Acid-Image-300x228.png
B Vitamins and Their Relation to the Brain

- Decreased brain volume is more common in individuals with lower levels of vitamin B
  - Vitamin B suppresses homocysteine
    - Homocysteine is linked to brain shrinkage

Lower levels of vitamin B-12 are related to more lesions (damage) in the brain.
- White matter: protected by vitamin B-12.
White Matter

• Myelin Sheath wraps around the axon of a cell and speeds up the process of relaying information

• Axon: Portion of the cell that information travels through
  • Damage to the axon slows down the process of relaying information, which then slows down cognitive processes
  
• Ex: Decision making
Related Research

- Refsum et al.
- 107 adults over the age of 60 in relatively good health
- Cognitive assessment, blood test, MRI and CT scan of the brain
- Conducted annually for 5 years
- Focused on brain volume loss

Results

- The rate of brain volume loss was greater in individuals with lower vitamin B-12 levels
  - 1\textsuperscript{ST} and 2\textsuperscript{nd} levels: 0.51\% per year
  - 3\textsuperscript{rd} levels: 1.05\% per year
    - Had a vitamin B-12 deficiency
- Age was a factor

Interesting Facts

- Blood tests for vitamin B-12 and folate are used as a part of the diagnostic process for dementia.
- Vitamin B supplementation was found to be effective in reducing the likelihood of a stroke in 2 studies.
- Some studies suggest that vitamin B supplements are beneficial in early stages of cognitive decline:
  - Reduces brain volume loss

Where can I get B Vitamins?
Recommended Daily Dosages of Vitamin B

According to MayoClinic.org:

- 1.3-1.7 milligrams of vitamin B-6
  - Ex: 1 cup of chickpeas and a baked potato

- 25-100 micrograms of vitamin B-12
  - Ex: 1 steak

- 400-1000 micrograms of folic acid
  - Ex: 1 spinach salad, 1 banana, and 1 hard boiled egg

Antioxidants


What Are Antioxidants?
Examples of Antioxidants

- Vitamin C
- Vitamin E
- Vitamin A (Retinol)
- Beta-Carotene
- Flavonoids

- According to Globalhealingcenter.com, several of these antioxidants can be found in local stores sold as dietary supplements, but it is much healthier to consume them through foods.
How do Antioxidants help me?

According to Healthchecksystems.com:

- Antioxidants prevent against free radical damage.
- Antioxidants help prevent cancers and heart disease.
- Antioxidants are known to have memory and mood-enhancing properties.

Experiment

- In 2007 a study was performed by N. Craft and other researchers on individual samples of brain tissue comparing antioxidants levels found in healthy brain tissue and brain tissue of those with signs of dementia.

- Brain tissue was extracted from both male and female cadaver’s between the ages of 67 and 90. These samples were tested for levels of antioxidants such as Retinoids and Carotenoids.
Studies found that there was a significant age related loss of antioxidants in the frontal region of the brain in the unhealthy brain tissue.

This is important information for the elderly population. More antioxidant consumption should be consumed as you age to maintain healthy cognitive function.
What Are Some Sources of Antioxidants?

- **Avocado**: Promote brain health & contributes healthy blood flow.
- **Carrot**: Reduce age-related memory deficits and inflammation in the brain.
- **Cherry Tomatoes**: Helps prevent dementia.
- **Pomegranate**: Protect the brain from damage of free radicals.
- **Blueberries**: Improve learning & motor skill on brain.
- **Cherries**: Help nervous system on brain.
- **Kiwi**: Increases bone mass.
- **Nuts, Seeds**: Help stimulate brain activity, increase blood flow in the brain.
- **Watermelon**: Target brain function.
How do I get Antioxidants?

Antioxidants are vitamins and minerals which can be consumed through many sources of food such as:

- Chocolate
- Red Wine
- Blueberries, Strawberries and Cranberries
- Kiwi
- Grapes
- Tea
- Apples
Recommended Doses for Antioxidants

According to Mayoclinic.com

- 75-120 milligrams of antioxidants should be added to your daily diet; antioxidants should be consumed with every meal. Routinely skipping antioxidants in your daily diet could lead to an excess number of free radicals which could ultimately damage one’s health.
Summary

Omega 3/ Fatty Acid:
• Recommended daily intake: 1.6 grams (Mayoclinic.org)
• Delay the onset of cognitive decline

B Vitamins
• Recommended daily intake: 25-100 micrograms of B12, 1.3-1.7 milligrams of B6, and 400-1000 micrograms of folic acid (Mayoclinic.org)
• Brain volume loss is associated with low vitamin B12 levels (Oxfordjournals.org)

Antioxidants
• Recommended daily intake: 75-120 milligrams (Mayoclinic.org)
• Enhance memory and mood
Post-test!
References

- https://s-media-cache-ak0.pinimg.com/236x/89/04/a4/8904a4a44249bdee8ebd968bd0e74bcb.jpg
- http://www.brightfocus.org/alzheimers/about/understanding/plaques-and-tangles.html
- https://prezi.com/gssla83fanos/gray-matter/