Neurotransmitters
Depression and Dementia

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4abettermemory.com
Neurotransmitters

- Transmit messages in the brain
- Maintain mood and motivation
- Help us to focus and think more clearly
THE BODY'S NEURON

Schematic of biological neuron.

- Axon hillock
- Soma
- Nucleus
- Axon
- Dendrite
- Terminal buttons
THE SYNAPSE

Nerve Terminal

Synapse

Receptor Nerve
Neurotransmitters linked to Depression

- Serotonin – calm, focus, elevate mood
  - Precursor to melatonin - for sleep

- GABA
  -- reduces anxiety

- Dopamine
  -- alert, energized, motivated

- Acetylcholine – to create memories
Proteins Needed for Neurotransmission

- Tryptophan, B-6 $\rightarrow$ Serotonin
- Phenylalanine $\rightarrow$ tyrosine
- Tyrosine $\rightarrow$ dopamine
- GABA $\rightarrow$ for anxiety
B-Complex vitamins

• B-complex → help in:
  – Digestion
  – synthesis of neurotransmitters
  – development and protection of myelin sheath
Fish – Brain Food

- Fish oil - DHA →
  - strengthens cells walls, and aids in neurotransmission.
  - Reduces risk for bipolar disorder
Omega 3 Supplements Help Manic Depression

Archives of General Psychiatry 1999;56:407-412, 413-414, 415-416

In an editorial, Dr. Joseph Calabrese and colleagues at Case Western Reserve University in Cleveland, Ohio, call the trial a “landmark attempt in drug development for bipolar disorder.”

Except: Is it a drug?
Minerals Needed

• Calcium & Magnesium $\rightarrow$ essential for nervous system, to calm and relax and for sleep
Sun

- **Sunlight** → Vitamin D3 a hormone to
  - helps regulate calcium,
  - Prevent SAD
  - improves the immune system
Sleep
Water

- Facilitate nutrient absorption
- Facilitate toxin elimination
- Maintain ph
- At least 6 glasses per day
**SAMe for Depression**

- **S-adenosyl-methionine**, a naturally occurring molecule in the body
- Short trials (one month) of 800 mg twice daily have shown equivalency to standard anti-depressants
Exercise

• Aids in digestion and assimilation
• Improves circulation of oxygen & nutrients
• Helps to prevent depression
Clues to a “Nutrition deficit”

• Diet includes a lot of junk food and/or meat

• Signs of a carbohydrate addict
  – Sugar temporarily increases brain serotonin levels, helping the person “feel better.”

• Low serum B-12 or folate, high homocysteine

• Often no obvious clues are present
Dementia Prevention
Proteins Needed for Neurofunctioning

- Tryptophan, B-6 $\rightarrow$ Serotonin
  - Low in those with Alzheimer’s
- Phenylalanine $\rightarrow$ tyrosine
- Tyrosine $\rightarrow$ dopamine $\rightarrow$ attention memory
- GABA $\rightarrow$ for anxiety
- L-Carnitine – energy for memories
- NA-Cysteine – protect the brain from oxidation
B-Complex vitamins

• B-complex → help in:
  – Digestion
  – synthesis of SAMe neurotransmitters
  – development and protection of myelin sheath
  – Control inflammation - homocysteine
Fish – Brain Food

• Fish oil - DHA ➔
  – strengthens cells walls, and aids in neurotransmission.
  – Reduces risk for bipolar disorder
  – Prevents plaque in the brain
  – Reduces risk for Alzheimer’s
  – EPA ➔ reduces inflammation
Fish – Brain Food

• Good source of Carnitine
  – fuel and protect brain cells
• Choline – raw material of memories
Recent Studies on Omega 3

- Neuro protection for greater cell integrity
- Improved intercellular communication
- Improves circulation
- As a result improves:
  - Sleep
  - Memory and
  - Other cognitive functioning
  - Aids in the repair of brain damage
  - Reduces risk for dementia
Omega 3

• Reduces platelet aggregation
• Reduces arrythmias
• In higher doses, reduces serum triglycerides
• Decreases arachidonic acid content of cell membranes which
• Inhibits synthesis of proinflammatory cytokines such as tumor necrosis factor, interleukin-1, interleukin-2.
Minerals Needed

• Calcium & Magnesium ➔ essential for
  – nervous system, to calm, relax
  – and for sleep

• Low dose lithium salt ➔
  – Protects the brain
  – may facilitate new nerve growth
  – Terry
Sun

- **Sunlight** → Vitamin D3 a hormone to
  - helps regulate calcium,
  - Prevent SAD
  - improves the immune system
  - protects the brain
Sleep
Water

- Facilitate nutrient absorption
- Facilitate toxin elimination
- Maintain pH
- Critical to prevent Alzheimer’s
- At least 6 glasses per day
SAMe for Depression

- S-adenosyl-methionine, a naturally occurring molecule in the body
- Requires folate & B-12
- Protects mitochondria for ATP production
- Short trials (one month) of 800 mg twice daily have shown equivalency to standard anti-depressants
- Increases acetylcholine for memories
Exercise

• Aids in digestion and assimilation
• Improves circulation of oxygen & nutrients
• Helps to prevent depression
• Increases Brain Nerve growth
• Major neuro protection
MemoryXL

- **Folic acid, B12 & vitamin E**
  - antioxidants that we cannot make

- **N-acetyl Cysteine**
  - building block for antioxidants that we do make

- **Acetyl-L-Carnitine**
  - energy for brain cells, keeps mitochondria strong

- **S-adenosyl methionine “SAM” or “SAMe”**
  - allows brain cells to use their own antioxidants
  - boosts neurotransmission

- **Vit E, Acetyl-L-Carnitine, SAM each used individually in prior clinical trials with marginal efficacy on their own**
MemoryXL fights

- Reduces oxidative damage to brain tissue*
- Increases production of our own antioxidants
- Compensates for ApoE deficiency*
- Prevents overexpression of presenilin-1
- Reduces gamma-secretase activity
- Reduces plaque and tangle components*
- Compensates for vitamin deficiency
- Reduces levels of the neurotoxin homocysteine
- Boosts acetylcholine production
- Maintains cognitive performance
- Reduces aggression…..
MemoryXL

Pilot open label study

10 of 14 improved by average of 30%
Going Strong at 2.5 yrs
Summary

- Eat right
- Get sun light
- Exercise your body and brain
- Consider supplements
- For more info: www.4abettermemory.com
For Application and Best Results

• As we go through the following slides -
• Make a note of those foods, and nutrients from the following lists that you would like to add to your diet.
Foods Rich in Tryptophan (mg/100 grams)

- Whole milk: 46
- Blackeyed Cowpeas: 267
- Black Walnuts: 290
- Almonds: 322
- Seasame seeds: 358
- Gluten flour: 510
- Roasted pumpkin seeds: 578
- Tofu: 747
Crossing the Blood Brain Barrier

• When tryptophan competes you lose
  1. Make sure you have adequate intake early in the day.
  2. Make sure you have enough B-6
  3. Avoid other protein’s for dinner
  4. Eat primarily a complex carb dinner
     (Carbohydrates help draw tryptophan across the blood brain barrier.)
Study Outcomes

Patients receiving omega 3 supplements “had a significantly longer period of remission (from illness) than the placebo group.” Patients receiving omega 3 supplements also displayed considerable improvement on tests assessing levels of depression and other bipolar symptoms.
Recent Studies on Omega 3

- Neuro protection for greater cell integrity
- Improved intercellular communication
- Improves circulation
- As a result improves:
  - Sleep
  - Memory and
  - Other cognitive functioning
  - Aids in the repair of brain damage
  - Reduces risk for dementia
Population Studies

- Multivariate analysis of dietary composition reveals higher omega 3 intake associated with lower heart disease death rates and lower total mortality.
- Post heart attack patients on omega 3 have lower death rates, especially the first 9 months after a heart attack.
# Fish High in Omega 3 (DHA)

<table>
<thead>
<tr>
<th>Fish</th>
<th>Amount</th>
<th>Omega-3 (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drum fish</td>
<td>1 ea.</td>
<td>810</td>
</tr>
<tr>
<td>Tuna (in water)</td>
<td>1 serv.</td>
<td>930</td>
</tr>
<tr>
<td>Rainbow trout</td>
<td>1 ea.</td>
<td>1180</td>
</tr>
<tr>
<td>Freshwater bass</td>
<td>3.5 oz</td>
<td>1190</td>
</tr>
<tr>
<td>Pink Salmon</td>
<td>3.5 oz</td>
<td>1710</td>
</tr>
<tr>
<td>Herring</td>
<td>3.5 oz</td>
<td>3000</td>
</tr>
<tr>
<td>Halibut</td>
<td>3.5 oz</td>
<td>3160</td>
</tr>
<tr>
<td>Shad fillet</td>
<td>1 cup</td>
<td>3680</td>
</tr>
<tr>
<td>Atlantic mackerel</td>
<td>3.5 oz</td>
<td>3930</td>
</tr>
</tbody>
</table>
### Biomagnification of DDD Insecticide

<table>
<thead>
<tr>
<th>Sample Site</th>
<th>DDD, ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake water</td>
<td>0.02</td>
</tr>
<tr>
<td>Phytoplankton (living in DDD-contaminated water)</td>
<td>5</td>
</tr>
<tr>
<td>Herbivorous fish (they eat the phytoplankton)</td>
<td>40-300</td>
</tr>
<tr>
<td>Carnivorous fish (they eat the herbivorous fish)</td>
<td>up to 2500</td>
</tr>
</tbody>
</table>

In parts per million (ppm) in Clear Lake, CA
## Plant Foods Containing Omega-3 (Linolenic Acid)

<table>
<thead>
<tr>
<th>Food Item</th>
<th>Amount</th>
<th>Omega-3 (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flaxseed/Linseed oil</td>
<td>1 Tbs.</td>
<td>7526</td>
</tr>
<tr>
<td>Walnuts, English</td>
<td>¼ cup</td>
<td>1703</td>
</tr>
<tr>
<td>Walnuts, black</td>
<td>¼ cup</td>
<td>1034</td>
</tr>
<tr>
<td>Wheat germ oil</td>
<td>1 Tbs.</td>
<td>938</td>
</tr>
<tr>
<td>Soybean oil (Crisco/Wesson)</td>
<td>1 Tbs.</td>
<td>927</td>
</tr>
<tr>
<td>Green soybeans</td>
<td>1 cup</td>
<td>637</td>
</tr>
<tr>
<td>Spinach canned</td>
<td>1 cup</td>
<td>353</td>
</tr>
<tr>
<td>Almonds</td>
<td>¼ cup</td>
<td>136</td>
</tr>
</tbody>
</table>
Best sources of DHA

- Wild mackerel, salmon, sardines
- Consult with your Dr. before adding these
- Cod liver oil
- Pharmaceutical grade fish oil
- Fish oil capsules
  - Ideally have 250 mg DHA to 1000 mg oil
  - Therapeutic dose usually 1-6 grams
- DHA/ EPA supplements an option

CAUTION: Do not take with blood thinners
Nutritional Causes of Depression

• Insufficient dietary tryptophan
• Low omega-3 fatty acid intake
• Low folate and B-12 levels (such depression is unresponsive to medication, but... relatively easy to remedy)

<table>
<thead>
<tr>
<th>Amount</th>
<th>Food Item</th>
<th>Folate (mcg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5½ ounces</td>
<td>Sirloin steak, broiled, trimmed</td>
<td>16</td>
</tr>
<tr>
<td>½ cup</td>
<td>Parsnips, raw slices</td>
<td>44</td>
</tr>
<tr>
<td>1 cup</td>
<td>Pineapple juice, canned</td>
<td>58</td>
</tr>
<tr>
<td>1 cup</td>
<td>Fresh orange juice</td>
<td>75</td>
</tr>
<tr>
<td>¼ cup</td>
<td>Spanish peanuts, raw</td>
<td>88</td>
</tr>
<tr>
<td>1 cup</td>
<td>Mustard greens, raw</td>
<td>105</td>
</tr>
<tr>
<td>1 cup</td>
<td>Spinach, raw</td>
<td>109</td>
</tr>
<tr>
<td>1 cup</td>
<td>Navy beans</td>
<td>255</td>
</tr>
<tr>
<td>1 cup</td>
<td>Okra pods, frozen</td>
<td>269</td>
</tr>
<tr>
<td>1 cup</td>
<td>Lentils</td>
<td>831</td>
</tr>
<tr>
<td>1 cup</td>
<td>Black-eyed cowpeas</td>
<td>1057</td>
</tr>
</tbody>
</table>
B-12

• Folate needs B-12 for balance
• Helps control homocystein and may prevent depression and dementia.
• Sources:
  – Meat, dairy and poultry - egg yolk
  – Total cereal
  – Shots and sublingual
• A little goes a long ways - lasts a long time
Other B vitamins

• **B-1** deficiencies linked to anxiety, irritability, confusion, aggression, depression, and poor memory. Also used in alcohol detox.

• **B-2** is needed to produce anti-stress hormones, and deficiencies have been linked to confusion, sluggishness, insomnia, and depression.

• **B-3** has been shown to improve the memories of middle-aged patients 10 to 40%. It also helps prevent anxiety, paranoia, and depression.
Other B vitamins

- **B-5** helps protect neurons and provides support for adrenal glands. Helpful in handling physical and mental stress. Low levels may result in increased anger, stomach upset, physical weakness, and poor memory.

- **B-6** is necessary for the synthesis of other neurotransmitters which help keep us alert, optimistic, and facilitate learning. Deficiencies can increase vulnerability to anxiety, depression, and, in some case, seizures.

- **Choline** is necessary for memory and has a soothing effect on nervous system. Reduces vulnerability to stress.
Foods High in Vitamin B₆

(mg/100 grams)

- Lima beans: 0.51
- Lentils: 0.54
- English Walnut: 0.56
- Banana: 0.58
- Sesame seeds: 0.79
- Sunflower seeds: 0.81
- Artichoke hearts: 0.94
- Sweet bell peppers: 2.22
Nutritional Causes of Depression

• Insufficient dietary tryptophan
• Low omega-3 fatty acid intake
• Low folate & B-12 levels (such depression is often unresponsive to medication)
• Low levels of other B- vitamins

Foods High in Vitamin B₆

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Nutritional Causes of Depression

- Insufficient dietary tryptophan
- Low omega-3 fatty acid intake
- Low folate & B-12 levels (such depression is unresponsive to medication)
- Low levels of the B-vitamins
- Marked anorexia, weight and weight loss (hypo (low) & hyper (high) glycemia blood sugar)

# Herbs Used for Depression

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<tr>
<th>Herb</th>
<th>Potential Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>St. John’s Wort</strong></td>
<td>• May be sedating</td>
</tr>
<tr>
<td><em>Hypericum perforatum</em></td>
<td>• May cause photodermatitis</td>
</tr>
<tr>
<td>Effective for mild to</td>
<td>• Should not be taken with other antidepressants</td>
</tr>
<tr>
<td>moderate depression</td>
<td>• May cause severely high blood pressure, headache, and heart arrhythmias when</td>
</tr>
<tr>
<td></td>
<td>combined with cheese, yogurt, beer, wine, or certain medications</td>
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## Herbs Used for Depression

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<td>Gingko Biloba</td>
<td>• Inhibits platelet aggregation</td>
</tr>
<tr>
<td></td>
<td>• May cause spontaneous bleeding, reports of brain bleeding when used with aspirin</td>
</tr>
<tr>
<td></td>
<td>• May cause minor GI side effects</td>
</tr>
<tr>
<td></td>
<td>• Rarely, headache, dizziness, dizziness, vertigo</td>
</tr>
</tbody>
</table>

Effective for mild to moderate depression
SAMe for Depression

• S-adenosyl-methionine, a naturally occurring molecule in the body made from methionine and ATP
• Short trials (one month) of 800 mg twice daily have shown equivalency to standard anti-depressants
• Requires adequate B-12 and folic acid to function optimally.
See Nedley for more info on

- Inflammatory Bowel Disease
- Ulcerative Colitis
- Crohn’s disease
Frequency & Effectiveness

• How often should you take supplements?
• What would be the natural course?
• Dr. Sahelian suggests:
  – Skip a day periodically. Why?
• Variety is the spice of life.
Take Control of Your Life

• By improving your diet
  – Plenty of tryptophan
  – Plenty of omega-3 & B foods
  – Foods high in natural carbohydrates

• By overcoming any harmful food addictions you have

• Avoid toxins