

Food is Medicine, or it is Poison? The Principles of Brain-Healthy Nutrition



Brain-Healthy Nutrition 12 Principles

1. High quality calories
2. Water
3. Healthy, clean protein
4. Smart carbohydrates
5. Healthy fat
6. Eat from the rainbow
7. Brain healthy herbs/spices
8. Only clean food
9. Check out food allergies
10. Using food to heal your mind
11. Type specific
12. Tips

Typical Western Diet

- **Bad fat, salt and sugar ... think cheeseburgers, fries and sodas**
- **Associated with depression, dementia, ADHD, heart disease, cancer, diabetes and obesity**
- **Promotes inflammation**
- **ADHD** (Is Associated With a Western Dietary Pattern in Adolescents 2011)

Howard AL, Robinson M, Smith GJ, Ambrosini GL, Piek JP, Oddy WH. ADHD is associated with a "Western" dietary pattern in adolescents. J Atten Disord. 2011 Jul;15(5):403-11. doi: 10.1177/1087054710365990.

Typical Western Diet Consists of Only 15 Foods

- **Contains an overabundance of bad fat, salt & sugar**
- **Think cheeseburgers, fries, sodas, and candy bars**
- **Promotes inflammation**
- **Associated with depression, ADD, dementia, heart disease, cancer, diabetes and obesity.**

Think Cheeseburger, Fries and a Coke

1. Beef patty
2. Lettuce
3. Tomato
4. Cheese
5. Pickles
6. Onions on a
7. Sesame seed bun
8. Sesame seeds
9. Mustard
10. Mayonnaise
11. Ketchup
12. French fries
13. Giant size Cola

**You've got 13 and for many,
a full day's supply of fat,
salt AND calories**



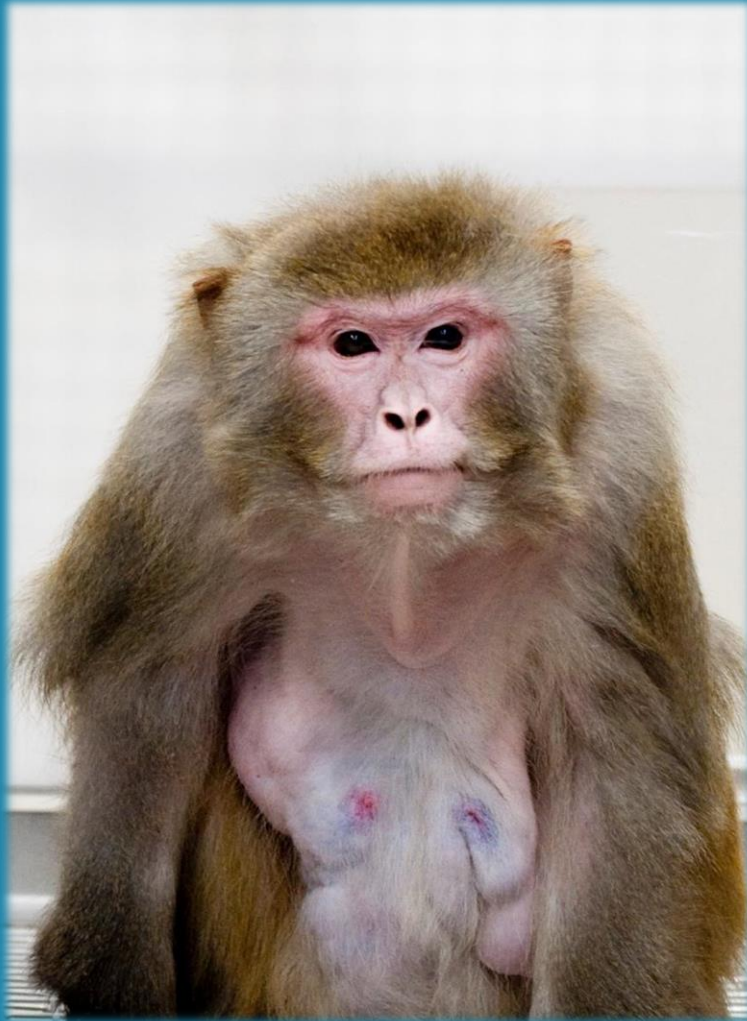
Would you feed a \$1M race horse junk food?

Eating Well is About Abundance, Not Deprivation



**Think High Quality Calories In
Versus High Quality Energy Out**

Calories Count



No Restrictions



Ate 30% Less

Calorie Restriction and Longevity

- **Most studied way to extend life!**
- **Works by controlling these processes:**
 - ❖ **Inflammation (major cause of aging and disease)**
 - ❖ **Glucose Control**
 - ❖ **Glycation (bonding of sugar to protein)**
 - ❖ **Oxidative Stress**
 - ❖ **Methylation-Detoxification**
 - ❖ **DNA Repair**

Go For High Quality Calories



Know Your Calories Requirements

Know the Number of Calories a Day You Eat



Average 50 year old man needs 2200 calories a day

Average 50 year old woman needs 1800

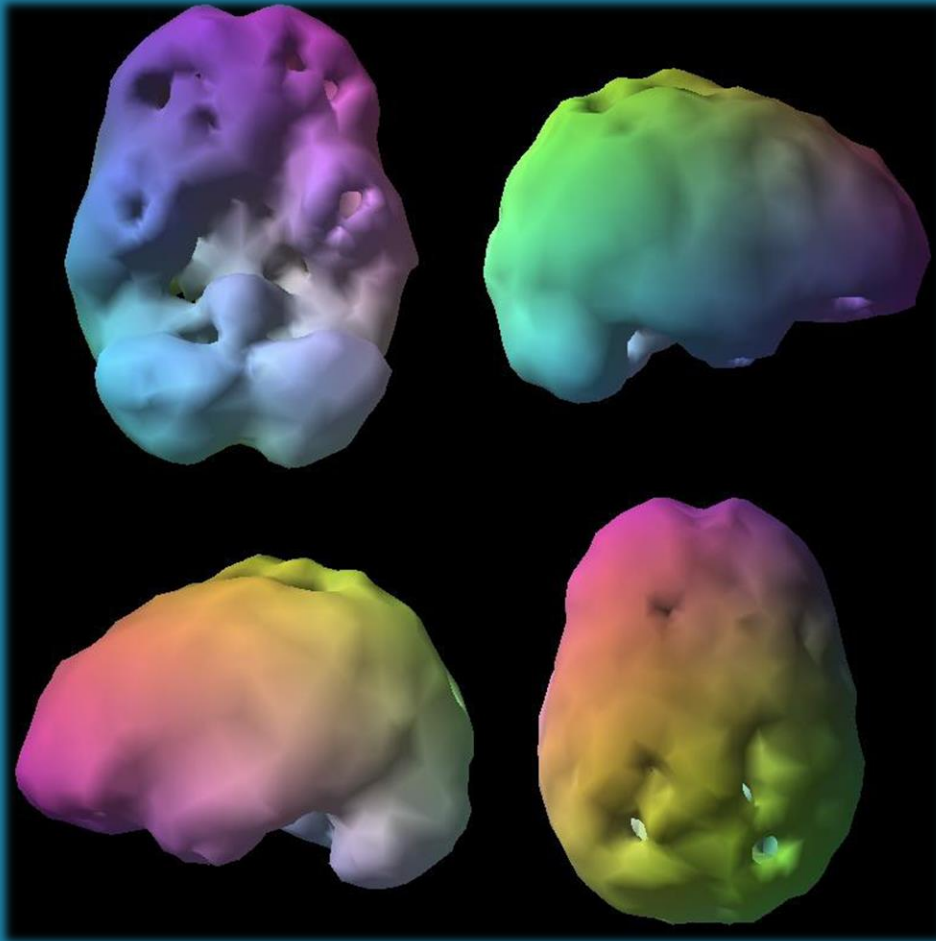
To lose a pound a week eat

500 calories a day less than you need

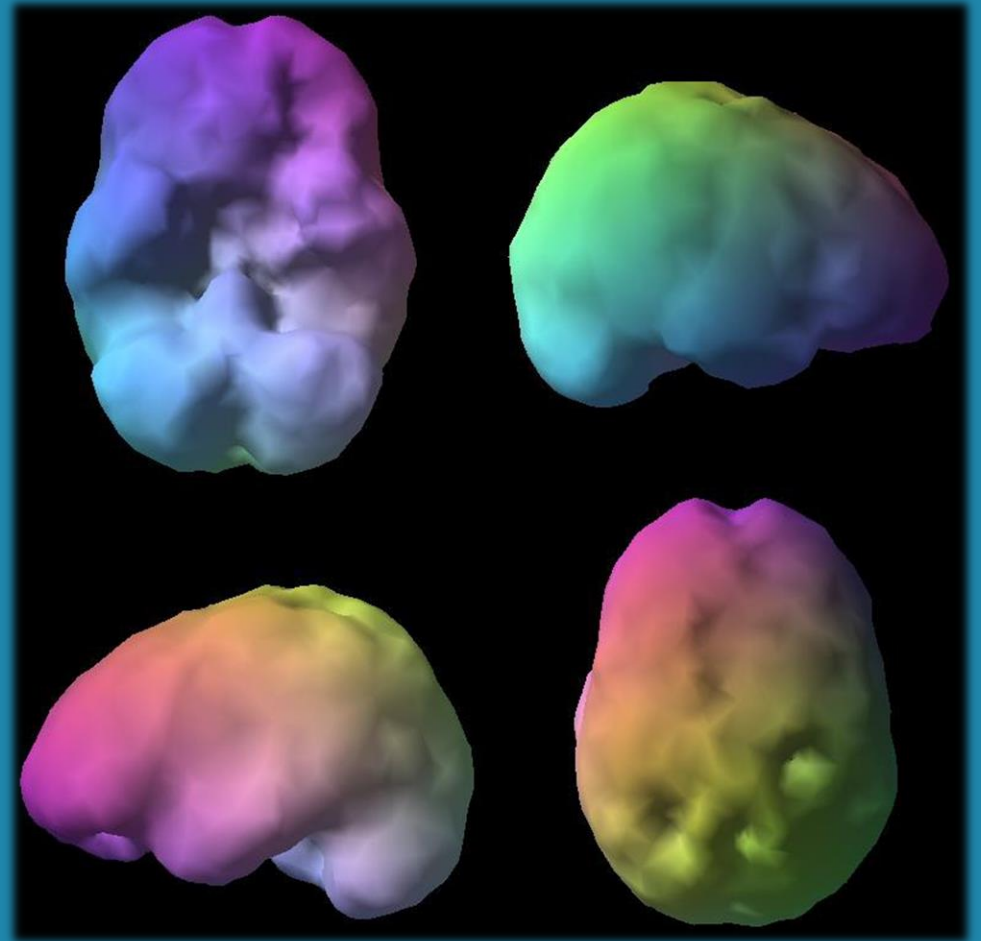
Drink Water and NOT Too Many Calories

- **Brain is 80% water**
- **Stay away from things that dehydrate you**
 - ❖ **Too much caffeine**
 - ❖ **Much alcohol (Decreases production of antidiuretic hormone and increases urination. Hard liquor is worse than beer [95% water], more concentrated. Vomiting)**
 - ❖ **Diuretics**





Dehydration



Good Hydration



ARE YOU POURING ON THE POUNDS?

DON'T DRINK YOURSELF FAT.

**Cut back on soda and other sugary beverages.
Go with water, seltzer or low-fat milk instead.**

NYC
Michael Bloomberg
Mayor

Department of
Health & Mental
Hygiene
Thomas F. Kelly, M.D., M.P.H.
Commissioner

High Quality Protein

- **Make it CLEAN** (hormone-free, antibiotic-free, free-range, grass fed)
- **Fish and lamb for omega-3s**
- **Turkey and chicken**
- **Beans**
- **Raw nuts**
- **High protein veggies**
 - ❖ **broccoli and spinach**



Smart Carbohydrates

- **Low glycemic, high fiber**
- **Carbs that do not raise your blood sugar**
- **High in fiber (vegetables and fruits, such as blueberries and apples)**



Fiber

- **Fiber decreases ghrelin**
- **Feel full faster and longer**
- **Slows absorption of food**
- **Reduces cholesterol**
- **Keeps your digestive tract moving**
- **Reduces high blood pressure**
- **Reduces the risk of cancer**
- **25-35 grams a day**



150 Pounds of Sugar



14 Types of Sugar in One “Health Bar”

Sugar

Molasses

Carmel color

Barley malt

Corn Syrup

Corn syrup solids

**High fructose corn
syrup**

Honey

Sorbitol

Fructose

Cane juice crystals

Maltose

Fruit juice concentrate

Maltodextrin

Sugar is NOT Your Friend

- **Refined sugar is 99.4 to 99.7% pure calories - no vitamins, minerals, or proteins - just carbohydrates**
- **Void of minerals needed for enzymes**
- **Causes chromium and copper deficiency**
- **Interferes with calcium and magnesium**
- **Increases inflammation**
- **Increases erratic brain cell firing**
- **Implicated in aggression**

United States Sugar Policy: An Analysis. Washington, D.C.: U.S. Printing Office, 1989, p.4. Kozlovsky, A., et al., "Effects of diets high in simple sugars on urinary chromium losses," Metabolism, 1986: 35;515-18.

Sugar is NOT Your Friend

- **Associated with ADHD and hyperactivity**
- **Increased triglycerides, lower HDL, raise LDL**
- **Feed cancer cells**
- **Increases “slow brain waves”**
- **Depression**
- **Makes you dumb – alters learning and memory, but adding omega-3s can help minimize the damage**

Goldman, J. Behavioral effects of sucrose on preschool children. *J Abnor Child Psychol*, 1986; 14:565-77.

Scanto, S., et al., “The effect of dietary sucrose on blood lipids, serum insulin, platelet adhesiveness and body weight in human volunteers,”: *Postgrad Med Jour*, 1969; 45:602-07.

Agrawal R, Gomez-Pinilla F. 'Metabolic syndrome' in the brain: deficiency in omega-3 fatty acid exacerbates dysfunctions in insulin receptor signalling and cognition. *J Physiol*. 2012 May 15;590(10):2485-99. doi: 10.1113/jphysiol.2012.230078.

Hidden Sugar

- **Alcoholic beverages**
- **Almost half of calories in ketchups**
- **In most luncheon meats**
- **Breading on many products**
- **Most store-bought breads**
- **Salad dressings frequently contain sugar**
- **Often added to hamburgers to prevent shrinkage**
- **In fast food grilled chicken**

Top 20 Carbohydrates in the US

Harvard Nurses' Health Study

1. Potatoes
2. White bread
3. Breakfast cereal
4. Dark bread
5. Orange juice
6. Banana
7. White rice
8. Pizza
9. Pasta
10. Muffins
11. Cookies, pastries
12. Other fruit juices
13. Coca-Cola
14. **Apple**
15. Skim milk
16. Pancake
17. Table sugar
18. Jam
19. French fries
20. Candy

Hypoglycemia

- **Present in violent offenders, arsonists** (Virkkunen 1982, 1984, 2009)
- **Alcoholic, impulsive offenders with intermittent explosive disorder had low mean CSF 5-HIAA concentration and blood glucose nadir after glucose challenge** (Virkkunen 1994).

Virkkunen M. Reactive hypoglycemic tendency among arsonists. *Acta Psychiatr Scand.* 1984 May;69(5):445-52.

Virkkunen M, Huttunen MO. Evidence for abnormal glucose tolerance test among violent offenders. *Neuropsychobiology.* 1982;8(1):30-4.

Virkkunen M, Rissanen A, Franssila-Kallunki A, Tiihonen J. Low non-oxidative glucose metabolism and violent offending: an 8-year prospective follow-up study. *Psychiatry Res.* 2009 Jun 30;168(1):26-31.

Virkkunen M, Rawlings R, Tokola R, Poland RE, Guidotti A, Nemeroff C, Bissette G, Kalogeras K, Karonen SL, Linnoila M. CSF biochemistries, glucose metabolism, and diurnal activity rhythms in alcoholic, violent offenders, fire setters, and healthy volunteers. *Arch Gen Psychiatry.* 1994 Jan;51(1):20-7. doi: 10.1001/archpsyc.1994.03950010020003.

Symptoms of Hypoglycemia

- **Feeling sleepy/drugged**
- **Mental confusion**
- **Inability to concentrate**
- **Impaired memory**
- **Dizzy, lightheaded**
- **Nervousness**
- **Depression**
- **Irritability**
- **Blurred vision**
- **Anxiety/panic attacks**
- **Palpitations**
- **Shaky hands**
- **“Butterflies in stomach”**
- **Flushing/sweating**
- **Faintness/fainting**
- **Frontal headache**
- **Insomnia**
- **Abdominal pain/diarrhea**

Kill Most Sugar

- **Robert Lustig, MD, UCSF Pediatric Endocrinology**
- **Sugar is addictive**
- **It is the PRIMARY cause of obesity, hypertension, heart disease, cholesterol problems and diabetes, all of which cause brain damage**
- **Average American eats 141 lbs of sugar a year!!**
- **Fructose processed in liver like alcohol**
- **90 minute [www.youtube](http://www.youtube.com) video worth watching**

Sugar Substitutes

- **Aspartame**
- **Sucralose**
- **Honey**
- **Saccharin**
- **Stevia**
- **Sugar alcohols: xylitol, erythritol, sorbitol, mannitol, isomalt**

Aspartame

- **Phenylalanine + aspartic acid**
- **PKU cannot use**
- **Destroyed by heat**
- **200 times sweeter than sugar**
- **Associated with dizziness**
- **Disorientation**
- **Elevated liver enzymes**
- **Arthritis/muscle aches**
- **Loss of balance**
- **Numbness**
- **High blood pressure**
- **ADD/ADHD**
- **Hives**
- **Memory loss**
- **Headaches**
- **Seizures**

Sucralose

- **Started out as a pesticide**
- **Closer to DDT than sugar**
- **Splenda is not natural**
- **600 times sweeter than sugar**
- **Starts as a sugar molecule and has 3 of its components removed and replaced with chloride**
- **Provides no calories because the body does not recognize it as food.**

Sucralose

- **No blood sugar increase, increases HgA1C**
- **Reduces good gut bacteria by 50% in one animal study**
- **May increase carb cravings**

http://ec.europa.eu/food/fs/sc/scf/out68_en.pdf

Honey

- **Contains small amounts of vitamins and minerals.**
- **Glycemic index of about 73 (slightly higher than sucrose because sucrose is half fructose and honey is about 40% fructose).**
- **20-60% sweeter than sugar.**

Saccharin

- **Has been used for over 100 years**
- **Studies are mixed on whether it is a carcinogen**
- **200 times sweeter than sugar**
- **In 2000, determined that the link between bladder cancer in rats was not associated to humans**
- **Better options**

Stevia

- **Stevia is extracted from a leaf**
- **No known side effects**
- **Does not raise glucose or insulin levels**

Xylitol

- Naturally occurring sweet compound, fruits/veggies
- Supplements made from fiber of birch tree
- May decrease dental caries and build up of plaque
- Increases satiety
- 40% less calories than sugar, 2.4 calories/gram
- 7 glycemic index, little effect on blood sugar/insulin
- Body produces up to 15 grams of xylitol per day
- Sugar alcohols incompletely absorbed in intestine, may have a laxative effect, especially in large quantity

Healthy Fats

- **Eliminate bad fats**
 - ❖ **ALL trans-fats (read the food labels)**
 - ❖ **unclean animal fat**
- **Focus on healthy fats, especially omega-3s**
 - ❖ **salmon, avocados, walnuts and green leafy vegetables**
- **High cholesterol is not good for your brain**
- **Very low fat diets not good for your brain either**

Low Cholesterol is Associated With:

- **Antisocial personality disorder**
- **Violence**
- **Suicide**
- **Childhood onset conduct disorder**
- **250 Finnish offenders – 8 times more likely to die of unnatural causes**

Repo-Tiihonen E, Halonen P, Tiihonen J, Virkkunen M. Total serum cholesterol level, violent criminal offences, suicidal behavior, mortality and the appearance of conduct disorder in Finnish male criminal offenders with antisocial personality disorder. *Eur Arch Psychiatry Clin Neurosci.* 2002 Feb;252(1):8-11. doi: 10.1007/s004060200001.

Healthy Fats

Ahi and Avocado Sauce



Does Fish Make You Smarter?

- **C. Raji, 2011, n260**
- **Asked how much fish they ate**
- **10 years later MRIs and cognitive testing**
- **People who ate baked fish at least once a week**
- **Greater amounts of gray matter in three key areas: hippocampus, posterior cingulate, orbital frontal cortex, performed better on tests**
- **Reduced risk of Alzheimer's disease or MCI by 5 times**

Best Fish Choices: Seafoodwatch.org

- **Abalone (US f = farmed)**
- **Arctic Char (f)**
- **Barramundi (US f)**
- **Catfish (US f)**
- **Clams, Mussels, Oysters (f)**
- **Cod: Pacific (US non-trawled)**
- **Crab: Dungeness**
- **Halibut: Pacific (US)**
- **Lobster: California Spiny (US)**
- **Rockfish: Black (CA,OR,WA, hook & line)**
- **Sablefish/Black Cod (Alaska & Canada)**
- **Salmon (Alaska wild)**
- **Sardines: Pacific (US)**
- **Scallops (f)**
- **Shrimp: Pink (OR)**
- **Spot Prawn (Canada)**
- **Striped Bass (f & wild*)**
- **Tilapia (US f)**
- **Trout: Rainbow (US f)**
- **Tuna: Albacore (Canada & US Pacific,troll/pole)**
- **Tuna: Skipjack, Yellowfin (US troll/pole)**
- **White Seabass (hook/line)**

Good Fish Choices: Seafoodwatch.org

- **Caviar, Sturgeon (US f)**
- **Clams, Oysters (wild)**
- **Cod: Pacific (US trawled)**
- **Crab: King (US), Snow**
- **Flounders, Soles (Pacific)**
- **Halibut: California***
- **Lingcod***
- **Lobster: American/Maine**
- **Mahi Mahi (US)**
- **Pollock: Alaska (US)**
- **Rockfish (Pacific hook/line)**
- **Sablefish/Black Cod (CA, OR, WA)**
- **Salmon (CA, OR, WA*, wild)**
- **Sanddabs (Pacific)**
- **Scallops (wild)**
- **Shrimp (US, Canada)**
- **Spot Prawn (US)**
- **Squid**
- **Swordfish (US)***
- **Tilapia (Central & South America f)**
- **Tuna: Bigeye, Tongol, Yellowfin (troll/pole)**
- **Yellowtail: California (US wild)**

Avoid Fish Choices: Seafoodwatch.org

- **Caviar, Sturgeon*** (imported)
- **Chilean Seabass/Toothfish***
- **Cod: Atlantic (Canada & US)**
- **Cod: Pacific (imported)**
- **Cobia (f)**
- **Crab: King (imported)**
- **Dogfish (US)***
- **Grenadier**
- **Lobster: Spiny (Brazil)**
- **Mahi Mahi (imported)**
- **Marlin: Blue, Striped (Pacific)***
- **Monkfish**
- **Orange Roughy***
- **Rockfish/ “Pacific Snapper” (trawled)**
- **Salmon (f, incl Atlantic)***
- **Sharks***
- **Shrimp (imported)**
- **Swordfish (imported)***
- **Tilapia (Asia farmed)**
- **Tuna: Albacore*, Bigeye*, Skipjack, Tongol, Yellowfin* (except troll/pole)**
- **Tuna: Bluefin***
- **Tuna: Canned (except troll/pole caught)**

Eat From the Rainbow

- **Foods of many different colors**
- **Boost antioxidant levels**
- **Helps keep brain young and happy**
- **Antioxidant status associated with depression**

Cumurcu BE, Ozyurt H, Etikan I, Demir S, Karlidag R. Total antioxidant capacity and total oxidant status in patients with major depression: impact of antidepressant treatment. *Psychiatry Clin Neurosci.* 2009



Antioxidants and Mental Health

- **Oxidative stress plays a role many major psychiatric disorders, including depression**
- **Reactive oxygen species modulate neurotransmitters NE, S, DA, glutamate**
- **Depression associated with lower antioxidants, such as compounds, such as vitamin E, zinc and CoQ10**
- **NAC helps depression in RPC studies**
- **Curcumin antidepressant activity in animal models**

Scapagnini G, Davinelli S, Drago F, De Lorenzo A, Oriani G. Antioxidants as antidepressants: fact or fiction? *CNS Drugs*. 2012 Jun 1;26(6):477-90. doi: 10.2165/11633190-000000000-00000.

Antioxidant Rich Foods (ORAC Oxygen Radical Absorbance Capacity)

- **Cloves 290,000**
- **Oregano 175,000**
- **Rosemary 165,000**
- **Thyme 157,000**
- **Cinnamon 131,000**
- **Tumeric 125,000**
- **Sage 120,000**
- **Acai fruit 102,000**
- **Cocoa power 55,000**
- **Raspberries 19,000**
- **Walnuts 13,000**
- **Blueberries 9,600**
- **Artichokes 9,400**
- **Cranberries 9,000**
- **Kidney beans 8,600**
- **Blackberries 5,900**
- **Pomegranates 4,400**

Eat From the Rainbow



Cook with Brain Healthy Herbs and Spices

- **Garlic and oregano boost brain blood flow**
- **Saffron has antidepressant effects**
- **Curcumin decreases beta-amyloid plaques**
- **Rosemary, thyme, sage enhance memory**
- **Cinnamon boosts attention, aphrodisiac for men**
- **Ginger, cayenne, black pepper – hot/spicy from gingerols, capsaicin, and piperine, compounds that boost metabolism and aphrodisiac effect**

Make Sure Food is Clean

- **Avoid toxic foods as much as possible**
- **Artificial colors and sodium benzoate increased ADHD symptoms (2007 Southampton University Study)**
- **Meta-analysis of 15 double-blind clinical trials that evaluated artificial food coloring in children already considered to be hyperactive showed an increase in hyperactive behavior**

McCann D et al. Food additives and hyperactive behaviour in 3-year-old and 8/9-year-old children in the community: a randomised, double-blinded, placebo-controlled trial. *Lancet*. 2007 Nov 3;370(9598):1560-7.

14 Foods with the Highest Levels of Pesticide Residues (Buy Organic)

1. Celery
2. Peaches
3. Strawberries
4. Apples
5. Blueberries
6. Nectarines
7. Cucumbers
8. Sweet Bell Peppers
9. Spinach
10. Cherries
11. Collard Greens/Kale
12. Potatoes
13. Grapes
14. Green beans

17 Foods with the Lowest Levels of Pesticides Residues (Don't Necessarily Need Organic)

- 1. Onions**
- 2. Avocado**
- 3. Sweet Corn (Frozen)**
- 4. Pineapples**
- 5. Mango**
- 6. Asparagus**
- 7. Sweet Peas (Frozen)**
- 8. Kiwi Fruit**
- 9. Bananas**
- 10. Cabbage**
- 11. Broccoli**
- 12. Papaya**
- 13. Mushrooms**
- 14. Watermelon**
- 15. Grapefruit**
- 16. Eggplant**
- 17. Cantaloupe**

Check Out Food Allergies

Gluten Sensitivity

- **Can cause lower overall perfusion in the brain and schizophrenic symptoms.**
- **Drastic reduction, if not full remission, of schizophrenic symptoms after initiation of gluten withdrawal has been noted in a variety of studies in a subset of schizophrenic patients.**
- **Improved ADHD symptoms in a subset of patients**

Kalaydjian AE, Eaton W, Cascella N, Fasano A. The gluten connection: the association between schizophrenia and celiac disease. *Acta Psychiatr Scand.* 2006 Feb;113(2):82-90.

Niederhofer H, Pittschieler K. A preliminary investigation of ADHD symptoms in persons with celiac disease. *J Atten Disord.* 2006 Nov;10(2):200-4. doi: 10.1177/1087054706292109.

Gluten Sensitivity

- **Associated with cerebellar abnormalities**
- **40% of idiopathic sporadic ataxia**
- **Intractable seizures and hippocampal atrophy**

Hadjivassiliou M, Sanders DS, Woodroffe N, Williamson C, Grünewald RA. Gluten ataxia. *Cerebellum*. 2008;7(3):494-8.

Peltola M, Kaukinen K, Dastidar P, Haimila K, Partanen J, Haapala AM, Mäki M, Keränen T, Peltola J. Hippocampal sclerosis in refractory temporal lobe epilepsy is associated with gluten sensitivity. *J Neurol Neurosurg Psychiatry*. 2009 Jun;80(6):626-30.

Schizophrenia and GI Inflammation

- **Immune factors (pathogens and food antigens) cross the gut barrier and implicated in brain disorders**
- **GI inflammation associated with schizophrenia**
- **Milk, gluten exorphins**
- **IgG antibodies to *Saccharomyces cerevisiae* (ASCA, a marker of intestinal inflammation)**
- **Casein, gluten, 6 infectious agents assayed**

Severance EG, Alaedini A, Yang S, Halling M, Gressitt KL, Stallings CR, Origoni AE, Vaughan C, Khushalani S, Leweke FM, Dickerson FB, Yolken RH. Gastrointestinal inflammation and associated immune activation in schizophrenia. *Schizophr Res.* 2012 Jun;138(1):48-53.

Schizophrenia and GI Inflammation

- **264 schizophrenics vs. 207 non-psych controls**
- **ASCA markers significantly elevated in patients (p≤0.00001-0.004)**
- **Anti-food antigen antibodies correlated to antibodies against *Toxoplasma gondii*, particularly in males with recent onset schizophrenia (p≤0.002)**
- **GI inflammation relevant in schizophrenia**

Severance EG, Alaedini A, Yang S, Halling M, Gressitt KL, Stallings CR, Origoni AE, Vaughan C, Khushalani S, Leweke FM, Dickerson FB, Yolken RH. Gastrointestinal inflammation and associated immune activation in schizophrenia. *Schizophr Res.* 2012 Jun;138(1):48-53.

Case of Gluten Sensitivity

- **A 33-year-old “schizophrenic patient”**
- **Diarrhea and weight loss**
- **SPECT hypoperfusion left frontal area**
- **Gluten sensitivity diagnosed**
- **Gluten-free diet eliminated psychiatric symptoms**

DeSantis et al. Schizophrenic symptoms and SPECT abnormalities in a celiac patient: regression after a gluten-free diet. J Intern Med 2007

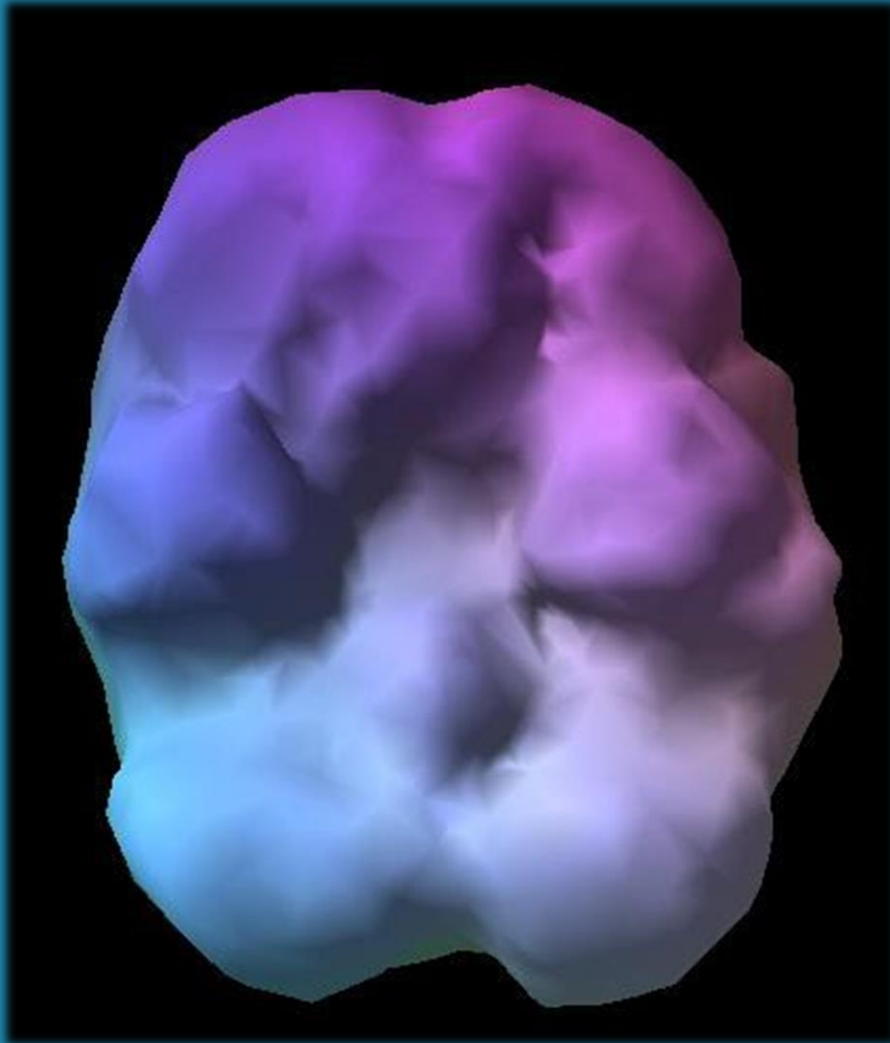
Bread is My Crack! Gluten and Addiction

- **Gluten and casein exposed to pepsin & HCL degrade to polypeptides (exorphins) cross BBB**
- **Bind to endorphin receptors, mild euphoria**
- **Effect blocked by naltrexone**
- **Withdrawal symptoms**

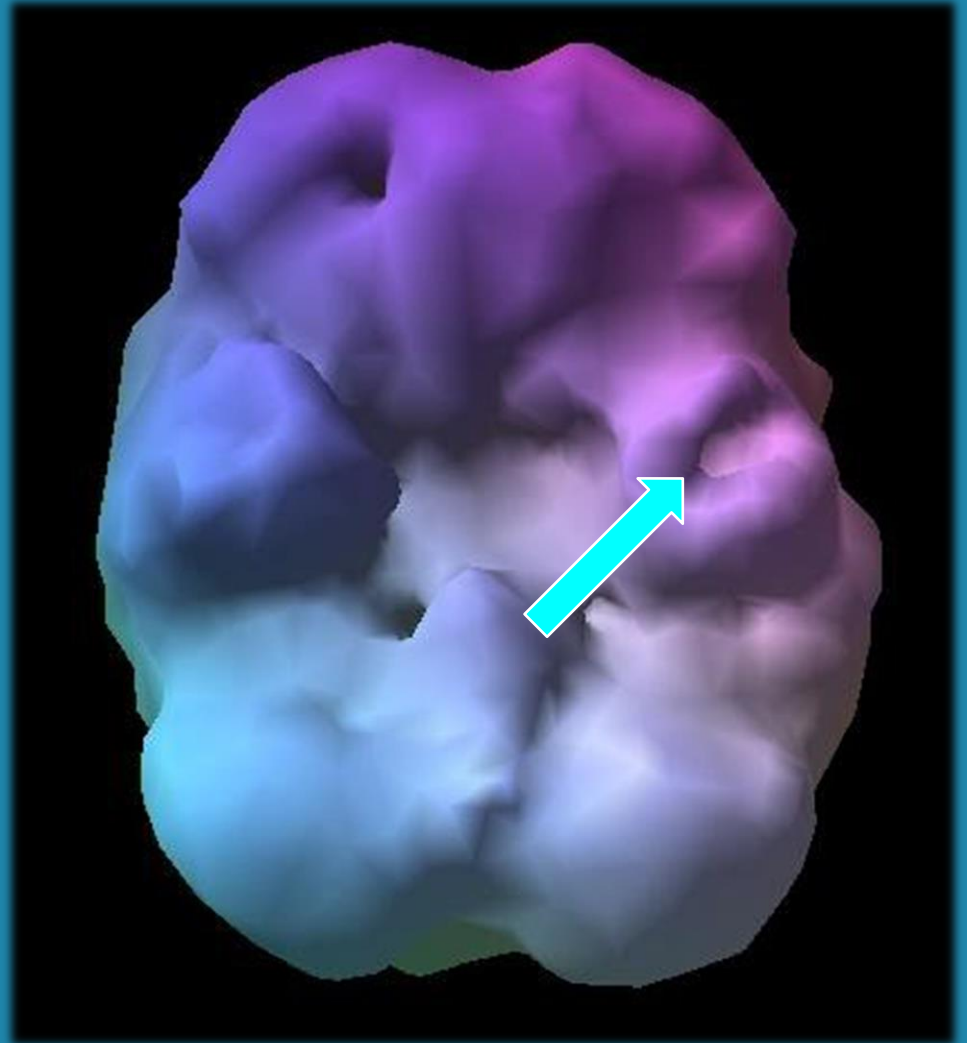
Zioudrou C, Streaty RA, Klee WA. Opioid peptides derived from food proteins. The exorphins. *J Biol Chem.* 1979 Apr 10;254(7):2446-9. Cohen MR, Cohen RM, Pickar D, Murphy DL. Naloxone reduces food intake in humans. *Psychosom Med.* 1985 Mar-Apr;47(2):132-8.

Drewnowski A, Krahn DD, Demitrack MA, Nairn K, Gosnell BA. Naloxone, an opiate blocker, reduces the consumption of sweet high-fat foods in obese and lean female binge eaters. *Am J Clin Nutr.* 1995





Off MSG



On MSG

Using Food to Heal Your Mind

Food as Medicine

- **Elimination diet found helpful for ADHD**
- **73% improved vs. 0% in controlled group**

Pessler et al. A randomised controlled trial into the effects of food on ADHD. Eur Child Adolesc Psychiatry. 2009

Ketogenic Diet in Epilepsy

- **Helpful for many children and adults with many different seizure types, including:**
 - ❖ **infantile spasms**
 - ❖ **myoclonic epilepsy**
 - ❖ **febrile infectious epilepsy**
 - ❖ **2/3 w/seizure reduction @ 6 months**
 - ❖ **Alzheimer's, ALS, autism being studied**



Kossoff EH, Hartman AL. Ketogenic diets: new advances for metabolism-based therapies. *Curr Opin Neurol.* 2012 Apr;25(2):173-8.

Food as Medicine

- **Mediterranean diet < depression and dementia**
- **Healthy diet associated with lower risk of depression**
- **Diet and physical activity associated with lower risk of dementia**

Sanchez-Villegas et al. Association of Mediterranean diet and depression. Arch Gen Psychiatry 2009



Please don't feed the animals

Bread and snacks are unhealthy for squirrels, deer and birds.

Handouts can lead to malnutrition and starvation. These animals need their natural diets.

Let them find their own food.

Feeding wildlife prohibited by County Ordinance #8.42.012

17 Mile Drive



Yakima Nation

Powerful Anti-Inflammatory Plant Chemicals

- **Sulforaphanes from Broccoli**
- **Curcumin from Curry**
- **Carnosol in Rosemary**
- **Garlic**
- **Green Tea**
- **Kahewol in Coffee!!!**
- **Pomegranate**
- **Super Foods: maca, cacao, gogi berries...**

Serotonin - mood stability, sleep regulation, appetite, social engagement, “don't worry be happy”

- **Carbohydrate rich foods that increase insulin**
- **Supplements: 5 HTP, inositol, saffron, SJW**



Foods to Boost Mood/Serotonin = Carbs

➤ Troubled Carbs

- ❖ Crackers
- ❖ Pancakes/waffles
- ❖ Sweet cereals
- ❖ Muffins
- ❖ Bagels
- ❖ Pasta
- ❖ White rice
- ❖ Potatoes
- ❖ Fruit juice/sodas

➤ Smart Carbs

- ❖ Sweet potatoes
- ❖ Brown rice
- ❖ Steel cut oatmeal w/ berries/stevia
- ❖ Apples
- ❖ Cherries
- ❖ Red bell peppers
- ❖ Sweet corn
- ❖ Cantaloupe

Dopamine - motivation, emotional significance, relevance, pain and pleasure, “let's get it done”

- Found in protein rich foods that decrease insulin
- Supplements: DLPA, L-tyrosine, SAMe, B-complex, rhodiola, ginkgo biloba, ascorbic acid



Foods to Boost Focus/Dopamine = Protein

➤ Good Sources

- ❖ Beans – lima, lentils
- ❖ Meat – fish, lamb, chicken, turkey, beef
- ❖ Eggs
- ❖ Cheese
- ❖ Nuts
- ❖ Seeds (pumpkin and sesame)
- ❖ High protein veggies – broccoli, spinach
- ❖ Protein powders

Acetylcholine - learning, memory, association “fact people”

- Found in liver, eggs, lecithin, milk, salmon, shrimp
- Supplements: choline salts, phosphatidylcholine, lecithin



GABA - inhibitory, calming, stabilizing, grounding, “list people”

- Found in whole grains, bananas, broccoli, nuts, lentils, green tea
- Supplements: L-theanine, GABA



Glutamate/Aspartate - excitability, memory, pain perception

- Found in diet soda, dairy (cheese), soy, wheat, barley, peanuts,
- meat (lamb and eggs are lowest)



The Brain Gut Connection

The Gut is the Second Brain

- **Gut is loaded with nervous tissue**
- **In direct communication with our big brain**
- **Why we get butterflies when excited or loose bowels when upset**
- **Anxiety, depression, stress, and grief all express themselves with emotional pain (the brain) and quite often gastrointestinal (GI) distress**

The Gut

- **Single epithelial layer (like the brain, largest mucosal surface in body)**
- **Interface between external world and host**
- **Initial metabolism & transformation of food**
- **Structural defense (trouble when this breaks down)**

Mucosal Lining of the Gut

- **Provides layer of protection to endothelium**
- **Made of glycoproteins – mucin**
- **Mucin production upregulated by probiotics**
- **Can be compromised by stress, drug use, diet, environmental chemicals, gut flora balance, genetic predisposition.**

Supports Brain Health

- **100 trillion microorganisms (bacteria, yeast, and others)**
- **10 times total number of cells in human body**
- **To be healthy, relationship of good/bad bugs needs to be lopsided in + direction**
- **Healthy 85% good 15% bad**
- **Out of balance bad for mental health**

Logan AC, Katzman M. Major depressive disorder: probiotics may be an adjuvant therapy. Med Hypotheses.

Gut Health

- **Friendly bacteria deter trouble makers, such as E-coli, and help us withstand stress**
- **If deficient, from poor diet that feeds yeast overgrowth (think sugar) or excessive use of antibiotics (even in childhood), more likely to feel stressed**
- **ADD, autism, depression, mental fogginess connected to intestinal bacteria imbalances**

Logan AC, Katzman M. Major depressive disorder: probiotics may be an adjuvant therapy. Med Hypotheses. 2005;64(3):533-8.

Gut Flora

- **Inhabit the small and large intestines**
- **Anaerobic bacteria are the most abundant**
- **Probiotic - beneficial bacteria that serve many functions in the gut**
- **Yeast - candida albicans are also part of normal flora should be kept under control by good bacteria**

Functions of Beneficial Flora

- **Makes vitamin K and biotin**
- **Helps with digestion**
- **Detoxification (probiotics have been found to decrease colon cancer risk)**
- **Carriers for estrogen out of the body**
- **Immune modulation**
- **Population control of pathogens**
- **Nutrient absorption and metabolism**

Beneficial Flora Protection

- **Allergies/Intolerances**
- **Hormonal Regulation**
- **Probiotic organisms help to synthesize butyrate, a short chain fatty acid that protects the GI lining**
- **Dysbiotic organisms contribute to the deterioration of the intestinal lining Yeast/Bacteria/Parasites**
- **Butyrate protects the cells of the intestine from abnormal growth, and may protect against colon cancer.**

What Decreases Healthy Gut Bacteria?

- **Medications (antibiotics, oral contraceptives, proton pump inhibitors, steroids, NSAIDS)**
- **Stress (physiological, emotional and environmental)**
- **Sugar intake, artificial sweeteners**
- **Allergies**
- **Toxins – bactericidal chemicals in H₂O, pesticides, heavy metals, alcohol**
- **Infections – H. Pylori, parasites**
- **Radiation/chemo**
- **High intensity exercise**

Food is the Greatest Danger

- **Greatest danger not from antibiotics prescribed by your doctor, but rather from foods you eat**
- **Prevalence of antibiotics found in conventionally raised meats and vegetables have potential to throw off the balance of good to bad bacteria**
- **70% of total antibiotic use in the U.S. for livestock**
- **Critical to focus on eating antibiotic free, hormone free, grass fed, free range meats**

A Few Germs Can Be Good For You

- **Animals raised in a germ-free environment show exaggerated responses to psychological stress**
- **Need good GI bugs to boost immune system**
- **Don't keep kids away from dirt**
- **When researchers gave animals probiotics stress levels normalized**
- **Stress, all by itself, decreases healthy gut flora**

Dinan TG, Cryan JF. Regulation of the stress response by the gut microbiota: implications for psychoneuroendocrinology. *Psychoneuroendocrinology*. 2012 Sep;37(9):1369-78.

Boost Gut Flora Early?

- **If deficient early in life causes decreased serotonin, maybe for the rest of a person's life**
- **At least in animal models**

Clarke G, Grenham S, Scully P, Fitzgerald P, Moloney RD, Shanahan F, Dinan TG and Cryan JF. The microbiome-gut-brain axis during early life regulates the hippocampal serotonergic system in a sex-dependent manner. *Molecular Psychiatry* June 12, 2012; doi:10.1038/mp.2012.77

Early Abandonment Issues

- **Early abandonment issues can cause increased stress, decreased healthy bacteria, and increased gut permeability**
- **When young rats separated from mothers, cell layers that line gut become more permeable, allowing bacteria from the intestine to pass through the bowel walls and stimulate immune cells to start attacking other organs.**

Desbonnet L, Garrett L, Clarke G, Kiely B, Cryan JF, Dinan TG. Effects of the probiotic *Bifidobacterium infantis* in the maternal separation model of depression. *Neuroscience*. 2010 Nov 10;170(4):1179-88. Epub 2010 Aug 6.

Early Abandonment Issues

- **“In rats, it’s an adaptive response ... If born into stressful, hostile environment, nature programs them to be vigilant and stress responsive in future life.”**
- **Up to 70% of patients treated for chronic gut disorders experienced early childhood traumas like parents’ divorces, chronic illnesses, or parents’ deaths.**
- **“What happens in early life, along with an individual’s genetic background, programs how a person will respond to stress for the rest of his or her life.”**

Brown, H. A brain in the head, and one in the gut, *New York Times* August 25, 2005.

Case T

- **T, grew up in a single parent home filled with stress**
- **At 4, her uncle was murdered**
- **Then, mom bringing her in for GI complaints**
- **Lots of antibiotics**
- **At 9, started having panic attacks, especially when mother came home late from work**
- **Developed bulimia as a teen with bad intestinal issues**
- **Probiotics and stress reduction helpful physically and emotionally**

Chronic Fatigue, Gut and Mind

- **Rao (2009) 39 CFS patients**
- **3 probiotic doses/day or placebo for 2 months**
- **73% probiotic group had increased good gut bacteria**
- **Corresponded with significant decreased anxiety**
- **No change in placebo group**
- **Researchers believed probiotics “crowded out” more toxic gut bacteria linked to depression**
- **“Subjects felt less anxious, calmer, better able to cope, sleeping better, fewer heart palpitations.”**

Rao AV, Bested AC, Beaulne TM, Katzman MA, Iorio C, Berardi JM, Logan AC. A randomized, double-blind, placebo-controlled pilot study of a probiotic in emotional symptoms of chronic fatigue syndrome. *Gut Pathog.* 2009 Mar 19;1(1):6. doi: 10.1186/1757-4749-1-6.

Fix the Gut

- **Improve diet, nutrient density, essential fatty acids, fiber, phytonutrients**
- **Eliminate most simple sugars that feed bad bugs**
- **Support digestion: enzymes and HCL**
- **Support normal flora: pre and probiotics**
- **Be careful with antibiotics**
- **Remove infections and toxins**