Nutritional Psychiatry

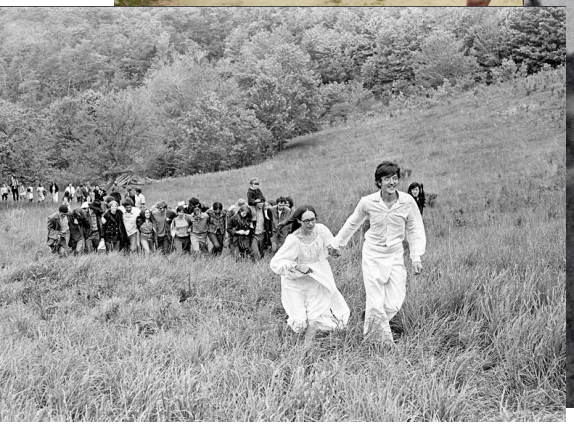
For Healthcare Professionals

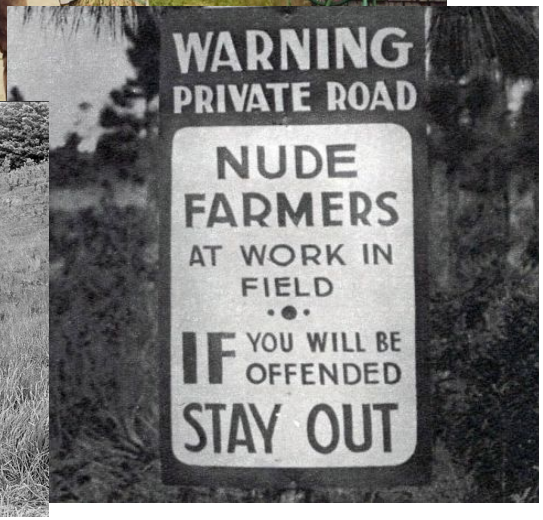
Drew Ramsey, MD
Assistant Clinical Professor of Psychiatry
Columbia University

Samantha Elkrief, LMSW
Clinical Director
The Brain Food Clinic

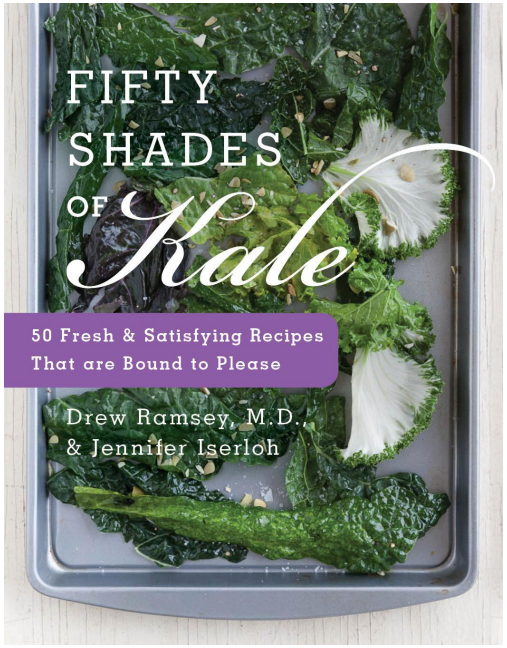
Hi. My Name is Drew and I'm a Taurus

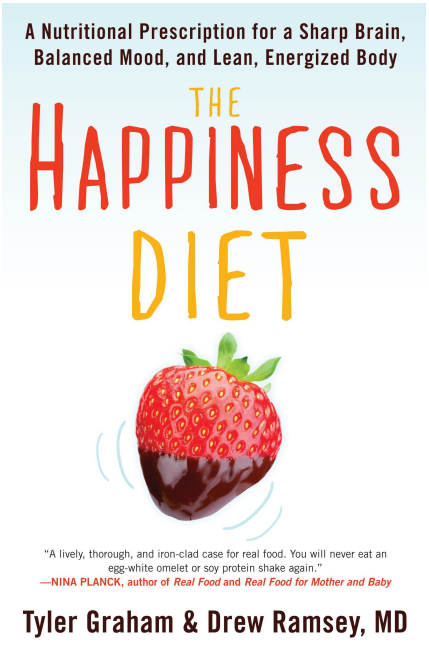
- 1979 Parents move from NYC "back to the land" 127 acres rural Indiana. Drew is 6
- Vegetarian medical student napping in the call room
- Scared of seafood and didn't like meat
- Indiana University Medical School MD 2000
- Columbia University Adult Psychiatry Residency 2004
- Clinical focus 2002 - present. Food enters practice due to atypical antipsychotics
- Books and Media 2008 The Happiness Diet, 50 Shades of Kale, Eat Complete
- Medscape The BrainFood Vlog
- Things you don't know about me. I was a pole vaulter in college. I lived in Kenya for 4 months during medical school. I don't like to eat birds.

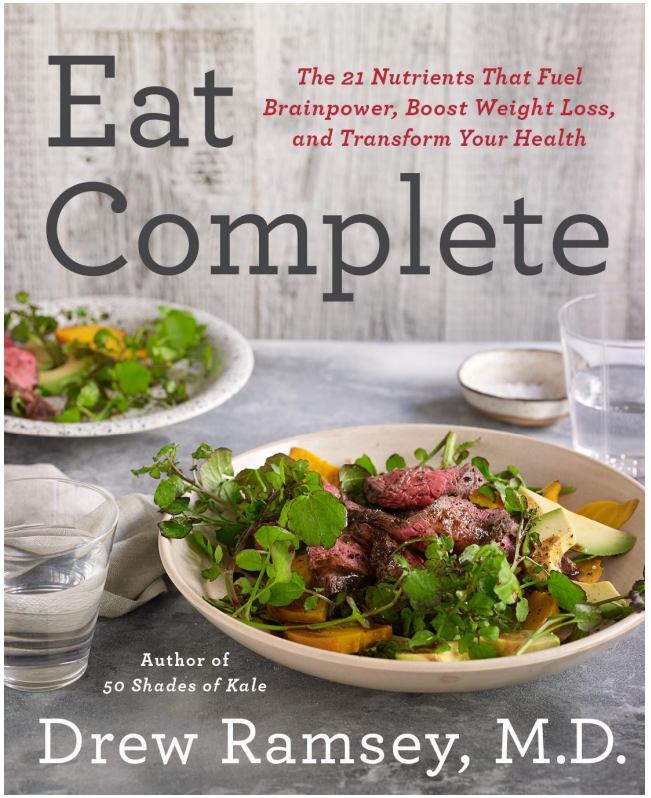




Warning: Diet Book Author

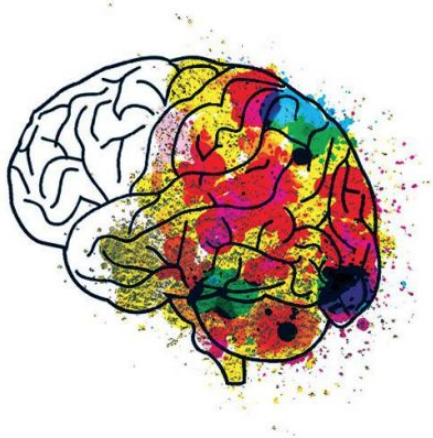






1 in 5

Adults in the U.S. experience mental illness each year



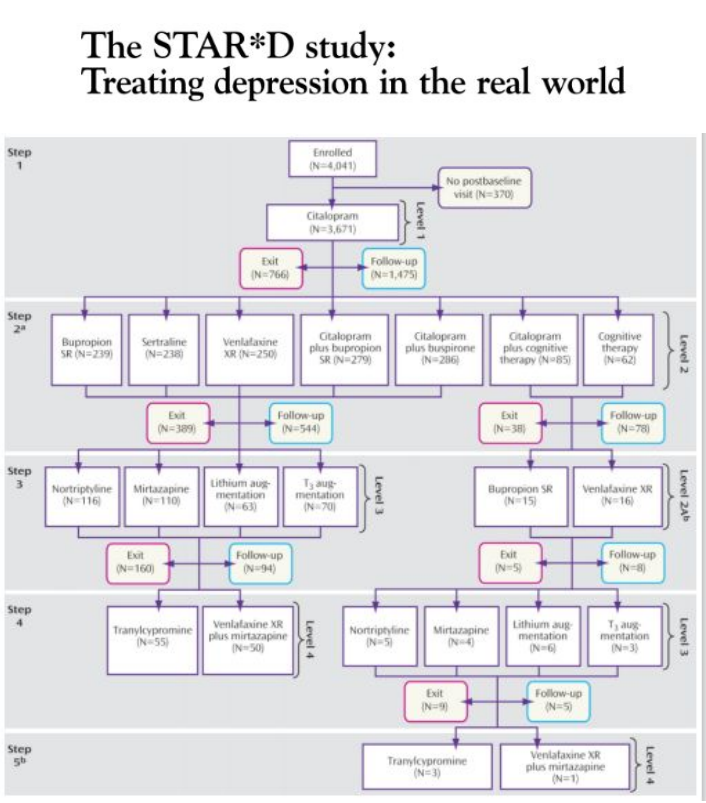
59%

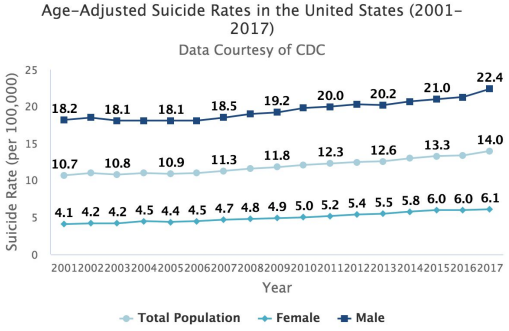
The number of adults with mental illness without treatment

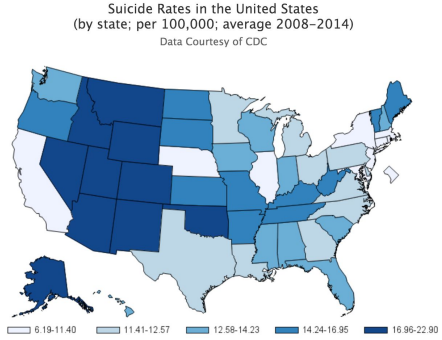
Fewer than 50% of children with mental health conditions receive help

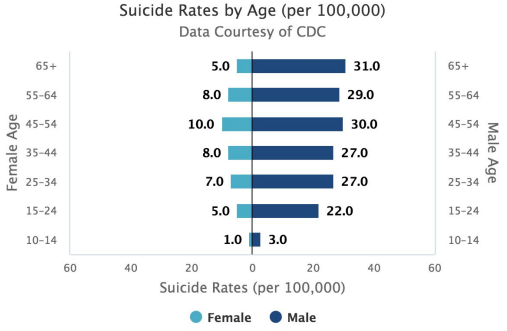
STAR*D

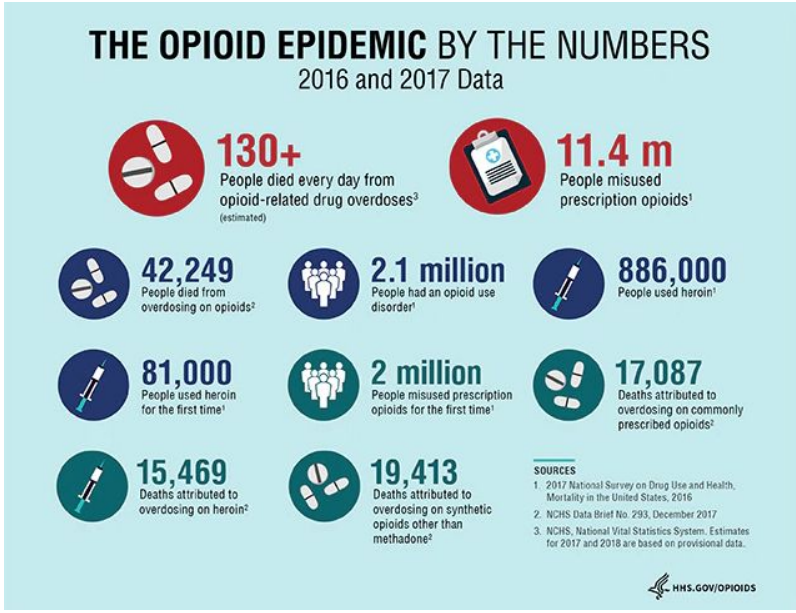
- 4,041 outpatients, ages 18-75 years, from
- 41 clinical sites around the country.
- All participants were diagnosed with MDD.
- About half of participants in the STAR*D study became symptom-free after two treatment levels.
- 70% of those who did not withdraw from the study became symptom-free.
- With each level, more attrition and 42% withdrew after level 3.

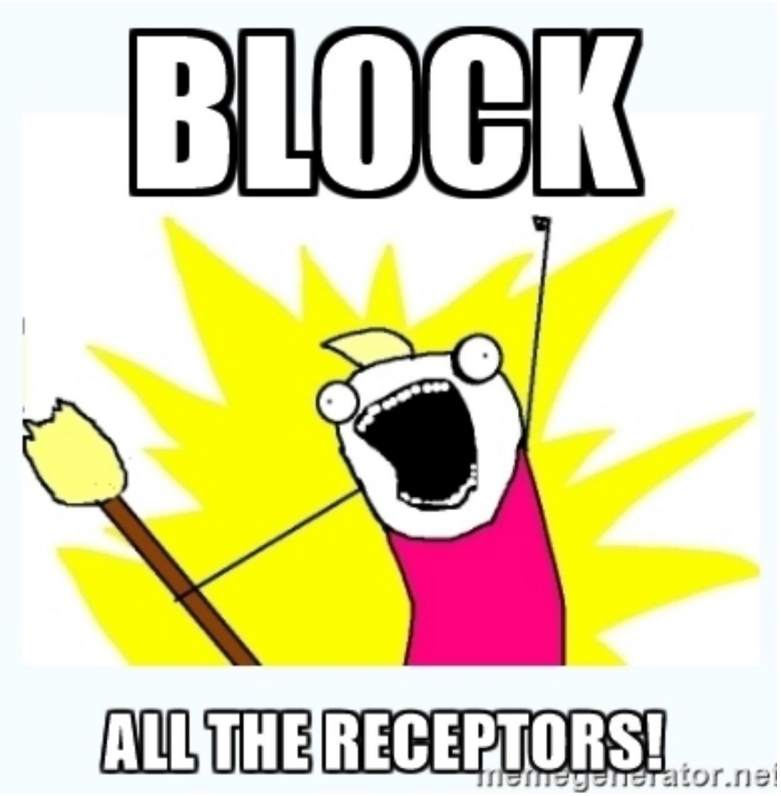


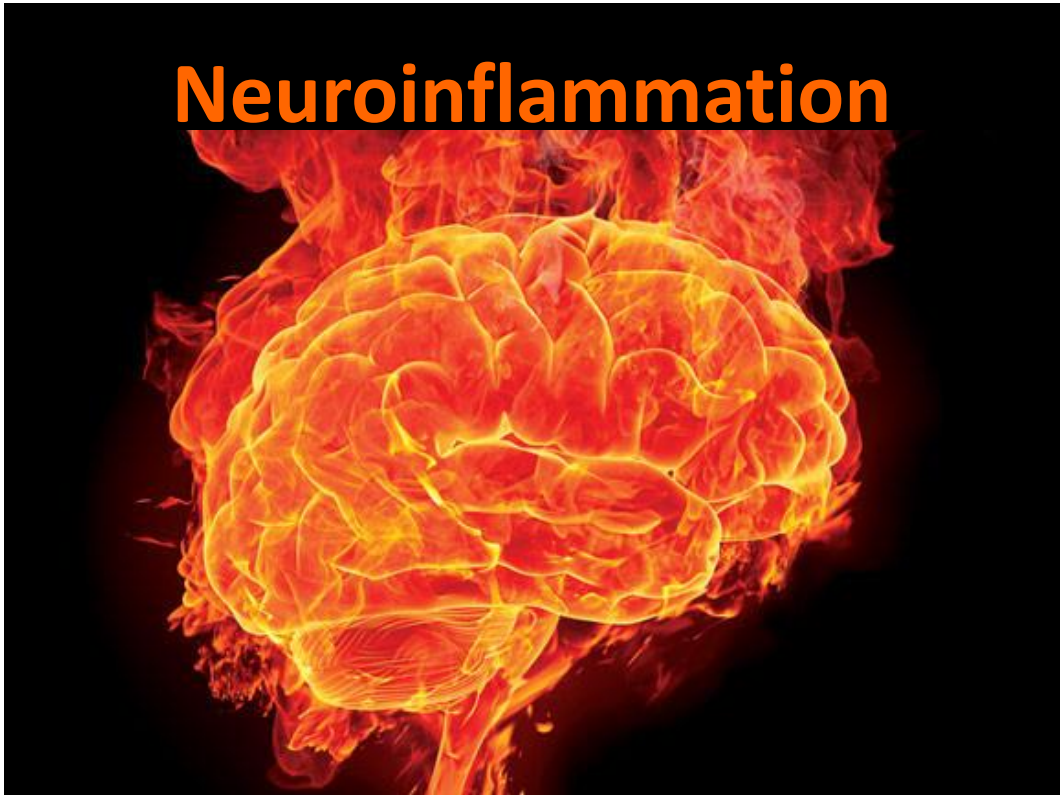




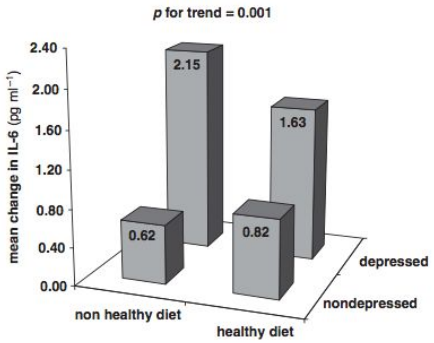








"Mediterranean diet buffers the effect of depression on inflammation."



y axis: IL-6 increase at 6 year follow-up visit

- Prospective population-based InCHIANTI study, n=793
- Measures: CES-D, IL-6, Medi diet score
- Baseline, 3 yr, 6 yr f/u

(Milaneschi Y, et al. 2011)

ELSEVIER

Brain, Behavior, and Immunity
Volume 36, February 2014, Pages 46-53

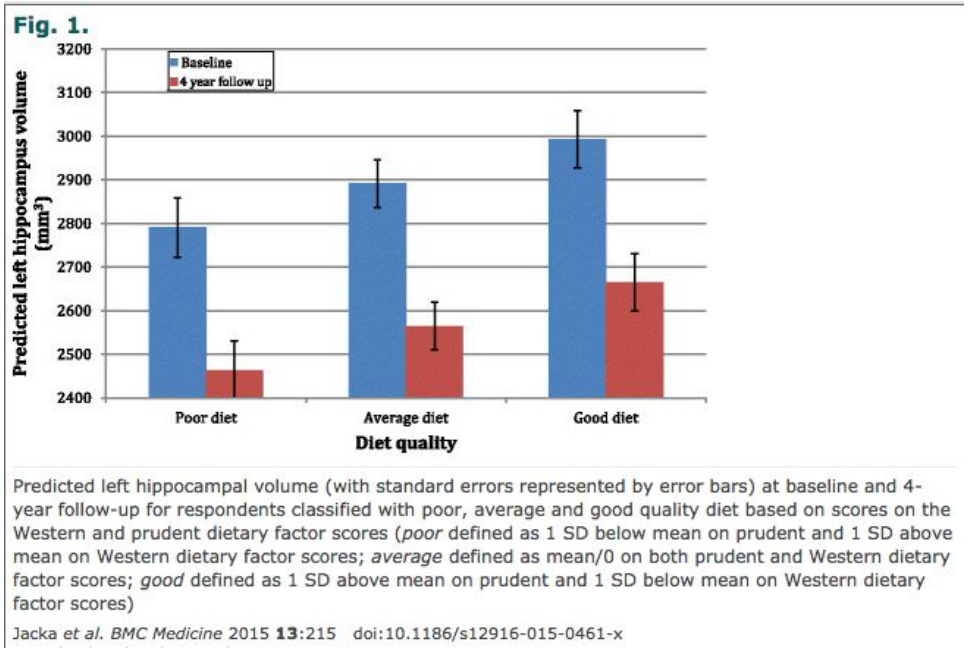
Diet, Inflammation and the Brain

Inflammatory dietary pattern and risk of depression among women

Michel Lucas [a, b], Patricia Chocano-Bedoya [a], Mathias B. Shulze [c], Fariba Mirzaei [a], Éilis J. O'Reilly [a, d], Olivia I. Okereke [d, e, f], Frank B. Hu [a, d, e], Walter C. Willett [a, d, e], Alberto Ascherio [a, d, e]

- Nurses Health Study **43,685 women** (aged 50–77) w/o depression
- Diet info from **food frequency questionnaires** completed 1984-2002
- During the 12-year follow-up cases of depression :
  - 2594 strict definition
  - 6446 broader definition
- Relative risks comparing extreme quintiles of the inflammatory diet
  - **1.41** (95% CI, 1.22, 1.63; *P*-trend < .001) strict definition
  - **1.29** (95% CI, 1.18, 1.41; *P*-trend < .001) for the broader definition

Better Diet, Bigger Brain



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)

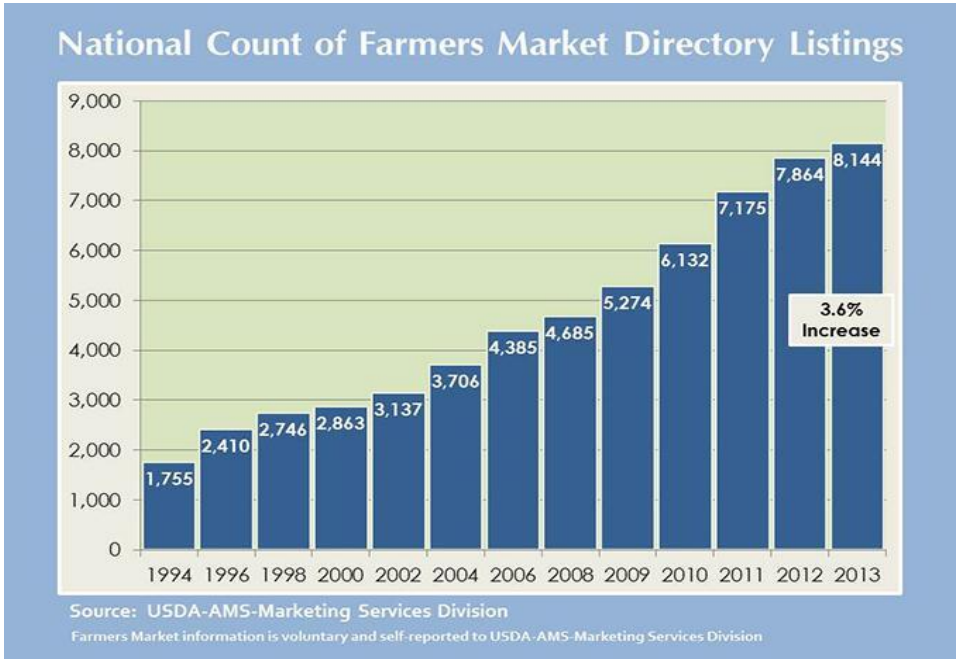
Jacka *et al. BMC Medicine* 2015 **13**:215 doi:10.1186/s12916-015-0461-x

A Smarter, Happier Planet?

- Intake of iron & omega-3 fats help determine IQ
- Iodine deficiency istop cause worldwide of development disability

  37% of American women 18-44 don't meet 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 correlate with diet pattern

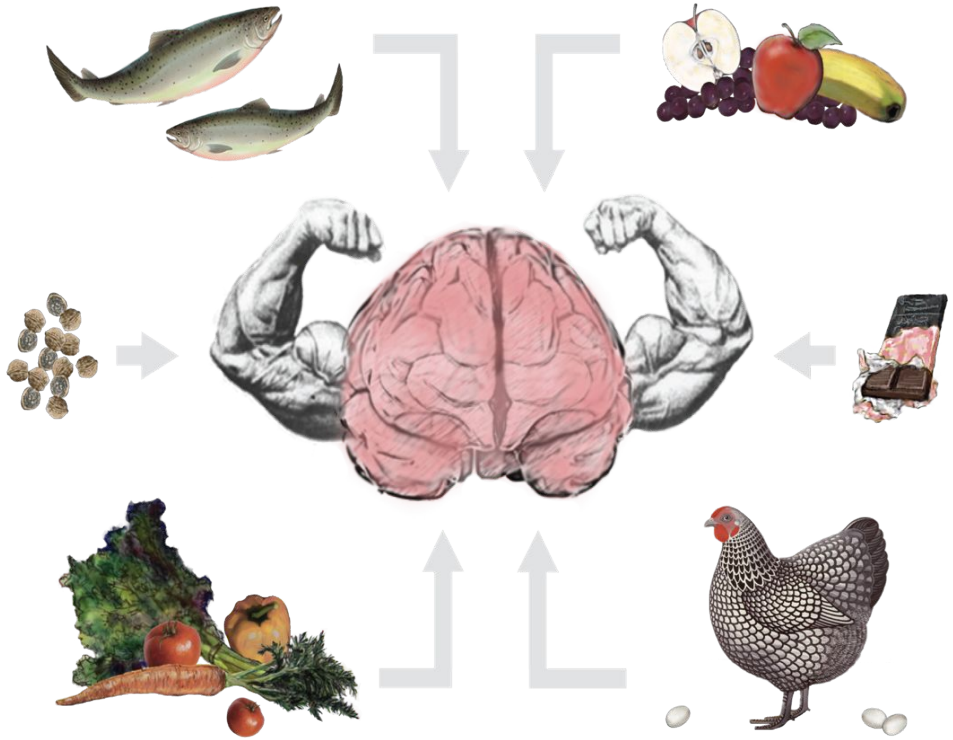
Broad Spectrum Medicine



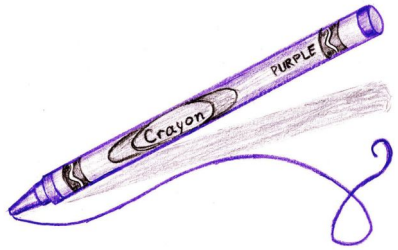
Nutritional Psychiatry

"The use of nutrition to optimize brain health and to treat and prevent mental health conditions."

- Drew Ramsey, MD



What's Your Relationship with Food?



Your Brain & Food

- ➔ Consumes 420 calories/day
- ➔ 60% daily glucose
- ➔ 20% of daily calories
- ➔ Composed of 60% Fat
- ➔ PUFAs and Cholesterol

Rx Brain Food Prescription™

Goal: Optimal brain health **Dose:** Eat at least 3 times per day **Refills:** Unlimited

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

Grow the field of nutritional psychiatry research

Supporting the generation of high quality evidence for nutritional approaches to the prevention and treatment of mental disorders

Sharing knowledge and building research collaborations

Encouraging a multi-disciplinary approach to nutritional psychiatry research

Building capacity in early career researchers by matching ECRs with mentors or qualified organisations in order to facilitate internships and study visits

Building partnerships with other disciplines and organisations with common aims

Facilitate Knowledge Translation (KT)

Promoting events, special edition journal issues, and major updates within fields of related research

Providing forums for open discussion of new research developments, methodologies, and ideas

Holding meetings and events supporting the development of the field of nutritional psychiatry research

Supporting the translation of evidence into policy and clinical practice by acting as a resource for research evidence and consensus

Building partnerships with health bodies and relevant government organisations

FOOD & MOOD CENTRE

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MEET THE TEAM

Professor Felice Jacka

Professor Jacka is Director of the Food and Mood Centre and founder and president of the International Society for Nutritional Psychiatry Research (ISNPR). She is an NHMRC Career Development Fellow at Deakin University in Australia, within the IMPACT SRC at the School of Medicine. She also holds Honorary Principal Research Fellow appointments at the Centre for Adolescent Health, Murdoch Children's Research Centre; The University of Melbourne; and the Black Dog Institute in NSW.

Professor Jacka has pioneered a highly innovative program of research that examines how individuals' diets, and other lifestyle behaviours, interact with the risk for mental health problems. This research is being carried out with the ultimate goal of developing an evidence-based public health message for the primary prevention of the common mental disorders. She has published extensively in high-impact journals in the mental health field including the American Journal of Psychiatry, World Psychiatry, BMC Medicine, Schizophrenia Bulletin and Lancet Psychiatry.

Emily Deans M.D.
Evolutionary Psychiatry

Magnesium for Depression

A controlled study of magnesium shows clinically significant improvement.

Posted Jan 28, 2018

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Source: Sander Van Der Wel/Wikimedia Commons

Magnesium is one of the most important minerals in the body. Years ago, I wrote about the importance of magnesium for the brain; it remains my most read blog post to this day.

We get most of our magnesium from plants (almonds, black beans, cashews, pumpkin seeds, and dark chocolate are all good sources), but it's the bacteria in the soils that enable plants to absorb magnesium, so all sorts of

Weill Cornell Medicine

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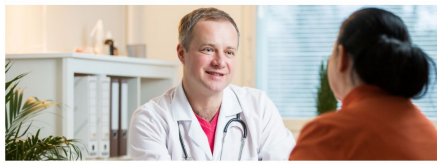


Alzheimer's Prevention Clinic

A New Approach to Alzheimer's Disease Management

Harvard Health Publishing
HARVARD MEDICAL SCHOOL
Trusted advice for a healthier life

HEART HEALTH | MIND & MOOD | PAIN | STAYING HEALTHY | CANCER

Home » Harvard Health Blog » Gut feelings: How food affects your mood - Harvard Health Blog

Gut feelings: How food affects your mood

POSTED DECEMBER 07, 2018, 6:30 AM

Uma Naidoo, MD
Contributor

The human microbiome, or gut environment, is a community of different bacteria that has co-evolved with humans to be beneficial to both a person and the bacteria. Researchers agree that a person's unique microbiome is created within the first 1,000 days of life, but there are things you can do to alter your gut environment throughout your life.

Ultra-processed foods and gut health

HEALTH *meets* FOOD™

Tulane University
SCHOOL OF MEDICINE

Certified Culinary Medicine Specialist

The **Certified Culinary Medicine Specialist** (CCMS) designation identifies clinicians who have a unique foundation for incorporating healthy eating into patients' diets: comprehensive knowledge of nutrition and the culinary techniques to prepare food that is consistent with real-world budgets, time constraints, and nutritional ideals. Physicians, Physicians Assistants, Pharmacists, Registered Dietitians and Nurse Practitioners are eligible for certification.

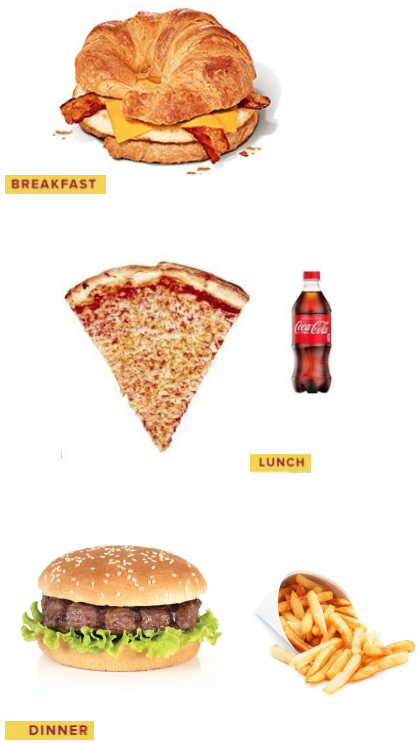
ESKENAZI HEALTH

Where are you seeing Nutritional Psychiatry?

“I’m in a fog doc”

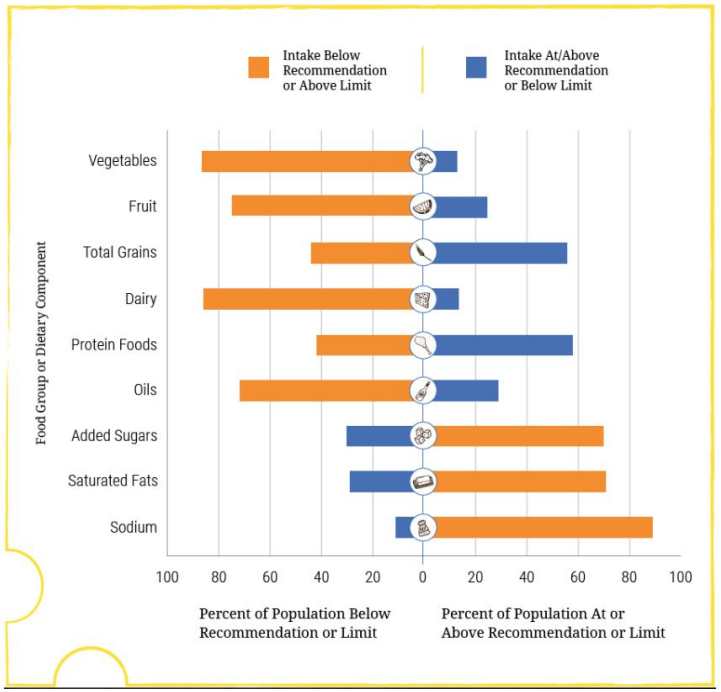
- 35 year old, married, computer programmer
- Low mood 3/10, passive suicidal ideation
- “Memory problems” and feeling unfocused
- “No energy...I’m done.”
- Irritable with wife and kids “I get triggered”
- No psychotic or manic symptoms
- 14-21 ETOH drinks/week, weekly MJ
- Elevated LDL, takes statin, overweight
- “*Food is boring. I don’t get full with salads and healthy stuff. Kale tastes like dirt to me, honestly.*”

1941 USDA
The Basic 7



VS

Dietary Intakes Compared to Recommendations. Percent of the U.S. Population Ages 1 Year and Older Who Are Below, At, or Above Each Dietary Goal or Limit



“Let’s talk about what you eat.”

NUTRITIONAL PSYCHIATRY ASSESSMENT
A Day in the Life of an Eater

What’s the **Dietary Pattern**?
Relationship with Food?
Avoid Diet Dogma in Clinical Practice!
High Yield Foods and Food Categories
Plants, Seafood, Meat, Snacks

MOTIVATIONS
Diagnosis, weight, internal or external?

FOOD SKILLS
COSA Cooking, **O**rganizing, **S**ourcing, **A**ccess

SMART GOALS - Specific, Measurable, Achievable, Realistic and Timely

EAT TO BEAT DEPRESSION - TOP FOOD CATEGORIES

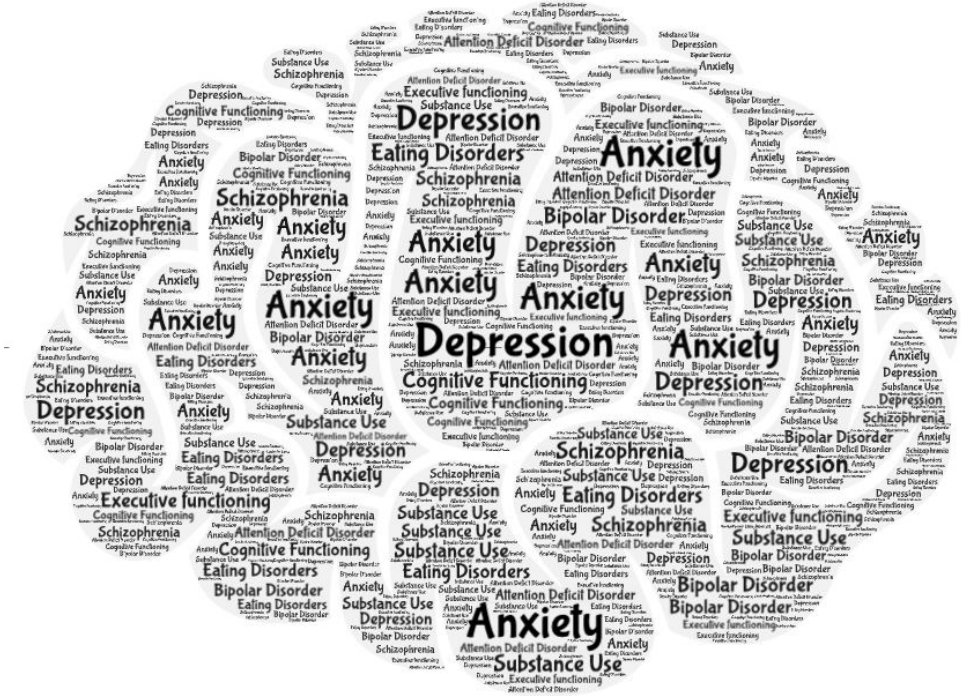
LEAFY GREENS Rich in fiber, phytonutrients, vitamin C, A & K, and folate	spinach, kale, watercress, arugula, chard	
RAINBOW FRUITS AND VEGGIES Rich in fiber, phytonutrients, vitamin C & A	tomato, bell peppers, broccoli, cauliflower, blueberries	
SEAFOOD Rich in omega-3 fatty acids, zinc, iodine and protein	sardines, oysters, mussels, salmon, tuna	
NUTS, BEANS, AND SEEDS Rich in fiber, zinc, iron and vitamin E	pumpkin seeds, almonds, walnuts, black beans, chickpeas	
MEAT Rich in B12, iron and protein	grass-fed and organic beef, organ meat, lamb, goat, chicken	
EGGS AND DAIRY Rich in choline, probiotics (the good bugs), protein, calcium	free-range and organic eggs, kefir, yogurt, cheese	

photos © www.123rf.com

How Can Nutritional Psychiatry Fit Into Your Practice?

- Include a Nutrition Assessment in all evaluations
- Work with coaches
- Hire a nutritionist or dietician
- Organize or sponsor cooking classes
- Create events with local chefs

Relevant Mental Health Conditions



Day 2: Overview

Morning:

Dietary Change

Brain Basics

The Microbiome

Evidence

Q+A

Lunch

Afternoon:

Key Nutrients

Food Categories

Dinner

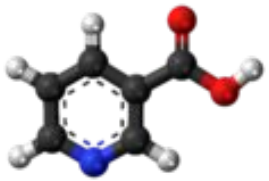
Dietary Change in last 100 years

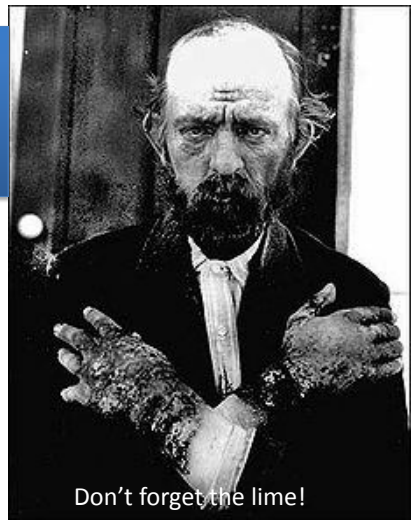
- **Whole Food to Processed**
- **↑Sugar and Refined Carbs**
- **Animal to Vegetable Fats**
- **Omega-3 to Omega-6**
- **New Molecules: Food Dyes, Preservatives, Trans-fats**

The Original Cheap Food

The Legend of the Vampires

Psychiatric Symptom or Nutritional Deficiency?





Vitamin B3/Niacin Deficiency

The 4- D's of Pellagra

1. Diarrhea
2. Dermatitis
3. Dementia
4. Death

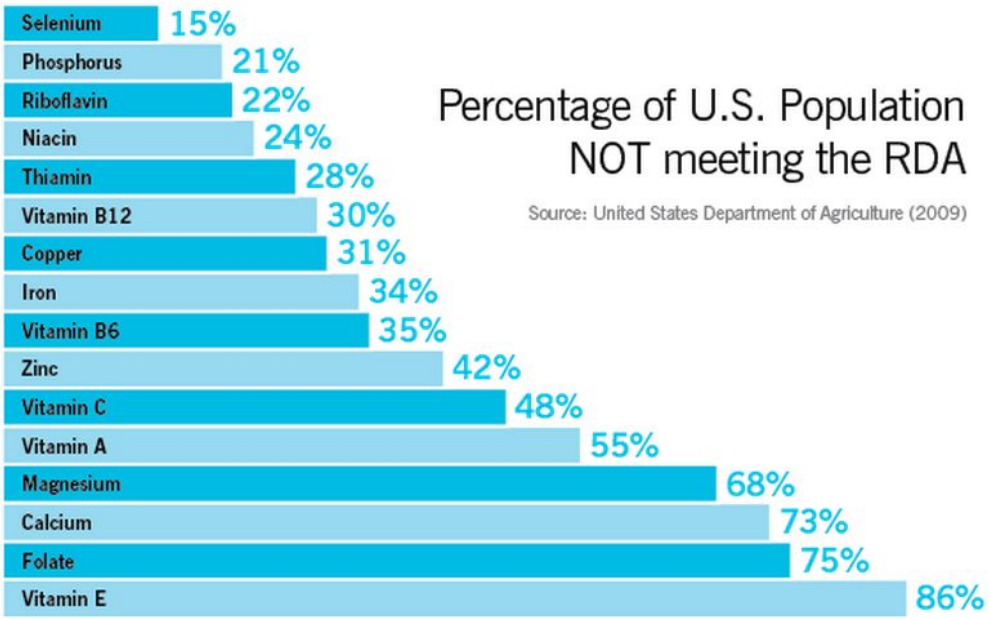
“Food” from the laboratory

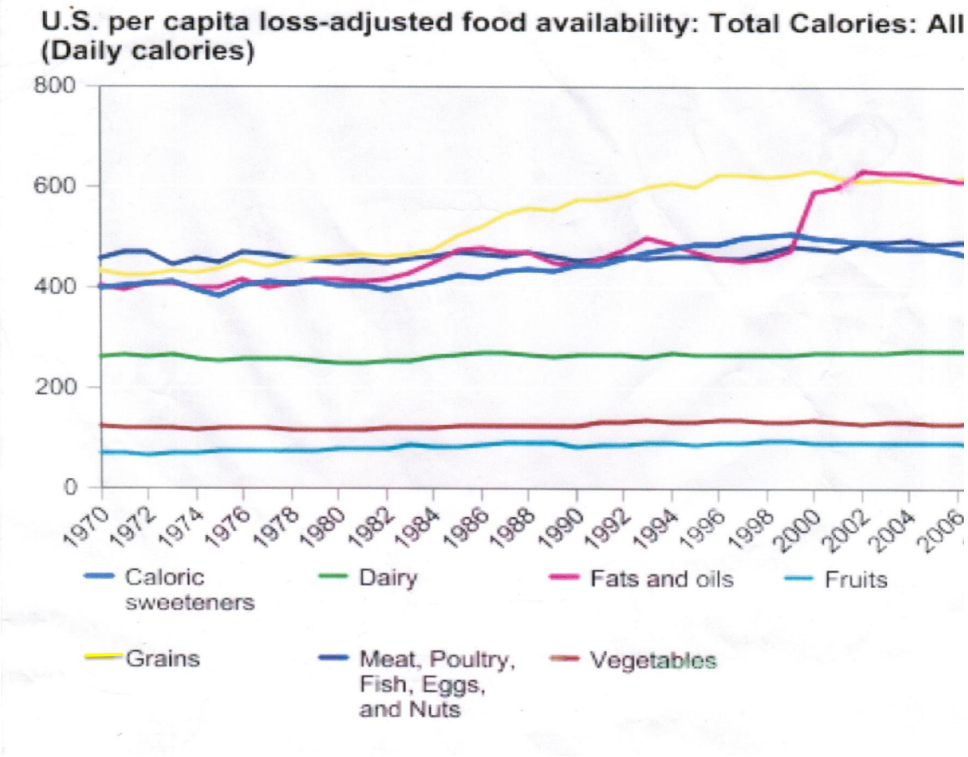
Crisco—Better than butter for cooking

The bad new is you have cancer. The good news is Crisco is

Dietary Fat Intake and Depression: The SUN Project

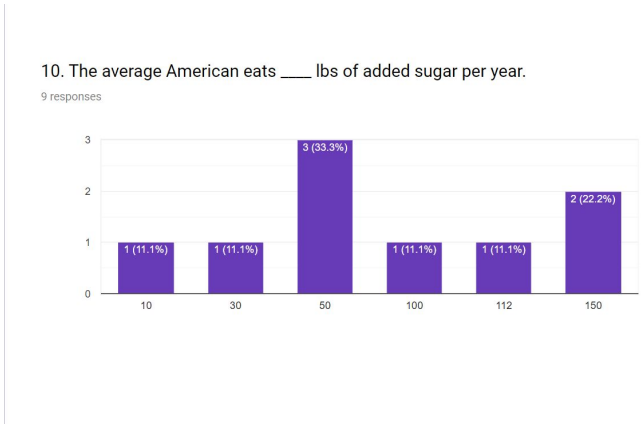
- 12,059 University Graduates
- FFQ-136, Followed 6.1 years
- Multivariate adjusted HR for *trans* Fat intake were: 1 (ref), 1.08 (0.82–1.43), 1.17 (0.88–1.53), 1.28 (0.97–1.68), 1.42 (1.09–1.84)
- TFA 0.% total energy, US up to 2.5%

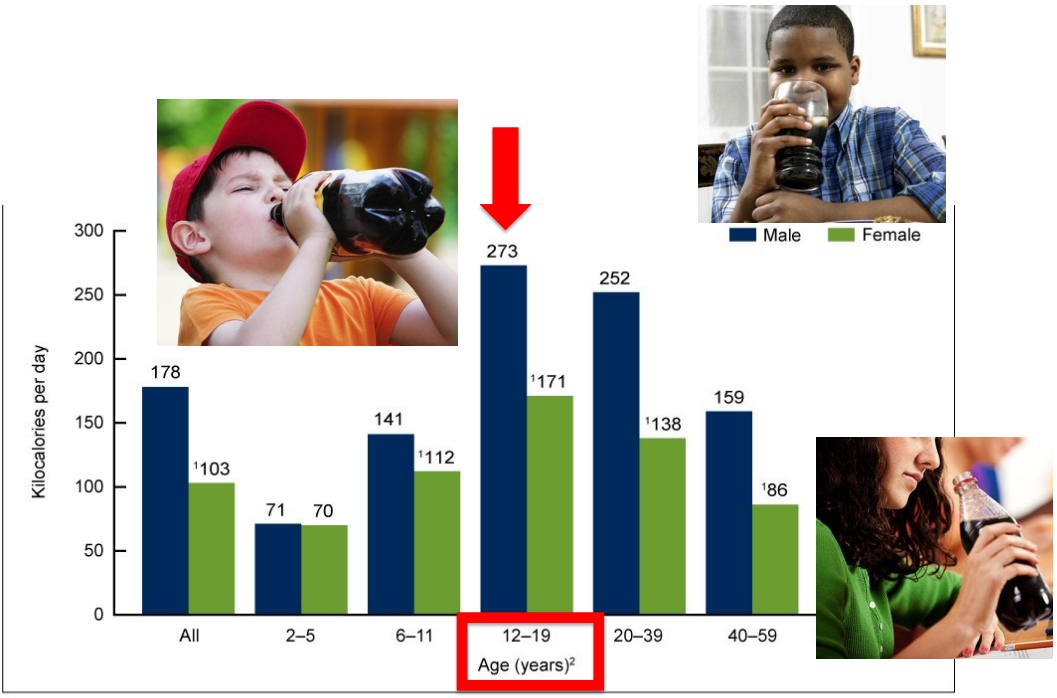




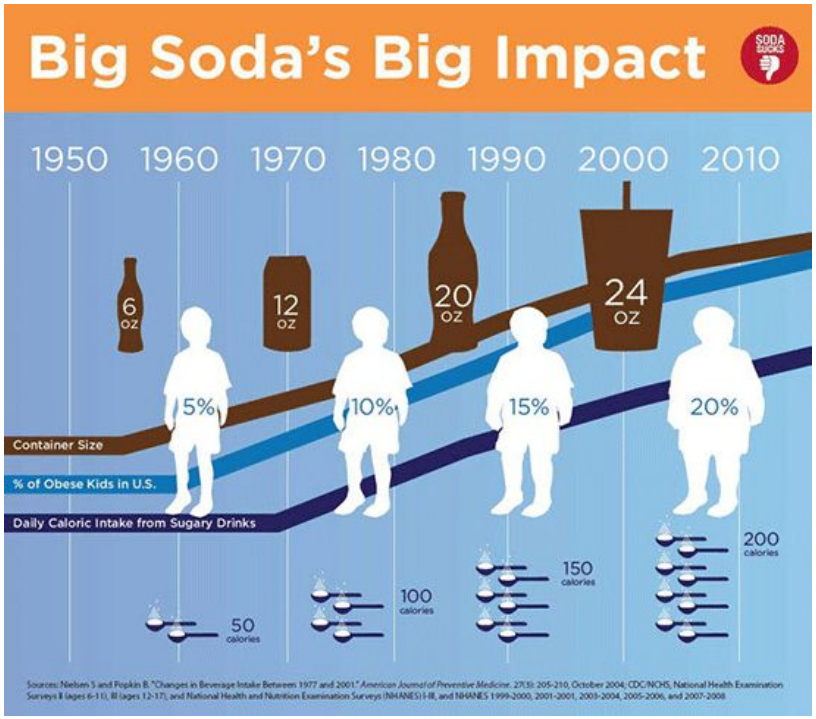
Sugar on the Rise

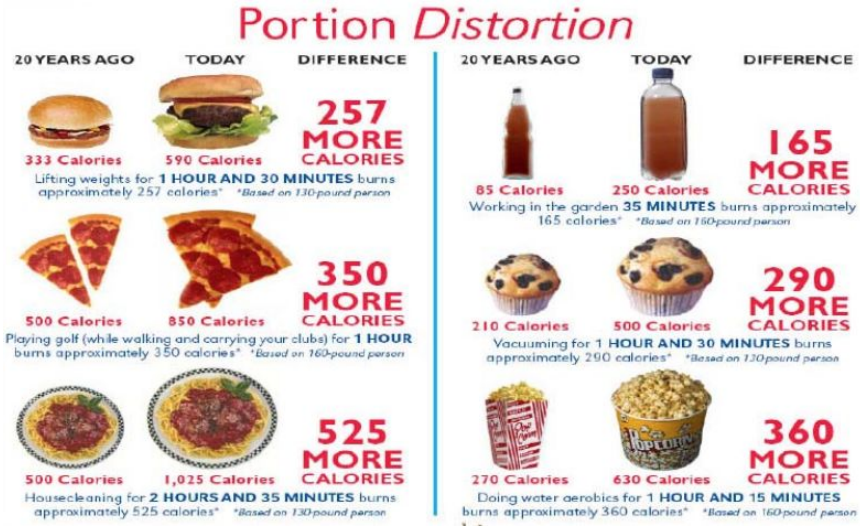
A summer of sugar…..





¹Significantly different from males.
²Significant quadratic trend for both males and females.
SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey, 2005–2008.





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Am J Clin Nutr. 2015 Aug; 102(2): 454–463. PMCID: PMC4515860
Published online 2015 Jun 24. doi: 10.3945/ajcn.114.103846 PMID: 26109579

High glycemic index diet as a risk factor for depression: analyses from the Women's Health Initiative[1]

James E Gangwisch,[2,*] Lauren Hale,[3,4] Lorena Garcia,[5] Dolores Malaspina,[6] Mark G Opler,[6] Martha E Payne,[7] Rebecca C Rossom,[8] and Dorothy Lane[4]

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Associated with increased odds of depression:

- Higher dietary GI (OR: 1.22; 95% CI: 1.09, 1.37), $P = 0.0032$).
- Higher consumption of added sugars (OR 1.23; 95% CI: 1.07, 1.41; P-trend = 0.0029).
- Non-whole/refined grain consumption

Lower odds of incident depression

- Higher consumption of lactose, fiber, non-juice fruit, and vegetables

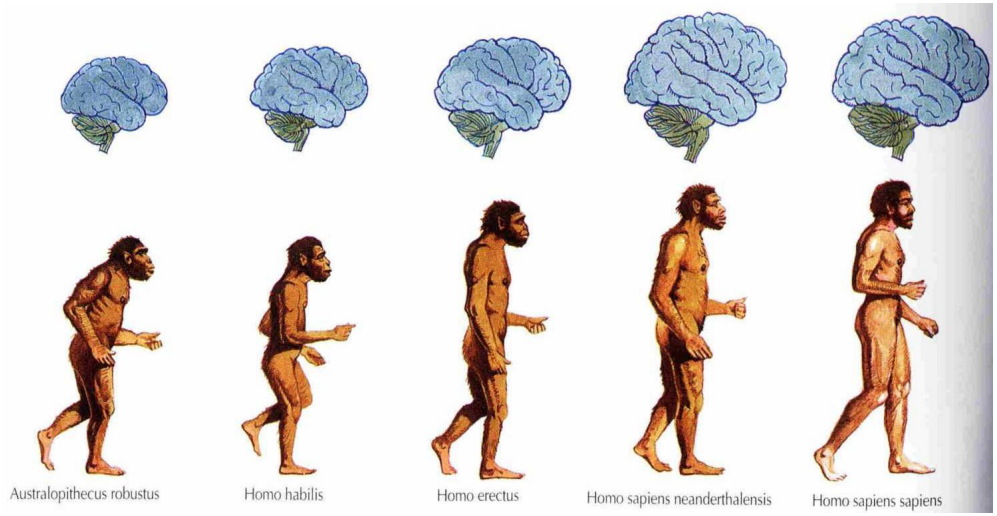
Sci Rep. 2017; 7: 6287.

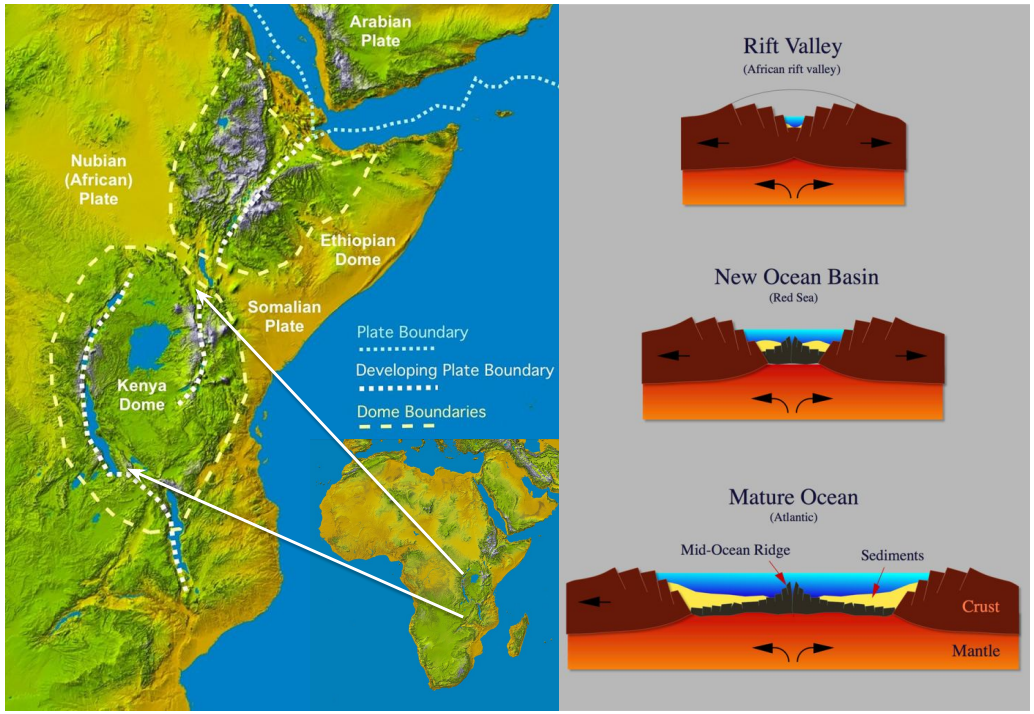
Sugar intake from sweet food and beverages, common mental disorder and depression: prospective findings from the Whitehall II study Anika Knüppel, Martin J. Shipley, Clare H. Llewellyn & Eric J. Brunner

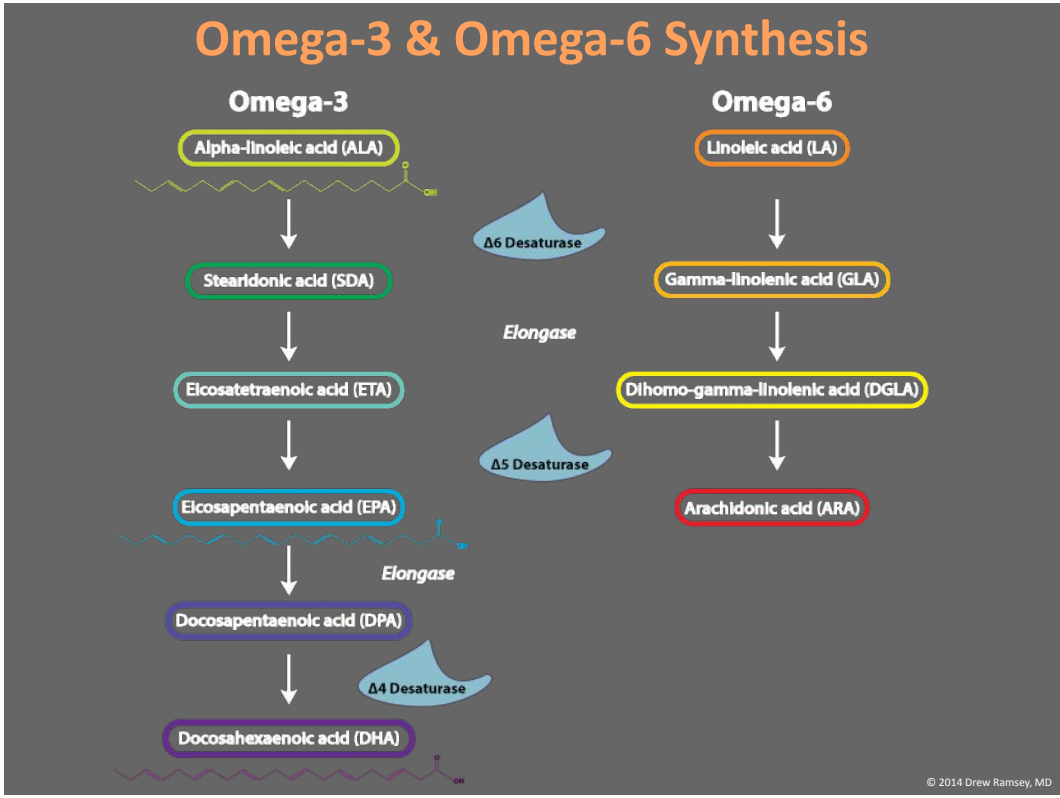
"Our research confirms an adverse effect of sugar intake from sweet food/beverage on long-term psychological health and suggests that lower intake of sugar may be associated with better psychological health."

- N = 23,245 from the Whitehall II study
- Diet was assessed using FFQ
- Cross-sectional analyses showed positive associations.
- Men in the highest tertile of sugar intake had a 23% increased odds of incident CMD after 5 years (95% CI: 1.02, 1.48)

Survival of the Fattest







Omega-6 & Omega-3 Content of Common Dietary Oils

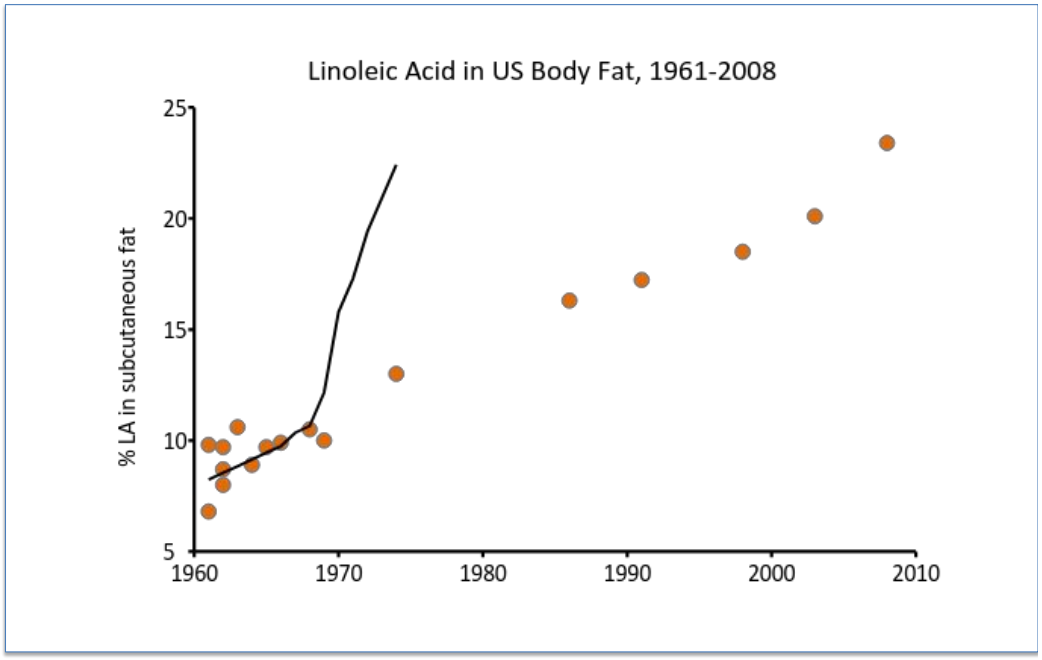
Oil	Omega-6	Omega-3
Safflower	77%	0%
Sunflower	65%	0%
Corn	60%	0%
Cottonseed	50%	0%
Sesame	45%	0%
Peanut	32%	0%
Soybean	52%	7%
Canola	20%	9%
Walnut	52%	10%
Flax	14%	57%

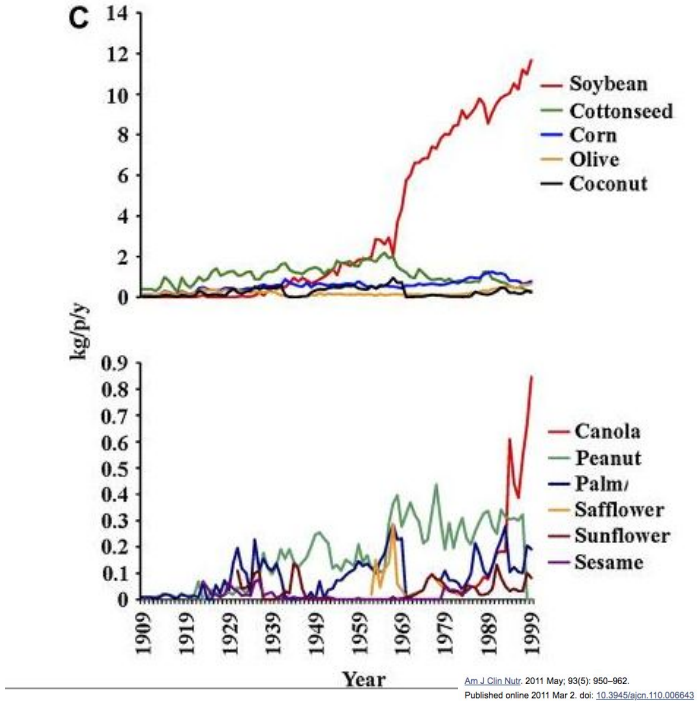
The Rise of Vegetable Oils

Omega-3 – Omega-6

1 - 40

1 - 39





Am J Clin Nutr. 2011 May; 93(5): 950–962.
Published online 2011 Mar 2. doi: 10.3945/ajcn.110.006643
PMCID: PMC3076650
PMID: 21367944

Changes in consumption of omega-3 and omega-6 fatty acids in the United States during the 20th century[1,2,3]

Tanya L Blasbalg, Joseph R Hibbeln, Christopher E Ramsden, Sharon F Majchrzak, and Robert R Rawlings

Omega-6 Fatty Acids and Risk for Cardiovascular Disease

A Science Advisory From the American Heart Association Nutrition Subcommittee of the Council on Nutrition, Physical Activity, and Metabolism; Council on Cardiovascular Nursing; and Council on Epidemiology and Prevention

William S. Harris, Dariush Mozaffarian, Eric Rimm, Penny Kris-Etherton, Lawrence L. Rudel, Lawrence J. Appel, Marguerite M. Engler, Mary B. Engler, and Frank Sacks

Circulation. 2009;119:902–907

American Heart Association®

- In summary, the AHA supports an omega-6 PUFA intake of at least 5% to 10% of energy in the context of other AHA lifestyle and dietary recommendations.
- To reduce omega-6 PUFA intakes from their current levels would be more likely to increase than to decrease risk for CHD.

ELSEVIER
Psychoneuroendocrinology
Volume 87, January 2018, Pages 53-62

Omega-3 and omega-6 fatty acid levels in depressive and anxiety disorders

Carisha S. Thesing [a], Mariska Bot [a], Yuri Milaneschi [a], Erik J. Giltay [b], Brenda W.J.H. Penninx [a]

- Lower N-3 PUFA levels characterize severe patients during a current depression.
- No differences in PUFA levels were found between remitted patients and controls.
- We found no differences for N-6 PUFA levels between depressed patients and controls.
- N-3 and N-6 PUFA levels were not associated with an anxiety disorder alone.

Cross-sectional data was used from the Netherlands Study of Depression and Anxiety, including persons with current pure depressive disorder (n = 304), current pure anxiety disorder (n = 548), current comorbid depressive and anxiety disorder (n = 529), remitted depressive/anxiety disorder(s) (n = 897), and healthy controls (n = 634).

OPEN

Citation: Transl Psychiatry (2017) 7, e1220; doi:10.1038/tp.2017.190
www.nature.com/tp

ORIGINAL ARTICLE

Omega-6 to omega-3 polyunsaturated fatty acid ratio and subsequent mood disorders in young people with at-risk mental states: a 7-year longitudinal study

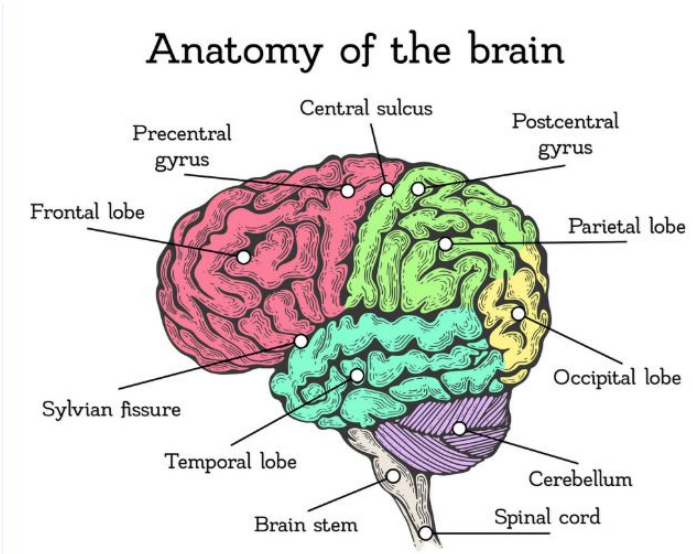
ME Berger[1,2,3], S Smesny[4], S-W Kim[5], CG Davey[3], S Rice[3], Z Sarnyai[1,2], M Schlögelhofer[6], MR Schäfer[3], M Berk[3,7,8,9], PD McGorry[3] and GP Amminger[3,6]

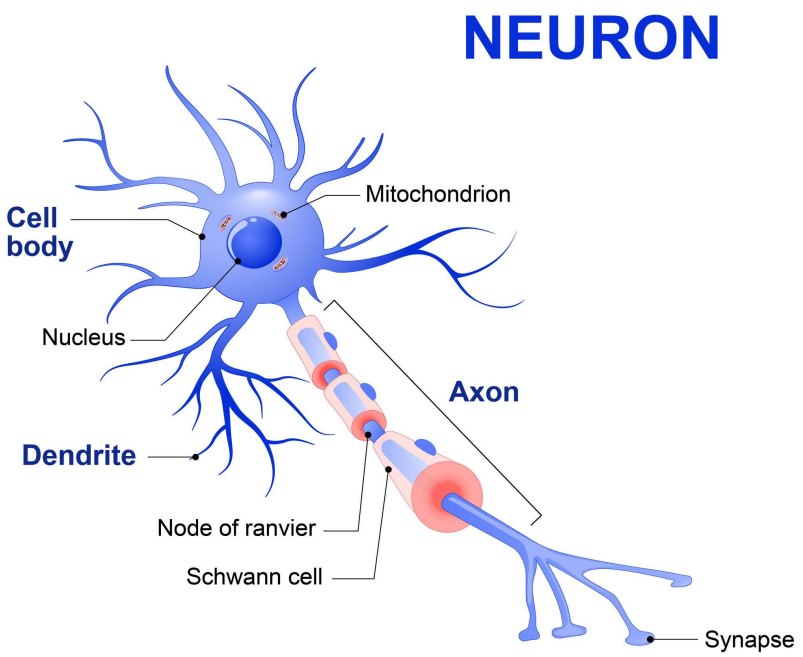
- 7-year follow-up study of young individuals with an ultra-high risk (UHR) phenotype.
- Secondary analysis of the Vienna omega-3 study, a longitudinal study of omega-3 PUFAs in individuals at UHR for psychosis (n = 69).
- Levels of n-6 and n-3 PUFAs were measured erythrocyte membranes at intake
- A higher n-6/3 PUFA ratio at baseline predicted mood disorders in UHR individuals (OR= 1.89, 95% CI = 1.075–3.338, P = 0.03).

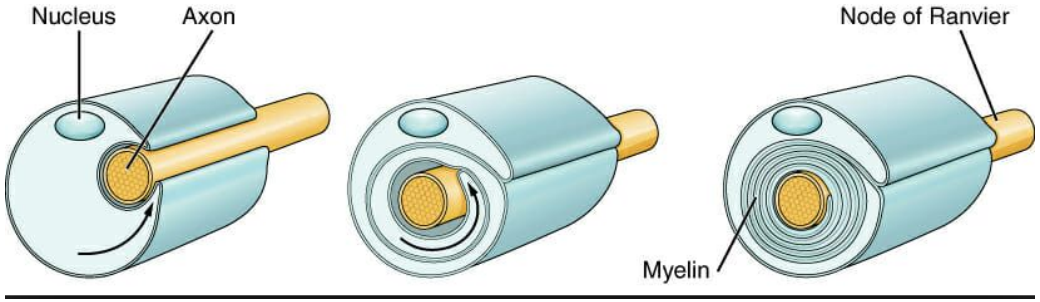
- Predictive capacity of these findings was specific to mood disorders.

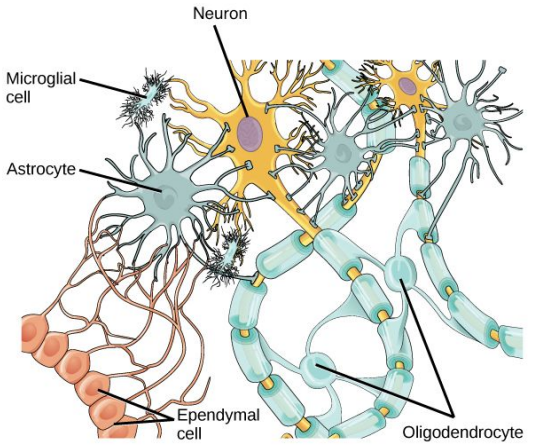
How have changes in food affected your patients?

Brain Basics

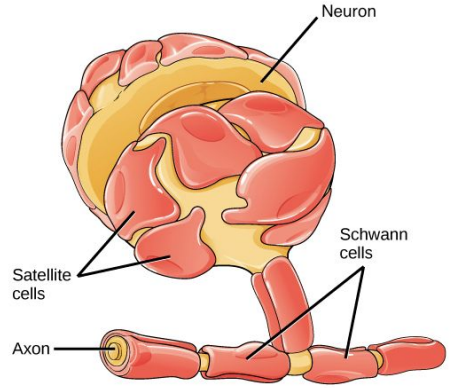




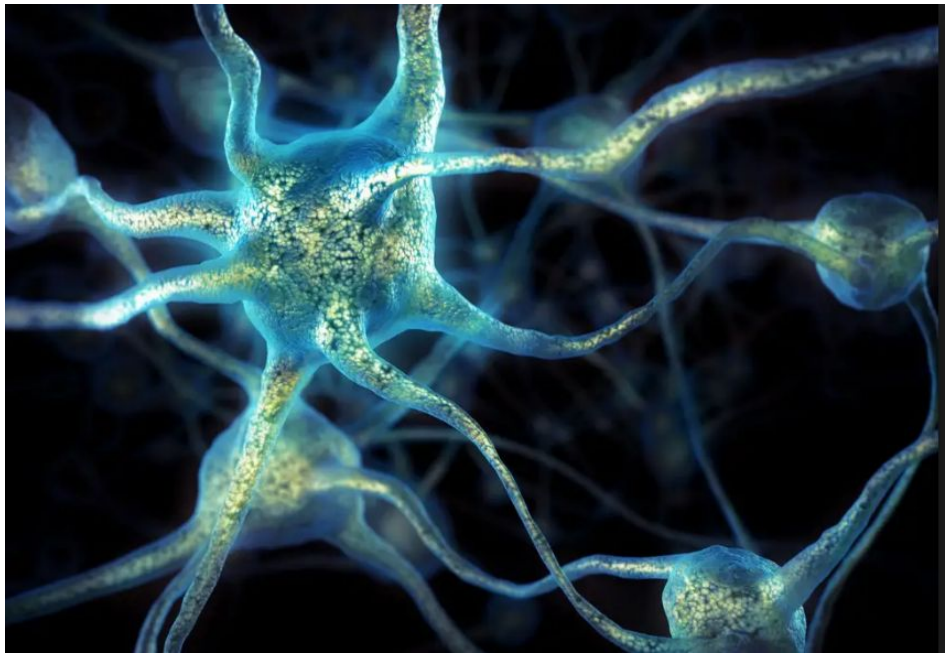


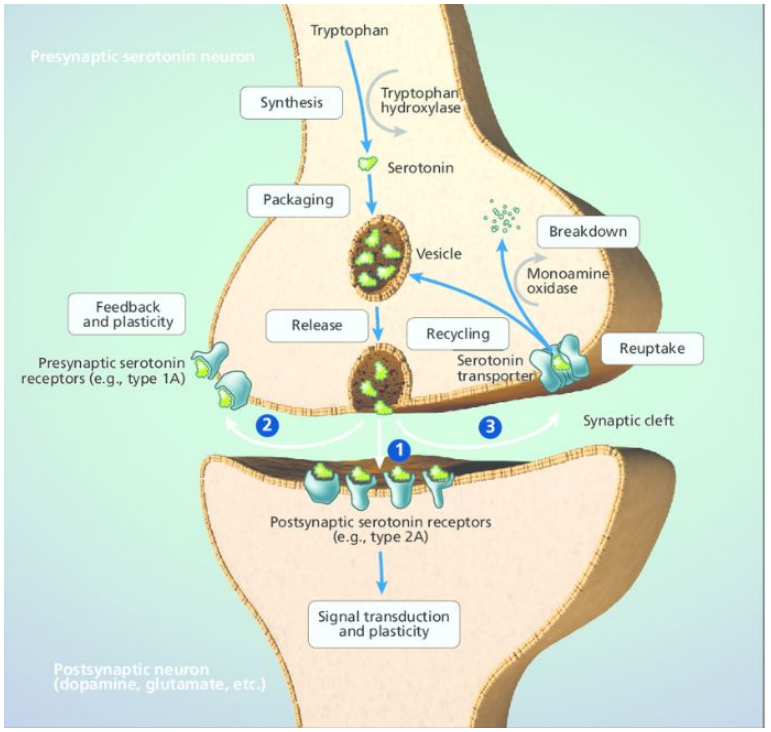


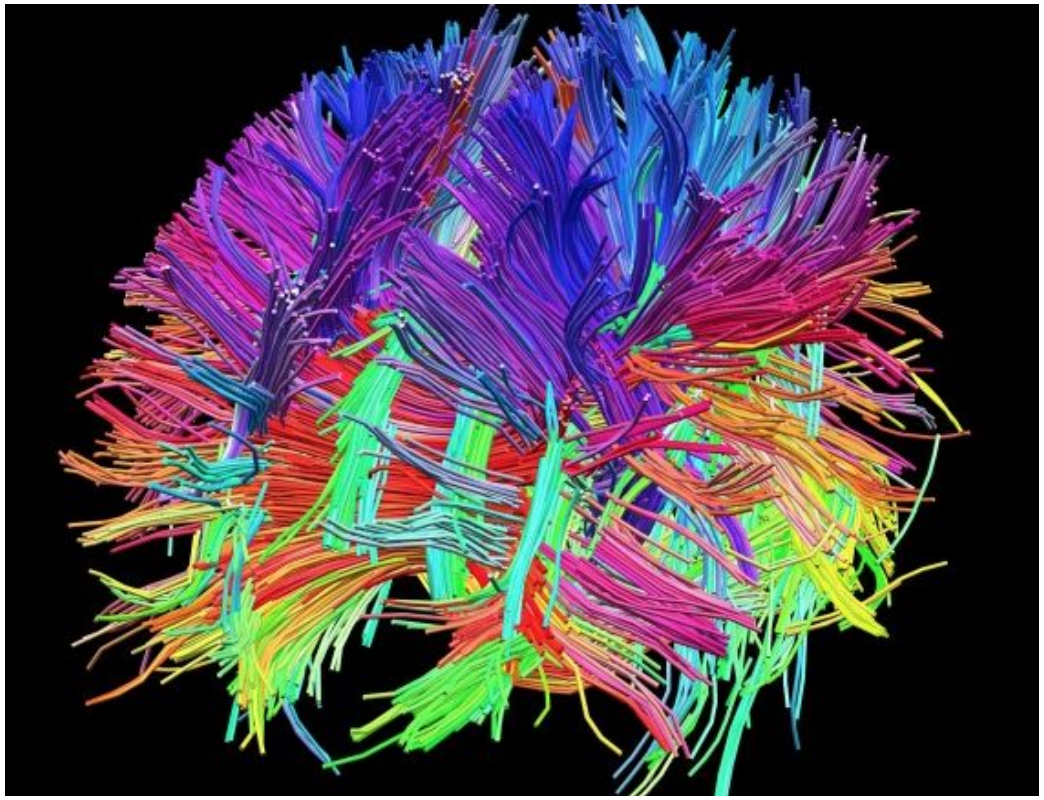
Central nervous system

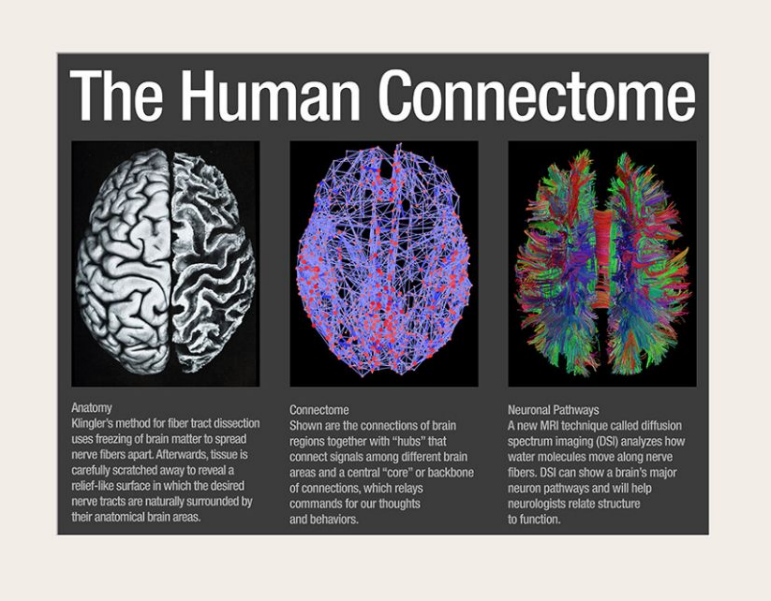


Peripheral nervous system



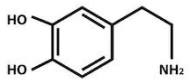

Tryptophan
Presynaptic serotonin neuron
Synthesis
Tryptophan hydroxylase
Serotonin
Packaging
Vesicle
Breakdown
Monoamine oxidase
Feedback and plasticity
Release
Recycling
Reuptake
Presynaptic serotonin receptors (e.g., type 1A)
Serotonin transporter
2
3
1
Synaptic cleft
Postsynaptic serotonin receptors (e.g., type 2A)
Signal transduction and plasticity
Postsynaptic neuron (dopamine, glutamate, etc.)



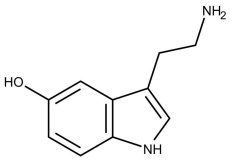


Neurotransmitters

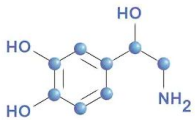
Dopamine



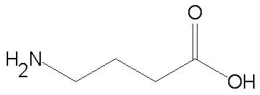
Serotonin



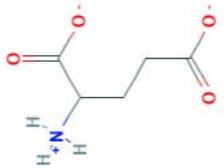
Norepinephrine



GABA



Glutamate



Brain-Derived Neurotrophic Factor (BDNF)

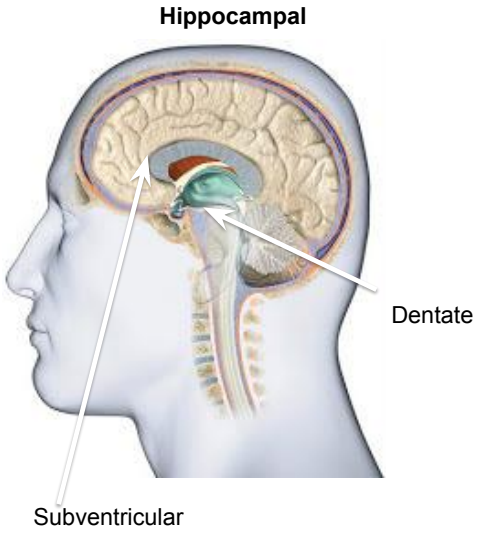
- Promotes neuron development, function, and survival
- Most abundant neurotrophin
- BDNF & it's TrkB receptor

Everywhere!

BRAIN GROW!

Adult Hippocampal Neurogenesis (AHN)

- Birth of New Neurons
- Adult neurogenesis hippocampus
- Associated with learning and memory
- New Framework?

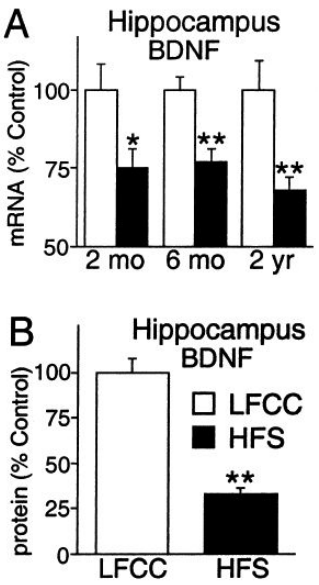


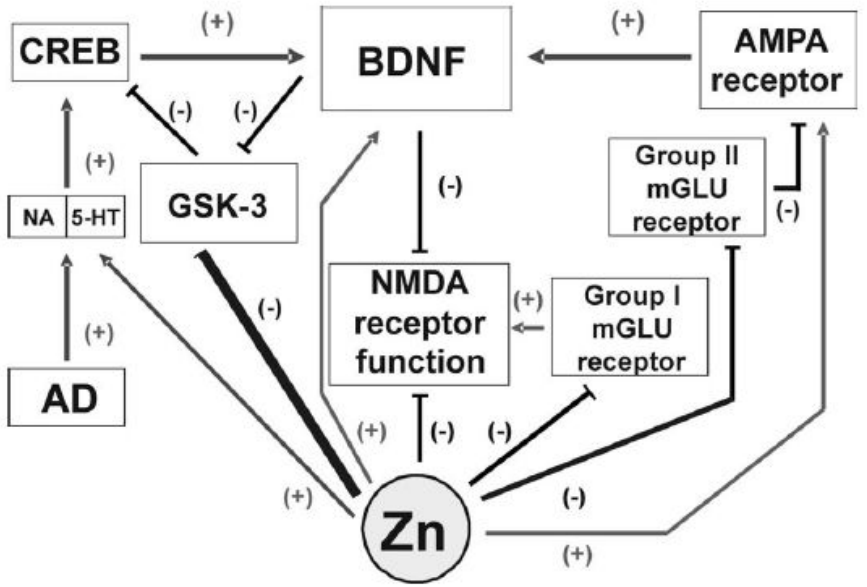
BDNF & Neuropsychiatric Disorders

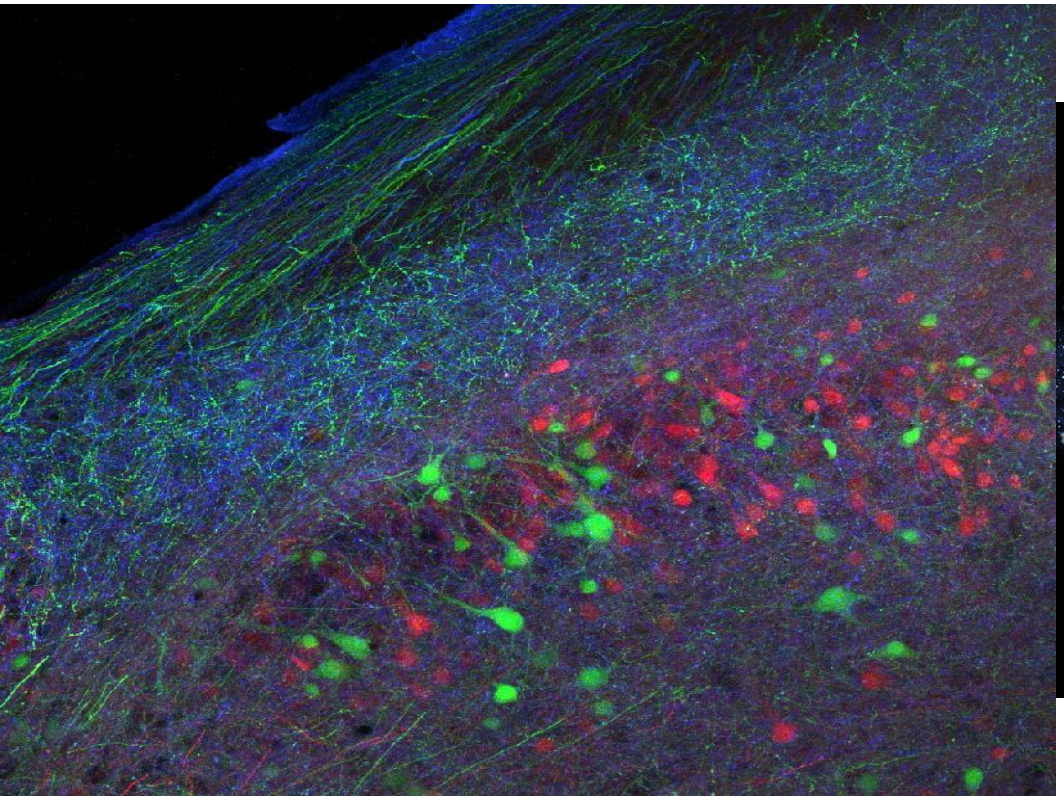
- Lower serum BDNF observed in MDD, PTSD, schizophrenia, and AD
- Expression down-regulated in rodent models of anxiety and depression
- Val66Met polymorphism associated with depression
- Associated with the severity of Alzheimer's
- May predict antidepressant response

More Junk Food = Fewer Neurons?

- Rats fed high-fat + refined sugars decrease in hippocampal BDNF and mRNA (Molteni et al., 2002)
- Western diet shown to impair hippocampal neurogenesis in male rats (Lindgvist et al., European Journal of Neurology 2006)
- Decrease in plasma BDNF reported within 6 hours after a high-fat meal in 18 young men (Karczewska-Kupczewska et al., 2012)







The Microbiome

"…little living animalcules, very prettily a-moving."

Anton van Leeuwenhoek, 1683

Commensals

- Gut inhabited by 100 trillion microorganisms
- 10x the number of cells in the human body
- Co-exist with gut pathogens, regulate the immune and endocrine systems, and modulate digestion (K2, Butyrate, fructose)

Bi-directional communication

- Take a mouse away from his or her mother, the gut flora is altered
- Stress and sleep deprivation are known to affect human gut flora
- 200-600 million neurons directly connecting the gut and the brain

Common Language

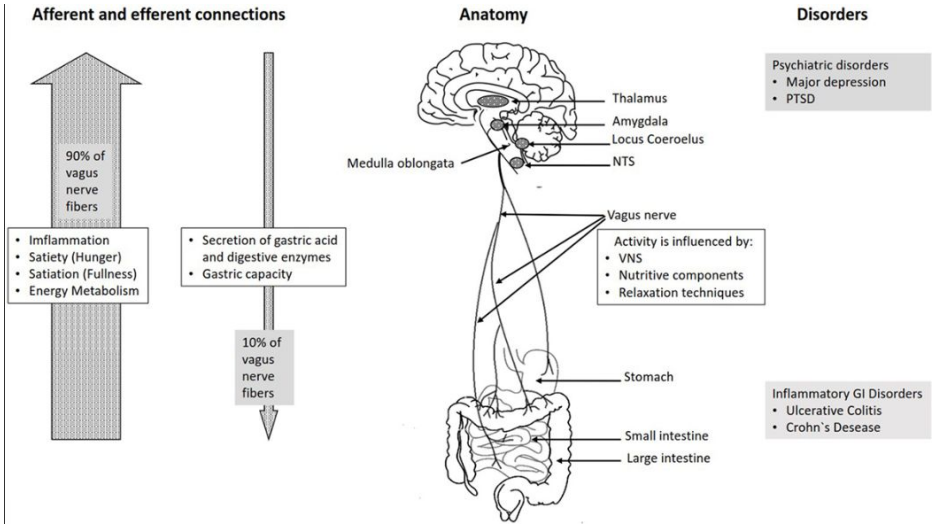
- *Lactobacillus* and *Bifidobacterium* species are known to produce **GABA**.
- *Escherichia*, *Bacillus*, and *Saccharomyces* produce **norepinephrine**.
- *Candida*, *Streptococcus*, *Escherichia*, and *Enterococcus* produce **serotonin**.
- *Bacillus* and *Serratia* produce **dopamine**.

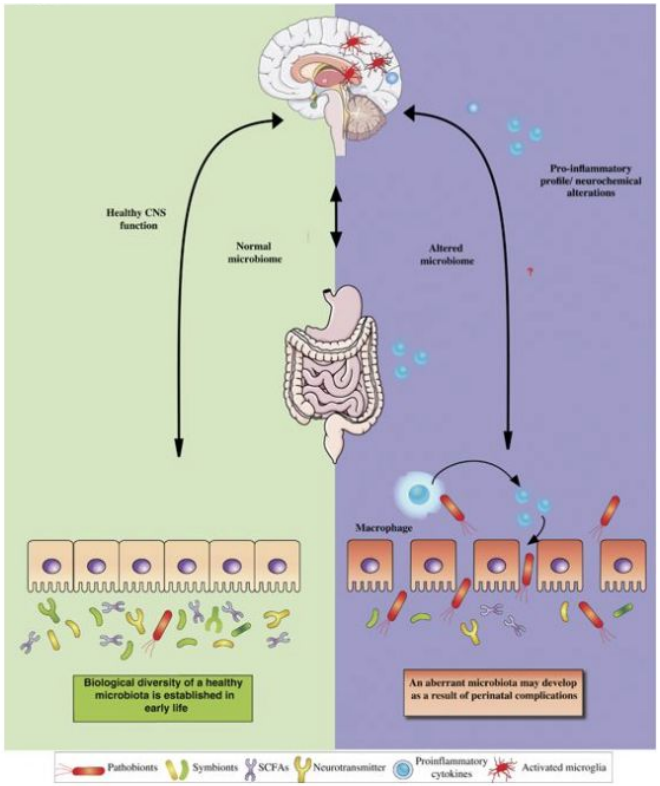
REVIEW ARTICLE
Front. Psychiatry, 13 March 2018 | https://doi.org/10.3389/fpsyt.2018.00044

Vagus Nerve as Modulator of the Brain–Gut Axis in Psychiatric and Inflammatory Disorders

Sigrid Breit[1†], Aleksandra Kupferberg[1†], Gerhard Rogler[2] and Gregor Hasler[1*]

[1]Division of Molecular Psychiatry, Translational Research Center, University Hospital of Psychiatry, University of Bern, Bern, Switzerland
[2]Department of Gastroenterology and Hepatology, University Hospital Zurich, Zurich, Switzerland





BIPOLAR DISORDERS
AN INTERNATIONAL JOURNAL OF PSYCHIATRY AND NEUROSCIENCES

ORIGINAL ARTICLE

Adjunctive probiotic microorganisms to prevent rehospitalization in patients with acute mania: A randomized controlled trial

Faith Dickerson, Maria Adamos, Emily Katsafanas, Sunil Khushalani, Andrea Origoni, Christina Savage, Lucy Schweinfurth, Cassie Stallings, Kevin Sweeney, Joshana Goga, Robert H Yolken

First published: 25 April 2018 | https://doi.org/10.1111/bdi.12652 | Cited by: 8

Neurosci Biobehav Rev. 2019 Jul;102:13-23. doi: 10.1016/j.neubiorev.2019.03.023. Epub 2019 Apr 17.

Prebiotics and probiotics for depression and anxiety: A systematic review and meta-analysis of controlled clinical trials.

Liu RT[1], Walsh RFL[2], Sheehan AE[2].

ELSEVIER
Journal of Affective Disorders
Volume 228, 1 March 2018, Pages 13-19

Review article

A meta-analysis of the use of probiotics to alleviate depressive symptoms

Qin Xiang Ng [a], Christina Peters [b], Collin Yih Xian Ho [c], Donovan Yutong Lim [d], Wee-Song Yeo [c, e]

frontiers in Microbiology

Front Microbiol. 2017; 8: 1935.
Published online 2017 Oct 6. doi: 10.3389/fmicb.2017.01935
PMCID: PMC5635058
PMID: 29056933

Linking the Gut Microbial Ecosystem with the Environment: Does Gut Health Depend on Where We Live?

Nishat Tasnim, Nijiati Abulizi, Jason Pither, Miranda M. Hart,*† and Deanna L. Gibson*†

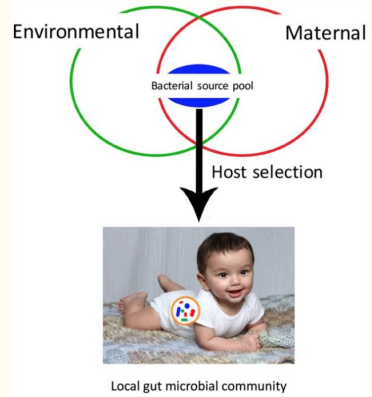


Figure 1

Local microbial community assembly of the infant gut microbiota depends on dispersal from a bacterial source pool. This bacterial source pool is comprised of both maternal microbes, transmitted vertically, and environmental microbes, transmitted horizontally. The development of the local community is shaped primarily by host selection, based on interactions between host and bacterial cells.

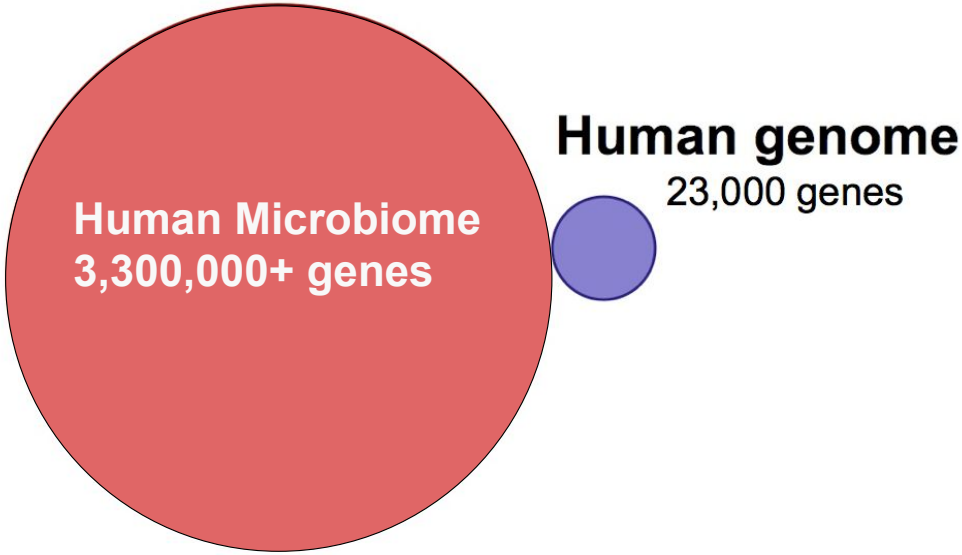
frontiers in Psychiatry

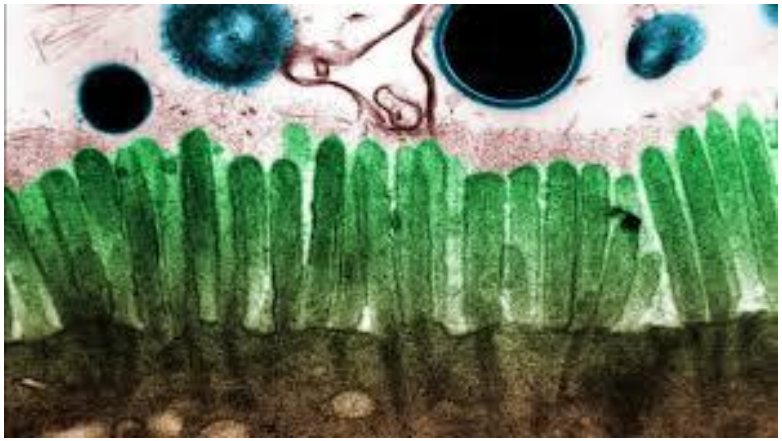
SYSTEMATIC REVIEW
published: 11 February 2019
doi: 10.3389/fpsyt.2019.00034

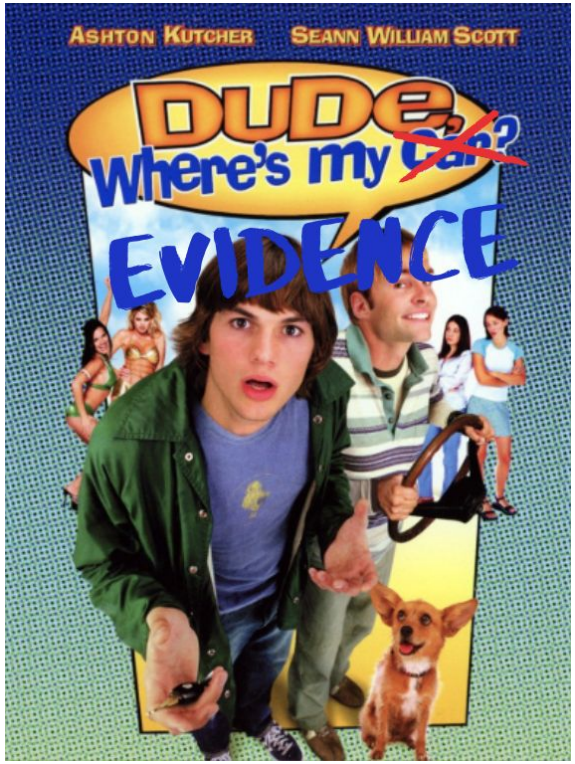
Systematic Review of Gut Microbiota and Major Depression

*Stephanie G. Cheung[1,2], Ariel R. Goldenthal[2,3], Anne-Catrin Uhlemann[4,5], J. John Mann[2,3,6], Jeffrey M. Miller[2,3] and M. Elizabeth Sublette[2,3]**

- Six eligible studies
- Across all five phyla, nine genera were higher in MDD (*Anaerostipes, Blautia, Clostridium, Klebsiella, Lachnospiraceae incertae sedis, Parabacteroides, Parasutterella, Phascolarctobacterium*, and *Streptococcus*), six were lower (*Bifidobacterium, Dialister, Escherichia/Shigella, Faecalibacterium*, and *Ruminococcus*), and six were divergent (*Alistipes, Bacteroides, Megamonas, Oscillibacter, Prevotella*, and *Roseburia*).
- No consensus has emerged from existing human studies of depression and gut microbiome concerning which bacterial taxa are most relevant to depression.
- Future directions? studying microbial functioning may be more productive than a purely taxonomic approach to understanding the gut microbiome in depression.







Nutritional Psychiatry

The Evidence

Personal View

THE LANCET Psychiatry

Nutritional medicine as mainstream in psychiatry

Jerome Sarris, Alan C Logan, Tasnime N Akbaraly, G Paul Amminger, Vicent Balanzá-Martínez, Marlene P Freeman, Joseph Hibbeln, Yutaka Matsuoka, David Mischoulon, Tetsuya Mizoue, Akiko Nanri, Daisuke Nishi, Drew Ramsey, Julia J Rucklidge, Almudena Sanchez-Villegas, Andrew Scholey, Kuan-Pin Su, Felice N Jacka, on behalf of The International Society for Nutritional Psychiatry Research

"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."

Better diet quality relates to larger brain tissue volumes

N = 4447 from Population-based Rotterdam Study

Participants underwent dietary assessment and brain MRI scanning between 2005 and 2015.

A diet quality score (0–14) was calculated reflecting adherence to Dutch dietary guidelines.

Brain MRI of brain tissue volumes, white matter lesion volume, lacunes, and cerebral microbleeds.

Better diet quality related to larger brain volume, gray matter volume, white matter volume, and hippocampal volume. Diet quality was not associated with white matter lesion volume, lacunes, or microbleeds.

High intake of vegetables, fruit, whole grains, nuts, dairy, and fish and low intake of sugar-containing beverages were associated with larger brain volumes.

Pauline H. Croll, Trudy Voortman, et al.
Neurology Jun 2018, 90 (24) e2166-e2173;
DOI:10.1212/WNL.0000000000005691

Depression

- Mediterranean/Traditional Dietary Pattern
- Seafood/Omega-3s
- B-vitamins
- More Plants
- Microbiome/Fermented Foods
- Limit Highly Processed Foods

The American Journal of Psychiatry

Association of Western and Traditional Diets With Depression and Anxiety in Women

Felice N. Jacka, Ph.D., Julie A. Pasco, Ph.D., Arnstein Mykletun, Ph.D., Lana J. Williams, Ph.D., Allison M. Hodge, Ph.D., Sharleen Linette O'Reilly, Ph.D., Geoffrey C. Nicholson, M.D., Ph.D., Mark A. Kotowicz, M.D., and Michael Berk, M.D., Ph.D.

Published Online: 1 Mar 2010 | https://doi.org/10.1176/appi.ajp.2009.09060881

This study examined the extent to which the high-prevalence mental disorders are related to habitual diet in 1,046 women ages 20–93 years randomly selected from the population.

A "traditional" dietary pattern characterized by vegetables, fruit, meat, fish, and whole grains was associated with lower odds for major depression or dysthymia and for anxiety disorders.

A "western" diet of processed or fried foods, refined grains, sugary products, and beer was associated with a higher GHQ-12 score.

A traditional dietary pattern comprised mainly vegetables, fruit, beef, lamb, fish, and whole-grain foods, while a western pattern comprised foods such as meat pies, processed meats, pizza, chips, hamburgers, white bread, sugar, flavored milk drinks, and beer.

The 12-item General Health Questionnaire (GHQ-12) was used to measure psychological symptoms, and a structured clinical interview was used to assess current depressive and anxiety disorders.

There was also an inverse association between diet quality score and GHQ-12 score that was not confounded

Western	**1.52 (0.96-2.41)**	**0.76 (0.49-1.18)**
Traditional	0.65 * (0.43-0.98)	0.68* (0.47-0.99)
Modern	1.29 (0.96-1.73)	0.93 (0.69-1.24)

Dietary Pattern & Depressive Symptoms

- Whitehall II Study – British Civil Service Workers 1985
- 8 evaluations survey plus clinical exam
- 'Whole Food' pattern: Vegetables, fruits and fish
- 'Processed Food' pattern: high consumption of sweetened desserts, chocolates, fried food, processed meat, pies, refined grains, high-fat dairy
- Covariates included: age, gender, marital status, employment grade and education, smoking, physical activity CAD, HTN.

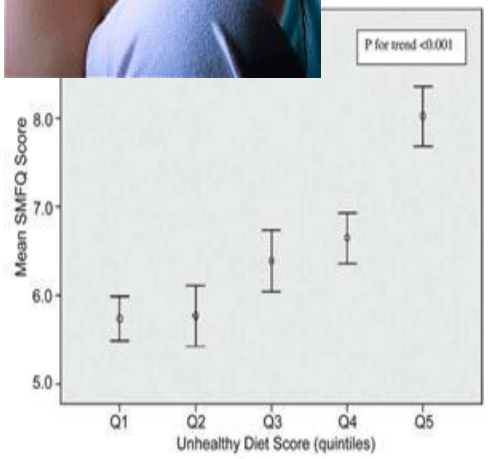
Table 4 Associations between dietary pattern scores at phase 5 and CES–D depression at phase 7 after excluding participants identified as having depression at phase 5 (total $n = 3059$)[a]

	Lowest tertile	Intermediate tertile		Highest tertile	
	OR	OR (95% CI)	P^a	OR (95% CI)	P^a
Whole food dietary pattern					
Model 1[b]	1	0.63 (0.46–0.87)	0.005	0.66 (0.47–0.92)	0.01
Model 2[c]	1	0.70 (0.50–0.96)	0.03	0.74 (0.52–1.04)	0.08
Model 3[d]	1	0.68 (0.50–0.94)	0.02	0.73 (0.51–1.02)	0.07
Processed food dietary pattern					
Model 1	1	1.44 (1.02–2.02)	0.04	1.83 (1.20–2.79)	0.004
Model 2	1	1.41 (1.00–2.00)	0.05	1.76 (1.14–2.70)	0.01
Model 3	1	1.38 (0.98–1.95)	0.06	1.69 (1.10–2.60)	0.02

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.

Teen Depression and Diet

- 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

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
  - Of community dwelling, lower socio-economic status (SES) elderly, 47% were depressed and food insufficiency increased the risk of depression by ten times

Alaimo K et al. Family Food Insufficiency, but Not Low Family Income, Is Positively Associated with Dysthymia and Suicide Symptoms in Adolescents. *J Nutr. 2002*; 132(4):719-25.

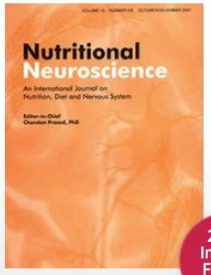
The Mediterranean Diet
Does Good Food = Good Mood?

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

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

Variable	Adherence to the Mediterranean Dietary Pattern Score (Median Score) 0-2 (2)	3 (3)	4 (4)	5 (5)	6-9 (6)	*P* Value for Trend
No. of cases per person-years	126/8866	91/8253	97/9240	67/8131	99/9715	
Crude rates per 10^3 (95% CI)[a]	14.2 (11.8-16.9)	11.0 (8.9-13.5)	10.5 (8.5-12.8)	8.2 (6.4-10.5)	10.2 (8.3-12.4)	
Model 1						
HR (95% CI)[b]	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						
No. of cases per person-years	67/8748	48/8167	46/9138	32/8061	44/9605	<.001
HR (95% CI)[b]	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						
No. of cases per person-years	86/8726	65/8155	61/9116	50/8075	75/9631	.007
HR (95% CI)[b]	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)	

Model 1 sex, age, smoking status , BMI, physical activity, energy intake, employment
Model 2 Excluded Participants w/depression dx in first 2 years
Model 3 Excluded Participants with antidepressant on f/u, No DX



Reviews

Alternate healthy eating index and risk of depression: A meta-analysis and systemematic review

Pei-Yu Wu, Mei-Yu Lin & Pei-Shan Tsai

Published online: 27 May 2018

Download citation https://doi.org/10.1080/1028415X.2018.1477424

Full Article | Figures & data | References | Supplemental | Citations | Metrics | Reprints & Permissions

Abstract

Objective: The alternate healthy eating index has been associated with depression. However, results reported in the literature are inconsistent. The present meta-analysis determined the association between the AHEI or AHEI-2010 and depression in adults without chronic disease.

Methods: Nine electronic databases and the reference lists of identified studies were systematically searched for studies published up to December 2016. Articles examining the association between depression and the AHEI or AHEI-2010 in adults were included.

Results: We identified eight observational studies with 10 effect sizes involving a total of 38,360 participants. When both the AHEI and AHEI-2010 were considered, the dietary index score was associated with a significant reduction in depression risk (odds ratio OR=0.70, 95% confidence interval CI=0.57–0.87). However, the subgroup analysis indicated that the AHEI-2010 (OR=0.69, 95% CI=0.56–0.89), but not the AHEI (OR=0.60, 95% CI=0.30–1.17), was significantly associated with reduced odds of depression. The heterogeneity among the included studies was significantly high (Q=48.9, P<0.01, I^2=81.60%).

Discussion: Our findings suggest that the AHEI-2010 is associated with a reduction in depression risk. However, well-designed randomized controlled trials must be conducted to confirm the causal relationship between the AHEI-2010 and depression.

Treatment in Psychiatry

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.

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

Prevention of ... within the important ... for only ... to ... q ... be ... sons ... among ... Using evidence ... pression prevention ... the authors found that coaching ... 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 ... initial ... gains were sustained over 2 years. The authors also describe why lifestyle interventions like coaching in healthy dietary practices may hold promise as effective, practical, nonstigmatizing interventions for preventing episodes of major depressive disorder in older adults with subsyndromal depressive symptoms.

(Am J Psychiatry 2014; 171:499–505)

BMC Medicine

Home About Articles Submission Guidelines

Abstract
Background
Methods
Results
Discussion
Conclusions
Declarations
References

Research article | Open Access | Open Peer Review

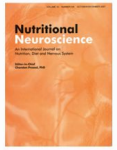
A randomised controlled trial of dietary improvement for adults with major depression (the 'SMILES' trial)

Felice N. Jacka, Adrienne O'Neil, Rachelle Opie, Catherine Itsiopoulos, Sue Cotton, Mohammedreza Mohebbi, David Castle, Sarah Dash, Cathrine Mihalopoulos, Mary Lou Chatterton, Laima Brazionis, Olivia M. Dean, Allison M. Hodge and Michael Berk

BMC Medicine 2017 **15**:23
https://doi.org/10.1186/s12916-017-0791-y
Received: 31 August 2016 | **Accepted:** 11 January 2017 | **Published:** 30 January 2017

SMILES

- 12-week, parallel-group, single blind, RCT
- Adjunctive dietary intervention vs. social support"befriending" protocol
- 7 individual nutritional consulting sessions clinical dietician.
- N = 67 (diet intervention, n = 33; control, n = 34).
- Remission (MADRS score <10) 32.3% (n = 10) intervention and 8.0% (n = 2) controls respectively
- Number needed to treat (NNT) based on remission scores was 4.1 (95% CI of NNT 2.3–27.8).



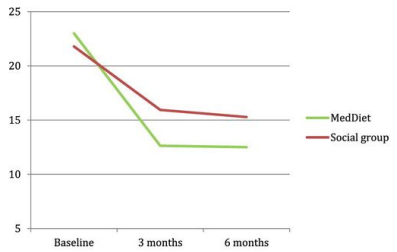
Nutritional Neuroscience
An International Journal on Nutrition, Diet and Nervous System

ISSN: 1028-415X (Print) 1476-8305 (Online) Journal homepage: https://www.tandfonline.com/loi/ynns20

A Mediterranean-style dietary intervention supplemented with fish oil improves diet quality and mental health in people with depression: A randomized controlled trial (HELFIMED)

Natalie Parletta, Dorota Zarnowiecki, Jihyun Cho, Amy Wilson, Svetlana Bogomolova, Anthony Villani, Catherine Itsiopoulos, Theo Niyonsenga, Sarah Blunden, Barbara Meyer, Leonie Segal, Bernhard T. Baune & Kerin O'Dea

Figure 4 DASS depression scores at baseline, 3 and 6 months.



N = 152

MedDiet cooking workshops for 3 months + fish oil 6 months vs. social groups for 3 months.

Depression scores improved by 45% in the MedDiet, 26.8% in the Social group.

Changes sustained at 6 months.

JAMA Network™

Original Investigation
March 5, 2019

Effect of Multinutrient Supplementation and Food-Related Behavioral Activation Therapy on Prevention of Major Depressive Disorder Among Overweight or Obese Adults With Subsyndromal Depressive Symptoms The MooDFOOD Randomized Clinical Trial

Mariska Bot, PhD[1]; Ingeborg A. Brouwer, PhD[2]; Miquel Roca, PhD[3]; et al Elisabeth Kohls, PhD[4]; Brenda W. J. H. Penninx, PhD[1]; Ed Watkins, PhD[5]; Gerard van Grootheest, MSc[1]; Mieke Cabout, MSc[2]; Ulrich Hegerl, PhD[4]; Margalida Gili, PhD[3]; Matthew Owens, PhD[5]; Marjolein Visser, PhD[2]; for the MooDFOOD Prevention Trial Investigators

N = 1025

12-month follow-up, 105 (10%) developed MDD: 25 (9.7%) in placebo without therapy, 26 (10.2%) in placebo with therapy, 32 (12.5%) in supplement without therapy, and 22 (8.6%) in supplement with therapy group. None of the treatment strategies affected MDD onset.

One person in the supplementation with therapy group, died. Twenty-four patients in each of the placebo groups and 24 patients in the supplementation with therapy group were hospitalized, and 26 patients in the supplementation-only group were hospitalized.

Journal
Nutritional Neuroscience ›
An International Journal on Nutrition, Diet and Nervous System
Volume 20, 2017 - Issue 3

Original Articles

Dietary recommendations for the prevention of depression

R.S. Opie, C. Itsiopoulos, N. Parletta, A. Sanchez-Villegas, T.N. Akbaraly, A. Ruusunen &
Pages 161-171 | Published online: 02 Mar 2016

1. Follow 'traditional' dietary patterns, such as the Mediterranean, Norwegian, or Japanese diet
2. Increase consumption of fruits, vegetables, legumes, wholegrain cereals, nuts, and seeds
3. Include a high consumption of foods rich in omega-3 polyunsaturated fatty acids
4. Replace unhealthy foods with wholesome nutritious foods
5. Limit your intake of processed-foods, 'fast' foods, commercial bakery goods, and sweets.

WJP World Journal of Psychiatry

Submit a Manuscript: http://www.f6publishing.com
World J Psychiatr 2018 September 20; 8(3): 1-11
DOI: 10.5498/wjp.v8.i3.1
ISSN 2220-3206 (online)

SYSTEMATIC REVIEW

Antidepressant foods: An evidence-based nutrient profiling system for depression

Laura R LaChance, Drew Ramsey

RESEARCH QUESTION

→ What are the most ***nutrient dense*** foods to prevent and promote recovery from depressive disorders ?

Anxiety Disorders

- Choline
- Omega-3s
- Microbiome/probiotics
- Gluten
- Caffeine and theobromines
- Dietary Pattern

Increased consumption of Western foods, or a more modern dietary pattern, correlates with elevated risk for anxiety disorder by 25%-29%.

*Sugar, food sensitivities and meal timing

Jacka FN, Mykletun A, Berk M, Bjelland I, Tell GS. The association between habitual diet quality and the common mental disorders in community-dwelling adults: the Hordaland Health study. Psychosom Med. 2011;73:483-490.

OPEN

The Effects of Dietary Improvement on Symptoms of Depression and Anxiety: A Meta-Analysis of Randomized Controlled Trials

Joseph Firth, PhD, Wolfgang Marx, PhD, Sarah Dash, PhD, Rebekah Carney, PhD, Scott B. Teasdale, PhD, Marco Solmi, MD, Brendon Stubbs, PhD, Felipe B. Schuch, PhD, André F. Carvalho, MD, Felice Jacka, PhD, and Jerome Sarris, PhD

45,826 participants were included;

Majority non-clinical depression (n = 15 studies).

Dietary interventions significantly reduced depressive symptoms (g = 0.275, 95% CI = 0.10 to 0.45, p = .002).

No effect of dietary interventions was observed for anxiety

(k = 11, n = 2270, g = 0.100, 95% CI = −0.04 to 0.24, p = .148).

Choline in anxiety and depression: the Hordaland Health Study.

Am J Clin Nutr. 2009; 90(4):1056-60 (ISSN: 1938-3207)

Bjelland I; Tell GS; Vollset SE; Konstantinova S; Ueland PM

- N = 5918
- Hospital Anxiety and Depression Scale
- Lowest plasma choline quintile significantly associated with high anxiety levels (OR: 1.33)
- No relationship choline and depression

Fermented foods, neuroticism, and social anxiety

Psychiatry Res. 2015; 228(2):203-8 (ISSN: 1872-7123)

Hilimire MR; DeVylder JE; Forestell CA

- Cross sectional, Self-report
- N=710 youth, measures fermented food consumption, neuroticism, and social anxiety.
- Fermented food consumption significantly and independently predicted social anxiety.
- In participants with high neuroticism, higher frequency of fermented food consumption was associated with fewer symptoms of social anxiety.
- Probiotics may have a protective effect against social anxiety symptoms for those at higher genetic risk (trait neuroticism.)
- Possible low-risk intervention for reducing social anxiety.

Can Probiotics Help Reduce Anxiety?

A new study finds that a certain strain of probiotics could reduce anxiety.

Posted Sep 28, 2018

The anxiolytic effect of probiotics: A systematic review and meta-analysis of the clinical and preclinical literature.
PLoS One. 2018

- 22 animal and 14 human clinical trials
- **"No conclusive human evidence."**
- Most evidence for *Lactobacillus rhamnosus*

Reis DJ, Ilardi SS, & Punt SEW. The anxiolytic effect of probiotics: A systematic review and meta-analysis of the clinical and preclinical literature. PLoS One. 2018; 13(6): e0199041.

Anxiety and the Microbiome

Article Addendum

Beneficial psychological effects of a probiotic formulation (*Lactobacillus helveticus* R0052 and *Bifidobacterium longum* R0175) in healthy human volunteers

Michaël Messaoudi, Nicolas Violle, Jean-François Bisson, Didier Desor, Hervé Javelot & Catherine Rougeot

Pages 256-261 | Received 20 Apr 2011, Accepted 21 Jul 2011, Published online: 01 Jul 2011

- *Lactobacillus helveticus* R0052 and *Bifidobacterium longum* R0175
- Hospital anxiety and depression scale (HADs)
  Hopkins symptoms checklist (HSCL-90)

"beneficial effects on anxiety and depression related behaviors in human volunteers."

Messaoudi M, Violle N, Bisson JF, Desor D, Javelot H, Rougeot C. Beneficial psychological effects of a probiotic formulation (Lactobacillus helveticus R0052 and Bifidobacterium longum R0175) in healthy human volunteers. Gut Microbes. 2011;2:256-261.

Consumption of Fermented Milk Product With Probiotic Modulates Brain Activity

KIRSTEN TILLISCH, JENNIFER LABUS, [...], and EMERAN A. MAYER

N=33, healthy women with healthy GI tract

4 wks Fermented Milk Product Probiotic vs. control vs. nothing

Bifidobacterium animalis, Streptococcus thermophiles, Lactobacillus bulgaricus, and Lactococcus lactis

fMRI x 2 Emotional faces attentention task, rapid preconcious regulatory system for threats

"Alterations in intrinsic activity of resting brain indicated that ingestion of FMPP was associated with changes in midbrain connectivity."

Research Article

Anxiety But Not Depression Decreases in Coeliac Patients After One-Year Gluten-free Diet: A Longitudinal Study

G. Addolorato

Pages 502-506 | Published online: 08 Jul 2009

Download citation https://doi.org/10.1080/00365520119754

35 patients, celiac disease
1 year gluten-free diet (GFD)

At baseline:
- 72% with significant levels of anxiety
- 24% of 59 healthy controls.

Over 1 year, GFD patients anxiety decreased 25%
No change in depression
No significant change in the control group

Addolorato G, Capristo E, Ghittoni G, et al. Anxiety but not depression decreases in coeliac patients after one-year gluten-free diet: a longitudinal study. Scand J Gastroenterol. 2001;36:502-506.

RESEARCH ARTICLE

Dietary Patterns, n-3 Fatty Acids Intake from Seafood and High Levels of Anxiety Symptoms during Pregnancy: Findings from the Avon Longitudinal Study of Parents and Children

Juliana dos Santos Vaz, Gilberto Kac, Pauline Emmett, John M. Davis, Jean Golding, Joseph R. Hibbeln

Published: July 12, 2013 • https://doi.org/10.1371/journal.pone.0067671

Pregnant women enrolled from 1991–1992 in ALSPAC (*n* 9,530).

Dietary patterns by FFQ (food frequency questionnaire).

32 weeks of gestation symptoms of anxiety measured with Crown-Crisp Experiential Index

Highest tertile of the health-conscious (OR 0.77; 0.65–0.93) and the traditional (OR 0.84; 0.73–0.97) pattern scores were less likely to report high levels of anxiety symptoms.

Women in the highest tertile of the vegetarian pattern score (OR 1.25; 1.08–1.44) were more likely to have high levels of anxiety

Women with no n-3 PUFA intake from seafood (OR 1.53; 1.25–1.87) versus intake of >1.5 grams/week reported higher anxiety

Do n-3 decrease proinflammatory cytokine production and depressive and anxiety symptoms in healthy young adults?

Omega-3 supplementation lowers inflammation and anxiety in medical students: a randomized controlled trial.

Brain Behav Immun. 2011; 25(8):1725-34 (ISSN: 1090-2139)

Kiecolt-Glaser JK; Belury MA; Andridge R; Malarkey WB; Glaser R

- 68 medical students, n-3 2.5 g/day (2085 EPA+384 DHA) vs. placebo
- parallel group, placebo-controlled, double-blind 12-week RCT
- 20% reduction anxiety symptoms, no change in depressive symptoms
- 14% decrease in lipopolysaccharide stimulated interleukin 6 production
- n-6:n-3 ratios led to lower anxiety, reductions in stimulated IL-6 and tumor necrosis factor alpha (TNF-α) production
- Suggest that n-3 supplementation can reduce inflammation and anxiety
- First evidence that n-3 may have potential anxiolytic benefits for individuals without an anxiety disorder diagnosis

Caffeine and Panic Disorder

Table 4 of 4
Table 4. The disorders/symptoms evaluated and the scales and results of the selected studies concerning the association between caffeine and panic disorder.

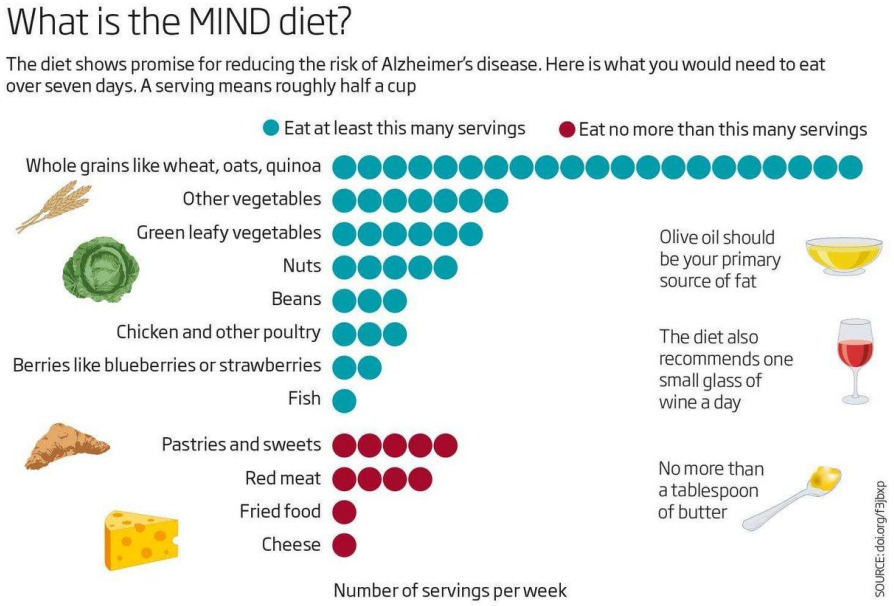
Study (year)	Disorders/symptoms evaluated	Scales	Results
Klein *et al.* (1991)	Panic disorder with or without agoraphobia	DSM-III, HDRS, NIMH panic attack inventory, NIMH rating scales for anxiety, depression and global impairment, and Zung SAS	Demonstrated that patients with panic disorder responded to caffeine with increased anxiety and panic attacks
Beck & Berisford (1992)	Panic disorder	ADIS-R, DSM-III-R	Although panic disorder patients in both caffeine and placebo conditions endorsed a significant number of panic symptoms and reported greater symptom severity relative to the normal controls, only the panic disorder/caffeine sample reported a significant increase in subjective anxiety
Bruce *et al.* (1992)	Panic disorder and generalized anxiety disorder	BSS, MRS, STAI	Patients with panic disorder showed different reactivity than normal patients, but were less reactive than patients with generalized anxiety disorder
Nardi *et al.* (2007)	Panic disorder, major depression and major depression with panic attacks	DSM-IV, DSQ, SCID, SUDS	Suggested that there is an association between panic attacks in panic disorder or major depression with panic attacks and hyper-reactivity to an oral caffeine challenge test
Nardi *et al.* (2007)	Panic disorder with agoraphobia	DSM-IV, SCID, SUDS	Suggested that there is an association between respiratory panic disorder subtype and hyperreactivity to an oral caffeine challenge test
Nardi *et al.* (2008)	Panic disorder	DSM-IV, DSQ, SCID, SUDS	Suggested that there is a genetic association between panic attacks after the intake of caffeine in panic disorder patients and their healthy first-degree relatives
Masdrakis *et al.* (2008)	Panic disorder with or without agoraphobia	DSM-IV, HDRS, SCID, SCLR-90-R, STAI	Indicated that patients with panic disorder who experience a panic attack after a 200 mg or a 400 mg caffeine challenge (compared with those patients with panic disorder who do not panic after both of these caffeine challenges) may present significantly higher nonspecific general psychopathology at baseline
Nardi *et al.* (2009)	Panic disorder, generalized social anxiety disorder and performance social anxiety disorder	DSM-IV, SCID, SUDS	Suggested that there is an association between panic disorder and an oral caffeine challenge test

Case Study BK

- 27 year old, female, attorney, married
- Panic attacks, worsened by mother's death
- Most often during evening commute
- Food sensitivity to sesame, soy and more
- Excellent initial reponse to sertraline (Zoloft)
- Cooks with husband, motivated
- Adopts Paleo style diet

Cognitive Impairment and Dementia

- MIND and Mediterranean
- Ketones and Ketogenic Diets (neeed to add in)
- Vitamin B12
- Phytonutrients
- Omega-3s



alzheimer's association | Alzheimer's & Dementia
THE JOURNAL OF THE ALZHEIMER'S ASSOCIATION

Published in final edited form as:
Alzheimers Dement. 2015 September ; 11(9): 1015–1022. doi:10.1016/j.jalz.2015.04.011.

MIND diet slows cognitive decline with aging

Martha Clare Morris, S.D.[1], **Christy C. Tangney, Ph.D.**[2], **Yamin Wang, Ph.D.**[1], **Frank M. Sacks, M.D.**[5], **Lisa L Barnes, Ph.D.**[3,4,6], **David A Bennett, M.D.**[4,6], and **Neelum T. Aggarwal, M.D.**[4,6]

n = 960 participants of the Memory and Aging Project

MIND diet score captures neuroprotective dietary components

MIND score was positively associated with slower decline in global cognitive score and with each of 5 cognitive domains.

7.5 years younger in age (top tertile vs the lowest)

MODEL	Tertile 1	Tertile 2	Tertile 3	P for Linear Trend
MIND DIET SCORE				
Score Range	2.5-6.5	7-8	8.5-12.5	
Age-adjusted				
HR (95% CI)	1.0 (referent)	0.75 (0.52, 1.09)	0.47 (0.30, 0.73)	0.0006
Basic-adjusted*				
HR (95% Confidence Interval)	1.0 (referent)	0.65 (0.44, 0.98)	0.47 (0.29, 0.76)	0.002
Basic-adjusted + Cardiovascular Conditions				
HR (95% Confidence Interval)	1.0 (referent)	0.64 (0.42, 0.97)	0.48 (0.29, 0.79)	0.003

MEDDIET SCORE				
Score Range	18 – 29	30 -34	35 - 46	
Age-adjusted				
HR (95% CI)	1.0 (referent)	0.77 (0.54, 1.11)	0.46 (0.29, 0.74)	0.001
Basic-adjusted*				
HR (95% CI)	1.0 (referent)	0.81 (0.54, 1.24)	0.46 (0.27, 0.79)	0.006
Basic-adjusted + Cardiovascular Conditions				
HR (95% Confidence Interval)	1.0 (referent)	0.81 (0.53, 1.21)	0.49 (0.29, 0.85)	0.01

*

DASH DIET SCORE				
Score Range	1.0 – 3.5	4.0 – 4.5	5.0 – 8.5	
Age-adjusted				
HR (95% CI)	1.0 (referent)	0.93 (0.64, 1.36)	0.56 (0.36, 0.86)	0.02
Basic-adjusted*				
HR (95% Confidence Interval)	1.0 (referent)	0.98 (0.66, 1.46)	0.61 (0.38, 0.97)	0.07
Basic-adjusted + Cardiovascular Conditions				
HR (95% Confidence Interval)	1.0 (referent)	0.98 (0.64, 1.46)	0.60 (0.37, 0.96)	0.06

B12, Biomarkers, Brain Aging

- 107 community-dwelling volunteers 61-87 yrs without cognitive impairment.
- Assessed yearly by clinical examination, MRI scans, and cognitive tests.
- Blood was collected at baseline for measurement of plasma vitamin B_{12}, transcobalamin (TC), holotranscobalamin (holoTC), methylmalonic acid (MMA), total homocysteine (tHcy), and serum folate.

Vogiatzoglou A et al.
Vitamin B12 status and rate of brain volume loss in community-dw
rly. Neurology. 2008 Sep 9;71(11):826-32.

- A lower level of vitamin B12 (bottom tertile 308 pmol/L) was associated with increased rate of brain volume loss
  (odds ratio 6.17, 95% CI 1.25–30.47)
- The association was similar for low levels of holoTC (54 pmol/L)
  (odds ratio 5.99, 95% CI 1.21–29.81)
- High levels of MMA or tHcy or low levels of folate were not associated with brain volume loss.
- Low vitamin B12 status a modifiable cause of brain atrophy and cognitive impairment?

Vogiatzoglou A et al.
Vitamin B12 status and rate of brain volume loss in community-dwe
ng elderly. Neurology. 2008 Sep 9;71(11):826-32.

B12 & Rate of Cognitive Decline

- 549 Community Dwelling Seniors
- Framingham Data, Follow-up 8 years
- Lowest 2/5ths of B12 accelerated decline MMSE
- *Folate levels >20.2 nmol/L = 1pt/year loss MMSE
- *"Plasma vitamin B-12 levels from 187 to 256.8 pmol/L predict cognitive decline."*

Morris MS et al Vitamin B-12 and folate status in relation to decline in scores on the mini-mental state examination in the framingham heart study. J Am Geriatr Soc. 2012 Aug;60(8):1457-64.

MCI, AD, and the Mediterranean Diet

- Meta-analysis of 5 studies, 7,537 patients
- Highest MeDi tertile had 33% less risk of MCI or AD compared to lowest Medi tertile
  (adjusted HR = 0.67; 95% CI,0.55–0.81; p< 0.0001)
- Each one-point increase MeDi score in cognitively normal individuals was associated with an 8% reduced risk of developing AD

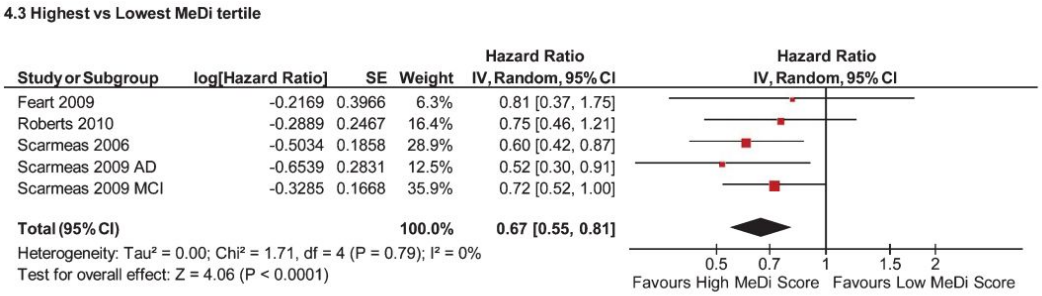


Fig. 4. Summary adherence to the Mediterranean diet and risk of cognitive impairment.

Balwinder Singh et al. Association of Mediterranean Diet with Mild Cognitive Impairment and Alzheimer's Disease: A Systematic Review and Meta-Analysis. Journal of Alzheimer's Disease 39 (2014) 271–282

Contents lists available at ScienceDirect
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journal homepage: www.ebiomedicine.com
EBioMedicine
Published by THE LANCET

Research paper

Modified Mediterranean-ketogenic diet modulates gut microbiome and short-chain fatty acids in association with Alzheimer's disease markers in subjects with mild cognitive impairment

Ravinder Nagpal [a,b], Bryan J. Neth [c,d], Shaohua Wang [a,b], Suzanne Craft [c,**], Hariom Yadav [a,b,*]

"Interpretation: The data suggest that specific gut microbial signatures may depict the mild cognitive impairment and that the MMKD can modulate the gut microbiome and metabolites in association with improved AD biomarkers in CSF."

nature neuroscience

Article | Published: 26 October 2014

Enhancing dentate gyrus function with dietary flavanols improves cognition in older adults

Adam M Brickman, Usman A Khan, Frank A Provenzano, Lok-Kin Yeung, Wendy Suzuki, Hagen Schroeter, Melanie Wall, Richard P Sloan & Scott A Small

Nature Neuroscience **17**, 1798–1803 (2014) | Download Citation

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January 16, 2018; 90 (3) ARTICLE

Nutrients and bioactives in green leafy vegetables and cognitive decline

Prospective study

Martha Clare Morris, Yamin Wang, Lisa L. Barnes, David A. Bennett, Bess Dawson-Hughes, Sarah L. Booth

Consumption of approximately 1 serving per day of green leafy vegetables and foods rich in phylloquinone, lutein, nitrate, folate, α-tocopherol, and kaempferol may help to slow cognitive decline with aging.

Bipolar Disorder

- Omega-3s
- Microbiome
- Ketogenic Diets
- Inflammation
- Nitrates
- Lifestyle Modification

ELSEVIER

Neurobiology of Aging

Volume 33, Issue 2, February 2012, Pages 425.e19-425.e27

Abstract of online article

Dietary ketosis enhances memory in mild cognitive impairment

Robert Krikorian [a], Marcelle D. Shidler [a], Krista Dangelo [b], Sarah C. Couch [b], Stephen C. Benoit [a], Deborah J. Clegg [c]

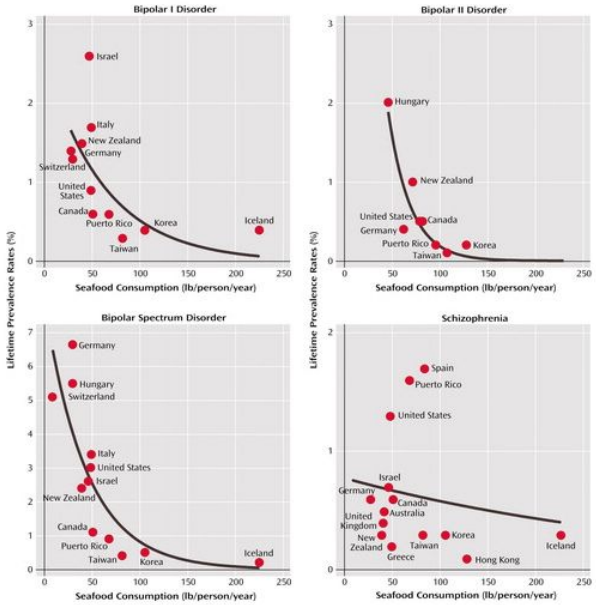
Study of the ketogenic agent AC-1202 in mild to moderate Alzheimer's disease: a randomized, double-blind, placebo-controlled, multicenter trial

Samuel T Henderson, Janet L Vogel, Linda J Barr, Fiona Garvin, Julie J Jones & Lauren C Costantini

Nutrition & Metabolism **6**, Article number: 31 (2009) | Download Citation

74k Accesses | **188** Citations | **222** Altmetric | Metrics »

Seafood Consumption



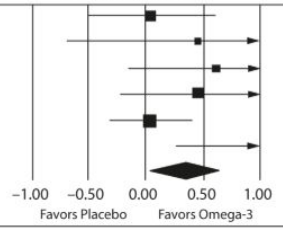
THE JOURNAL OF CLINICAL PSYCHIATRY

Omega-3 for Bipolar Disorder: Meta-Analyses of Use in Mania and Bipolar Depression

Jerome Sarris, PhD, MHSc; David Mischoulon, MD, PhD; and Isaac Schweitzer, MD

Figure 2. Meta-Analysis: Omega-3 Versus Control in Bipolar Depression

Study	Standard Difference in Means	Lower Limit	Upper Limit	*P* Value	Relative Weight
Gracious et al, 2010[19]	0.058	−0.491	0.607	.836	19.87
Frangou et al, 2007[31]	0.451	−0.610	1.512	.405	7.13
Frangou et al, 2006[23] (1 g)	0.612	−0.077	1.302	.082	14.44
Frangou et al, 2006[23] (2 g)	0.452	−0.226	1.130	.191	14.80
Keck et al, 2006[32]	0.042	−0.323	0.406	.823	31.38
Stoll et al, 1999[33]	1.016	0.254	1.778	.009	12.38
Pooled data	0.338	0.035	0.641	.029	



Conclusions: The meta-analytic findings provide **strong evidence that bipolar depressive symptoms may be improved by adjunctive use of omega-3.** The evidence, however, does not support its adjunctive use in attenuating mania.

ELSEVIER

Psychiatry Research
Volume 196, Issue 1, 30 March 2012, Pages 68-71

Markers of gluten sensitivity in acute mania: A longitudinal study

Faith Dickerson [a], Cassie Stallings [a], Andrea Origoni [a], Crystal Vaughan [a], Sunil Khushalani [a], Robert Yolken [b]

- n = 60 individuals assessed during a hospital stay for acute mania
- n= 39 at a 6-month follow-up vs 143 non-psychiatric controls.
- Baseline mania vs control had significantly increased levels of IgG antibodies to gliadin, but not other markers of celiac disease,
- Levels were not significantly different from those of controls at the six month follow-up. Among the individuals with mania, elevated levels at follow-up were significantly associated with re-hospitalization in the 6-month follow-up period.

BIPOLAR DISORDERS
AN INTERNATIONAL JOURNAL OF PSYCHIATRY AND NEUROSCIENCES

ORIGINAL ARTICLE

Adjunctive probiotic microorganisms to prevent rehospitalization in patients with acute mania: A randomized controlled trial

Faith Dickerson, Maria Adamos, Emily Katsafanas, Sunil Khushalani, Andrea Origoni, Christina Savage, Lucy Schweinfurth, Cassie Stallings, Kevin Sweeney, Joshana Goga, Robert H Yolken

N=66 patient admitted for bipolar disorder, manic phase

24 weeks of adjunctive probiotics vs. adjunctive placebo
(*Lactobacillus rhamnosus* strain GG and *Bifidobacterium animalis* subsp. *lactis* strain Bb12)

8/33 patients readmitted probiotic group
24/33 rehospitalizations placebo

Fewer days rehospitalized (mean 8.3 vs 2.8 days for placebo and probiotic treatment)

Inflammatory Index measured.
90% reduction of hospitalization in patients with highest inflammation scores

ELSEVIER

Contents lists available at ScienceDirect

Neuroscience and Biobehavioral Reviews

journal homepage: www.elsevier.com/locate/neubiorev

Ketogenic diet as a metabolic therapy for mood disorders: Evidence and developments

Elisa Brietzke[a,b,*], Rodrigo B. Mansur[a], Mehala Subramaniapillai[a], Vicent Balanzá-Martínez[c], Maj Vinberg[d], Ana González-Pinto[e], Joshua D. Rosenblat[a], Roger Ho[f,g], Roger S. McIntyre[a,h]

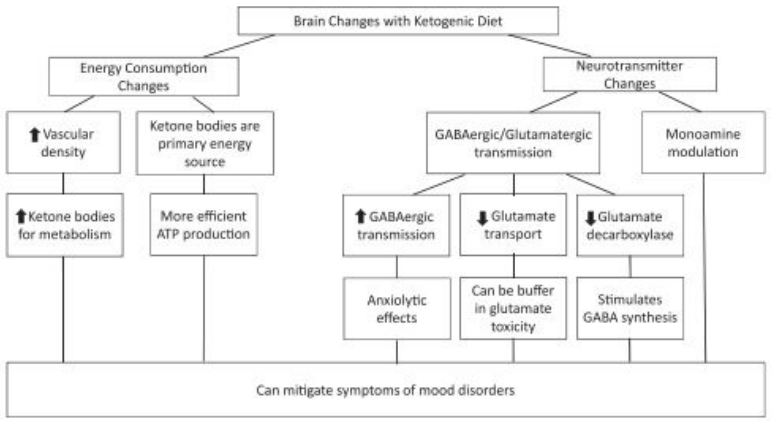
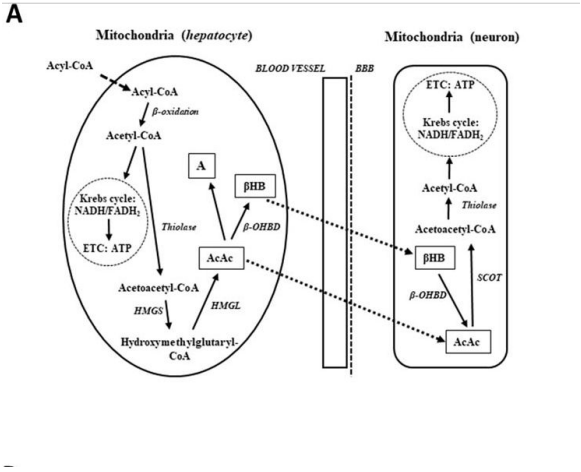


Fig. 1. Putative actions of ketogenic diet in mood disorders.

REVIEW ARTICLE
Front. Psychiatry, 23 May 2019 | https://doi.org/10.3389/fpsyt.2019.00363

Therapeutic Potential of Exogenous Ketone Supplement Induced Ketosis in the Treatment of Psychiatric Disorders: Review of Current Literature



Molecular Psychiatry

Article | Published: 18 July 2018

Nitrated meat products are associated with mania in humans and altered behavior and brain gene expression in rats

Seva G. Khambadkone, Zachary A. Cordner, Faith Dickerson, Emily G. Severance, Emese Prandovszky, Mikhail Pletnikov, Jianchun Xiao, Ye Li, Gretha J. Boersma, C. Conover Talbot Jr., Wayne W. Campbell, Christian S. Wright, C. Evan Siple, Timothy H. Moran, Kellie L. Tamashiro & Robert H. Yolken

N = 1,000 people with and without psychiatric disorders

Used to cure meats such as beef jerky, salami, hot dogs and other processed meat snacks.

People hospitalized for an episode of mania had more than three times the odds of having ever eaten nitrate-cured meats than people without a history of a serious psychiatric disorder.

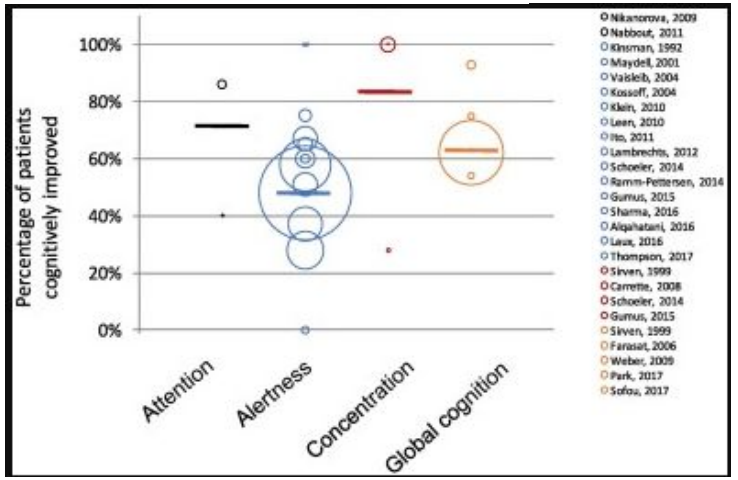
ELSEVIER

Epilepsy & Behavior
Volume 87, October 2018, Pages 69-77

Review

Cognitive benefits of the ketogenic diet in patients with epilepsy: A systematic overview

Annemiek A. van Berkel [a], Dominique M. IJff [b], Jan Martin Verkuyl [c]



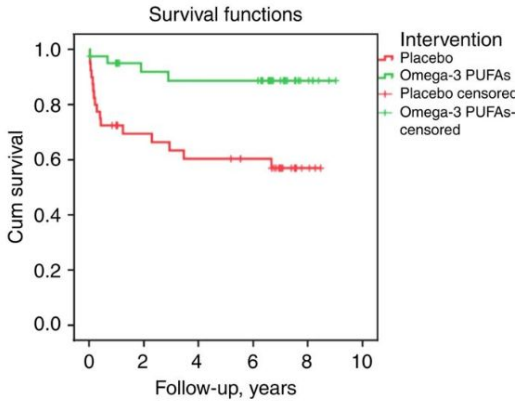
Schizophrenia

Omega 3 fatty acids
Gluten

Challenges
- Lower SES
- Food sources (shelters, soup kitchens etc)
- Metabolic syndrome and antipsychotics

The Vienna Study

Figure 2: Kaplan–Meier estimates of the risk of progression from the at-risk state to psychotic disorder in participants assigned to omega-3 PUFAs or placebo.



Four of 41 individuals from the omega-3 PUFA group and 16 of 40 individuals from the placebo group developed a psychotic disorder during the entire follow-up period. The difference between the groups in the cumulative risk of progression to psychosis was 30.2% (95% confidence interval, 10.1–50.4, with continuity correction). Kaplan–Meier survival

ARTICLE

Received 26 Nov 2014 | Accepted 29 Jun 2015 | Published 11 Aug 2015 DOI: 10.1038/ncomms8934 OPEN

Longer-term outcome in the prevention of psychotic disorders by the Vienna omega-3 study

G. Paul Amminger[1], Miriam R. Schäfer[1], Monika Schlögelhofer[2], Claudia M. Klier[3] & Patrick D. McGorry[1]

- RCT Omega-3 vs placebo trial in high risk teens (median 6.7 years)
- Brief intervention with omega-3 PUFAs reduced both the risk of progression to psychotic disorder and psychiatric morbidity in general in this study.
- The majority of the individuals from the omega-3 group did not show severe functional impairment and no longer experienced attenuated psychotic symptoms at follow-up.

Use of a Gluten-Free Diet in Schizophrenia: A Systematic Review

Anastasia Levinta ✉, Ilya Mukovozov, Christopher Tsoutsoulas

Advances in Nutrition, Volume 9, Issue 6, November 2018, Pages 824–832,
https://doi.org/10.1093/advances/nmy056
Published: 15 October 2018

- Nine studies: 1 RCT, 1 open label pilot, 7 cross-over
- GFD well tolerated by patients with schizophrenia
- Six studies demonstrated positive effects
- Non-randomized, publication bias, heterogeneity of study design
- CATIE Trial: 23.4% gliadin antibodies vs 2.9% of controls

ADHD

Dietary Pattern and ADHD

N= 120 children and adolescents (60 with newly diagnosed ADHD and 60 controls)

Lower adherence to a Mediterranean diet associated with ADHD diagnosis (odds ratio: 7.07)

Lower frequency of consuming fruit, vegetables, pasta, and rice and higher frequency of skipping breakfast and eating at fast-food restaurants were associated with ADHD diagnosis ($P < .05$).

High consumption of sugar, candy, cola beverages, and non-cola soft drinks ($P < .01$) and low consumption of fatty fish ($P < .05$) were also associated with a higher prevalence of ADHD diagnosis.

Meta-Analysis of Attention-Deficit/Hyperactivity Disorder or Attention-Deficit/Hyperactivity Disorder Symptoms, Restriction Diet, and Synthetic Food Color Additives

Joel T. Nigg, Ph.D., Kara Lewis, Ph.D., Tracy Edinger, N.D., and **Michael Falk, Ph.D.**
Drs. Nigg and Edinger are with Oregon Health and Science University, Portland, OR. Drs. Lewis and Falk are with the Life Sciences Research Organization, Bethesda, MD

- Twenty-four publications met inclusion criteria for synthetic food colors
- A random-effects meta-analytic model generated summary effect sizes.
- Restriction diets reduced ADHD symptoms at an effect of g = 0.29 (95% CI, 0.07– 0.53)
- In psychometric tests of attention, the summary effect size was 0.27 (95% CI = 0.07–0.47; p = .007)
- An estimated 8% of children with ADHD may have symptoms related to synthetic food colors.

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

Omega 3 Supplementation and ADHD

N=95, randomized, double-blind placebo-controlled 16 weeks trial

Supplementation with the omega-3 fatty acid mix

Increased EPA and DHA concentrations in erythrocyte membranes

Improved working memory function,

No effect on other cognitive measures and parent- and teacher-rated behavior.

Improved working memory correlated significantly with increased EPA, DHA and decreased AA.

Widenhorn-Muller, K et al. Effect of supplementation with long-chain ω-3 polyunsaturated fatty acids on behavior and cognition in children with attention deficit/hyperactivity disorder (ADHD): A randomized placebo-controlled intervention trial. Prostaglandins, Leukotrienes and Essential Fatty Acids Volume 91, Issues 1–2, July–August 2014, Pages 49-60

ELSEVIER
Drug and Alcohol Dependence
Volume 179, 1 October 2017, Pages 229-239

Review

The importance of nutrition in aiding recovery from substance use disorders: A review

Kendall D. Jeynes [a], E. Leigh Gibson [b]

- Substance use impact on digestion
- Nutritional deficiencies
- Alcohol and blood sugar
- Refeeding syndrome
- Sugar cravings
- Food as diversion and form of stimulation
- Culinary training program
  - sense of purpose, pride, self care

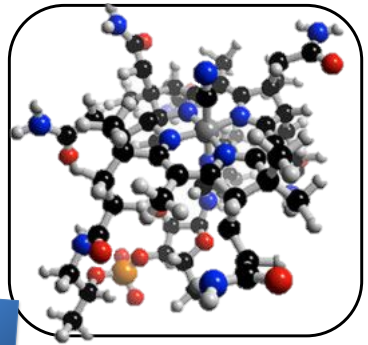
Q & A

How was lunch? What was different?

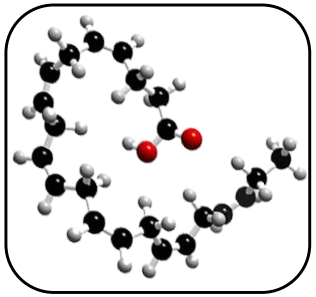
Key Nutrients

- B-vitamins
- Fat Soluble Vitamins
- Minerals
- Fats
- PUFAs
- Probiotics and Prebiotics
- Anti-nutrients

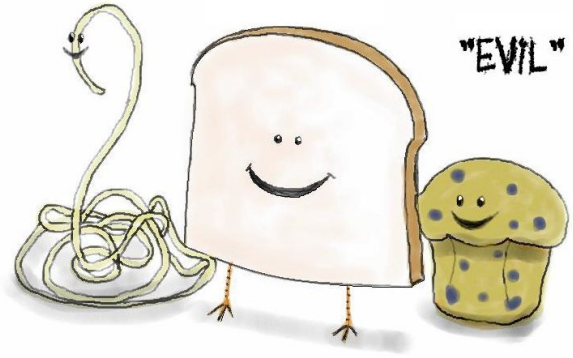
Nutritionism

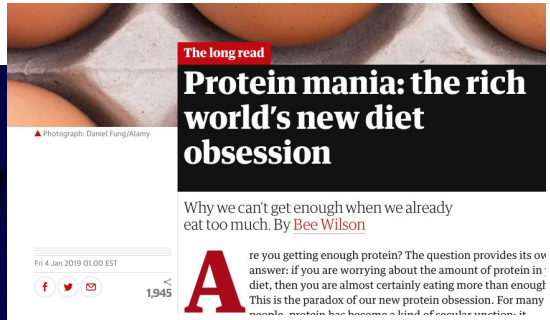


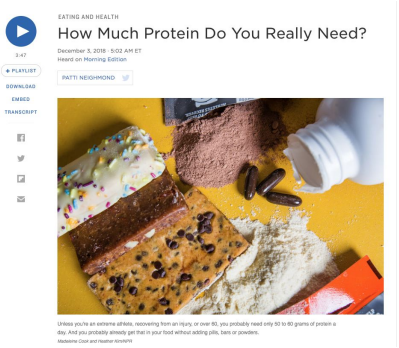
Vitamin B-12



DHA – Omega-3







Can You Get Too Much Protein?

iStock

By Roni Caryn Rabin

Dec. 6, 2016

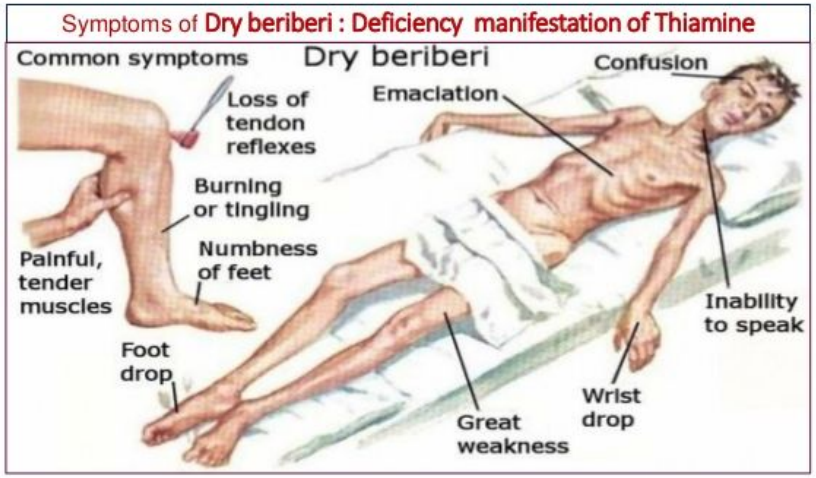
A Story: The First Vitamin

Kanehiro Takaki
Japanese Surgeon

1878 - 25%-40% of Japanese naval personnel were afflicted by beriberi.

Kanehiro Takaki, a Japanese surgeon, when the symptoms were ameliorated by supplementing the primarily **white rice** diet.

1886 - By altering the naval diet beriberi incidence dropped to 0.04%.



Vitamin B9 - Folate

Function in the Brain:

1. Methylation Cycle
2. Cell division/DNA replication
3. 4x Higher concentration CSF

Links to Illness:

- Neural Tube Defects
- Depression
- Cancer
- Heart disease

Intake/Deficiency:

- Ages 9-18 yrs 300-400 µg
- 19% of adolescent girls are deficient
- Up to 50% of patients with depression deficient

Top Food Sources:

- Leafy greens
- Lentils
- Black-eyed peas
- Asparagus
- Beef liver
- Eggs

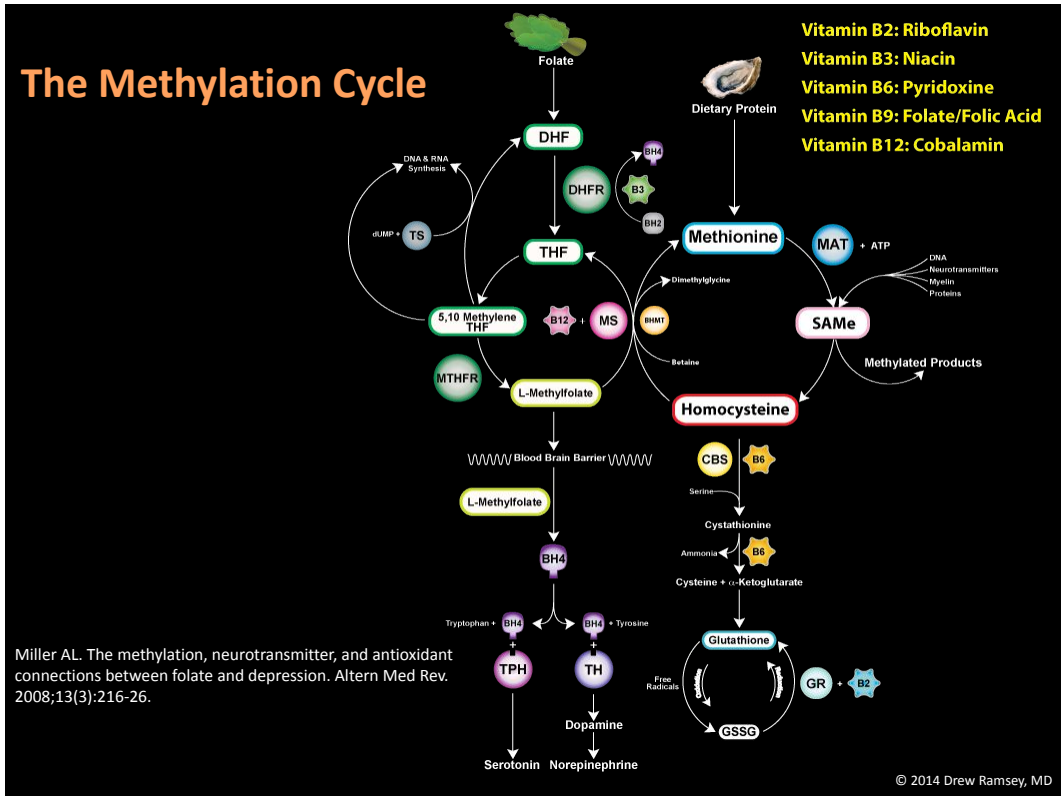
Journal of Psychopharmacology
BAP British Association for Psychopharmacology

Treatment of depression: time to consider folic acid and vitamin B12

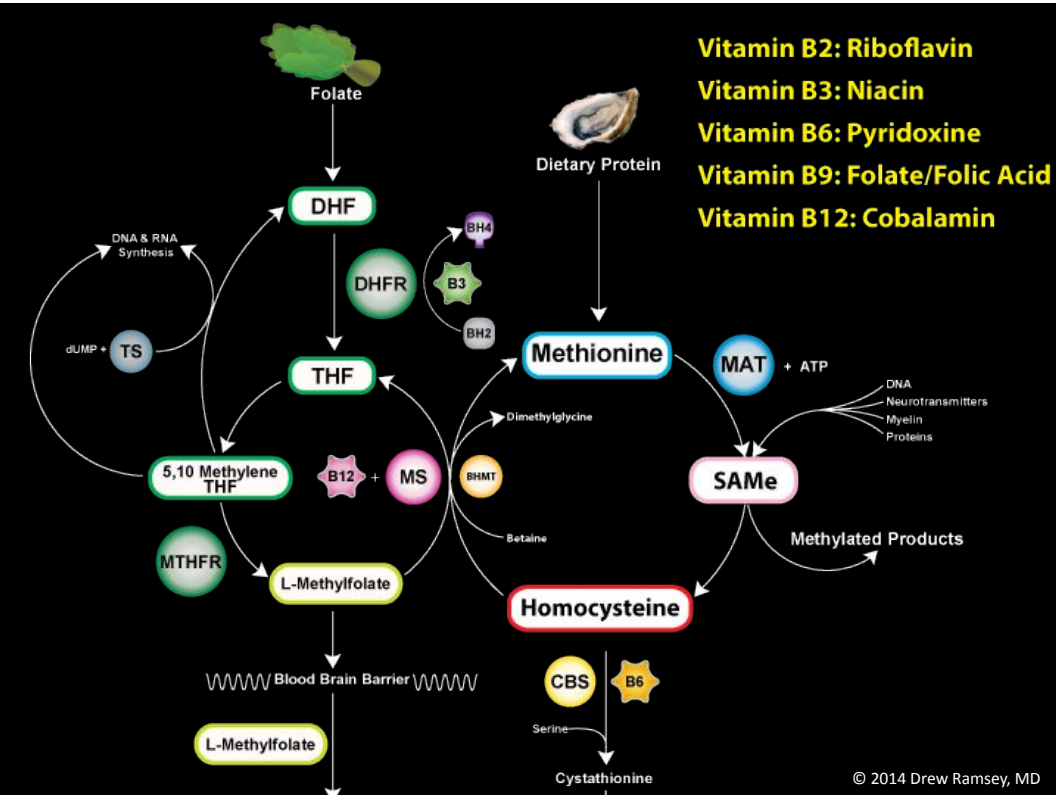
Alec Coppen, Christina Bolander-Gouaille

First Published January 1, 2005 | Research Article
https://doi.org/10.1177/0269881105048899

- Traditional Chinese diets (rich in folate) have high serum folate concentrations and very low lifetime rates of major depression.
- Low folate levels linked to a poor response to antidepressants, and treatment with folic acid shown to improve response to antidepressants.
- High B12 status may be associated with better treatment outcome.
- Folate and vitamin B12 are major determinants of one-carbon metabolism, in which S-adenosylmethionine (SAM) is formed.
- Increased plasma homocysteine as functional marker of both folate and B12 deficiency.
- Increased homocysteine levels are found in MTHFR C677T polymorphism impairs homocysteine metabolism shown to be overrepresented among depressive patients.
- Suggest oral doses folic acid (800 microg daily) and vitamin B12 (1 mg daily) to improve treatment outcome in depression.



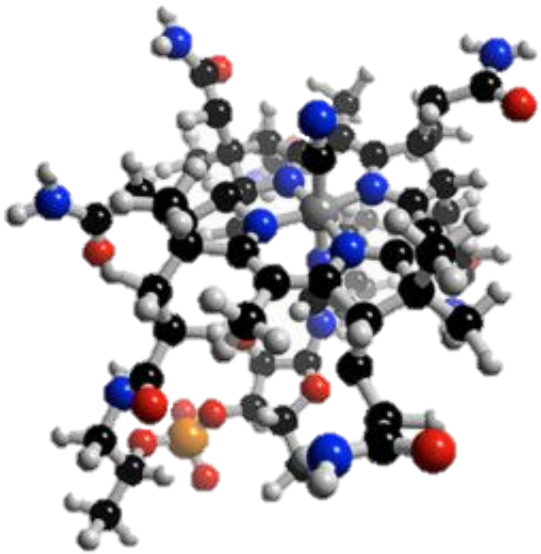
Miller AL. The methylation, neurotransmitter, and antioxidant connections between folate and depression. Altern Med Rev. 2008;13(3):216-26.



Vitamin B12

Brain Functions

1. Myelin
2. Serotonin, dopamine
3. Homocystiene



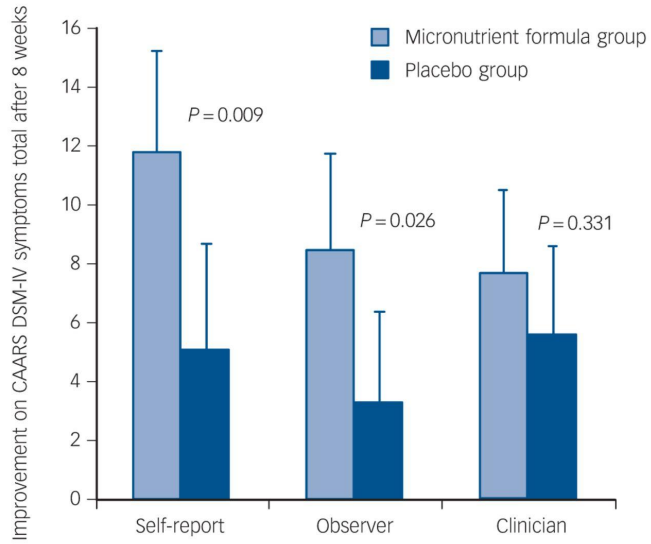
Links to Illness:

- Depression
- Cognitive decline
- Anemia

Top Food Sources:

- Seafood esp Bivalves
- Grass Fed Beef, Yogurt, Cheese, Eggs

Improvement on the Conners Adult ADHD Rating Scale (CAARS) DSM-IV symptoms total subscale across the three reporters (self, observer and clinician) and groups.



THE BRITISH JOURNAL OF PSYCHIATRY

Vitamin B12

- **10-15% Elderly Deficient**
- **PPI, H2 Blockers, Achlorydria**
- **Pernicious Anemia – Auto Immune**
- 25% patients with B12 deficiency exhibit neuropsychiatric symptoms without hematological findings (Lindenbaum et al., 1988).

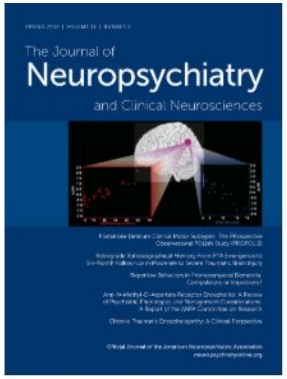
Folic acid & B12 Supplementation?

"No consistent evidence either way that folic acid, with or without vitamin B12, has a beneficial effect on cognitive function of unselected healthy or cognitively impaired older people."

Malouf R and Grimley Evans J. Folic acid with or without vitamin B12 for the prevention and treatment of healthy elderly and demented people. Cochrane Database Syst Rev 2008 Oct 8;(4):CD004514.

Vegans, Vegetarians, and B12

- Serum levels of vitamin B12 and folate measured in 689 men
- Mean serum vitamin B12 lowest among vegans (122, 95% CI: 117–127 pmol/l).
- 52% of vegans B12 deficient, 21% "depleted" vs 7% of vegetarians (and 1 omnivore)
- Folate concentrations were highest among vegans, 1 case deficiency in an omnivore



Around 40% of older adults have vitamin B12 (cobalamin) deficiencies, most due to malabsorption

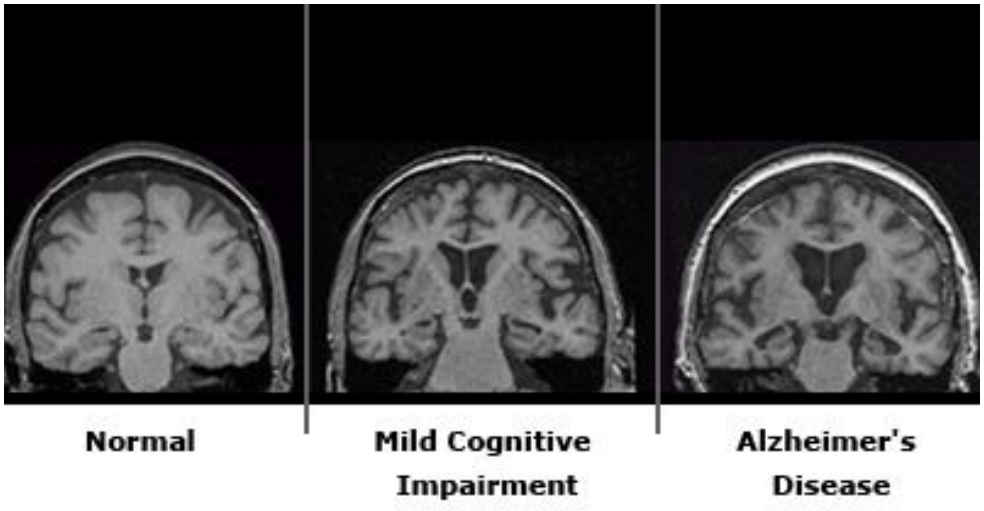
Neuropsychiatric manifestations associated with vitamin B12 deficiency include motor, sensory, and autonomic symptoms; cognitive impairment; and mood and psychotic symptoms.

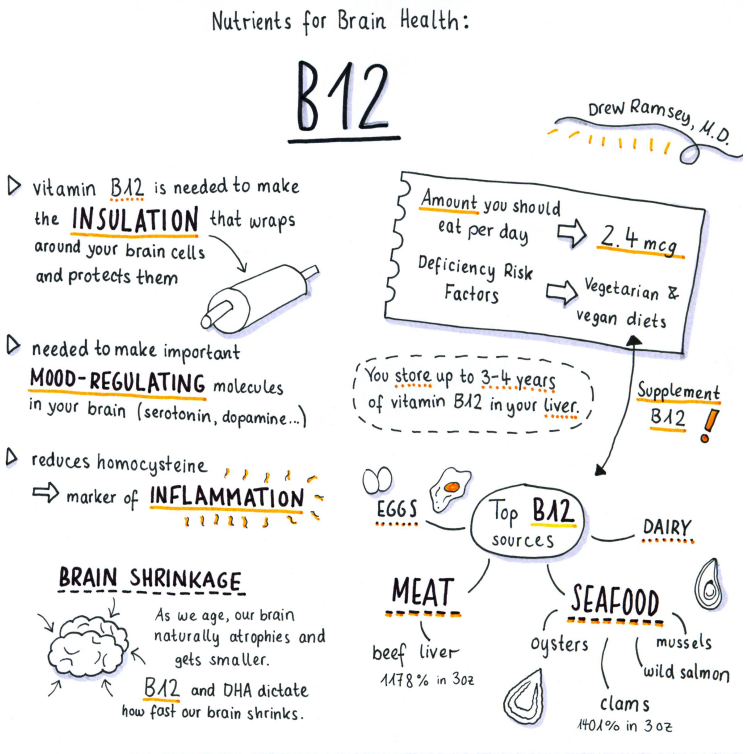
Some of these symptoms include paresthesias, ataxia, proprioception and vibration loss, memory loss, delirium, dementia, depression, mania, hallucinations, delusions, personality change, and abnormal behavior

The Neuropsychiatry of Vitamin B_{12} Deficiency in Elderly Patients

Christian Lachner, M.D., Nanette I. Steinle, M.D., and William T. Regenold, M.D., C.M.

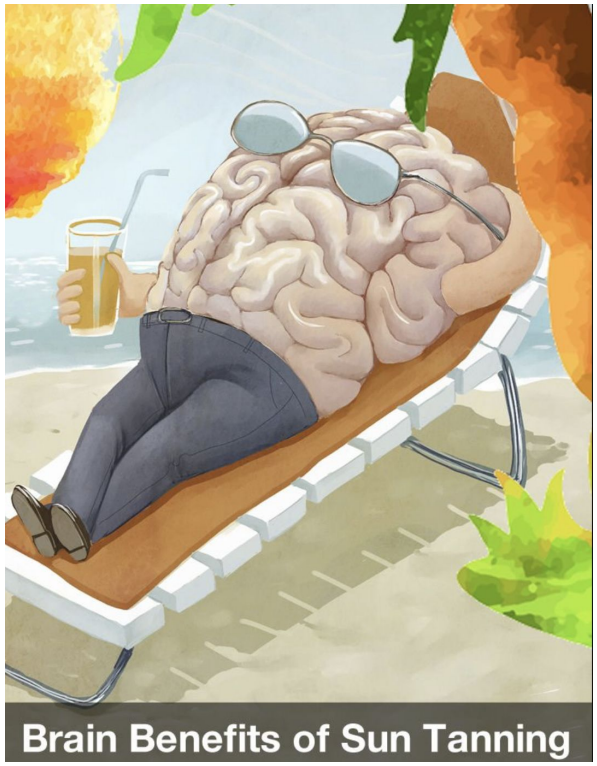
Published Online: 1 Jan 2012 | https://doi.org/10.1176/appi.neuropsych.11020052





Vitamin D

- Neurosteroid
- Supplements, Sun, Food
- VDR
- Transcription regulation



RC PSYCH ROYAL COLLEGE OF PSYCHIATRISTS

BJPsych The British Journal of Psychiatry

Annual high-dose vitamin D_3 and mental well-being: randomised controlled trial

Kerrie M. Sanders, Amanda L. Stuart, Elizabeth J. Williamson, Felice N. Jacka, Seetal Dodd, Geoff Nicholson and Michael Berk

BJP 2011, 198:357-364.
Access the most recent version at doi: 10.1192/bjp.bp.110.087544

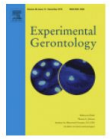
- Vital D Study n=2258 community dwelling women
- Annual Fall Dose 500,000 IU Vitamin D3 → 41% higher Vit D level
- Followed 3-5 years GHQ-12, SF-12, WHO Wellbeing Index

Conclusions

The lack of improvement in indices of mental well-being in the vitamin D group does not support the hypothesis that an annual high dose of vitamin D_3 is a practical intervention to prevent depressive symptoms in older community-dwelling women.

ELSEVIER

Experimental Gerontology
Volume 48, Issue 12, December 2013, Pages 1428-1435



Serum levels of vitamin E forms and risk of cognitive impairment in a Finnish cohort of older adults

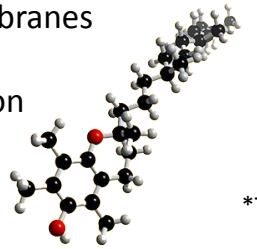
Francesca Mangialasche [a, b], Alina Solomon [a, c], Ingemar Kåreholt [a], Babak Hooshmand [a], Roberta

- 141 Cognitively Impaired Men
- Higher incidence of cognitive impairment was found in the middle [OR (95% CI): 3.41 (1.29–9.06)] and highest [OR (95% CI): 2.89 (1.05–7.97)] tertiles of the 5-NO_2-γ-tocopherol/γ-tocopherol ratio.

VITAMIN E'S

Function in the Brain:

1. Protects Neuron Membranes
2. Vascular Health
3. Decreases inflammation
4. Gene Regulation



Link to Illness:

- Depression
- Alzheimer's Disease
- Cancer
- Heart disease

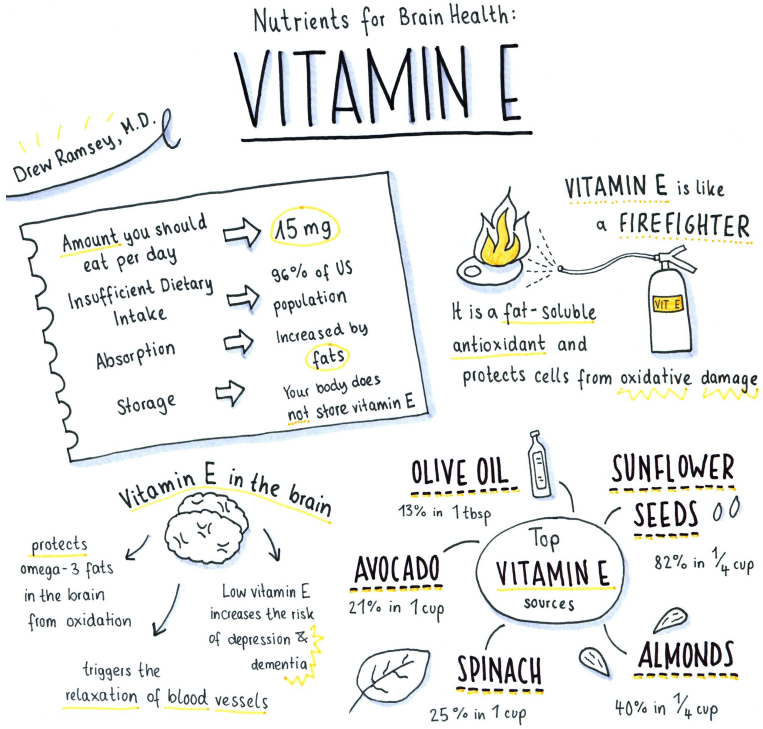
*TOP % FOOD INSuFFICIENCY IN US

Recommended Intake:

- Ages 4-8 years require 7 mg
- Ages 9-13 years require 11 mg
- People on low-fat diets are at risk

Top Food Sources:

- Almonds
- Olive oil
- Avocado
- Sunflower seeds
- Peppers
- Tomatoes



Nutrients for Brain Health:

VITAMIN A

Drew Ramsey, M.D.

Carotenoids (certain plant pigments) absorb light.

Amount you should eat per day → ♀ 700 mcg ♂ 900 mcg

Absorption → increased with fat

Storage → depends on intake; you use 0.5% of your stores daily

Lycopene serves as an antioxidant and protects the brain

Lutein & zeaxanthin protect your vision

Certain CAROTENOIDS are converted to the active form of VITAMIN A in the body

VITAMIN A regulates cell growth & division

VITAMIN A plays a role in producing DHA

VITAMIN A helps maintain your immune system

Top sources for VITAMIN A:

- CARROTS — 428% in 1 cup
- MUSTARD GREENS — 118% in 1 cup
- PUMPKIN — 245% in 1 cup
- SWEET POTATO — 438% in 1 medium potato
- CHICKEN LIVER — 186% in 3oz

Nutrients for Brain Health:

VITAMIN K

Drew Ramsey, M.D.

Role of vitamin K: regulating blood coagulation and clotting → helps ensure your brain receives oxygen

is key to bone formation

serves an integral role in the construction of very specialized fats that insulate your brain cells and allow for the ultrarapid connection between cells

Amount you should eat per day → ♀ 90 mcg ♂ 120 mcg

Absorption → greatly increased by adding fats

Storage → levels begin to decline in about 10 days without intake

Top VITAMIN K sources:

- KALE — 1,180% in 1 cup
- SPINACH — 987% in 1 cup
- MUSTARD GREENS — 922% in 1 cup
- BEET GREENS — 774% in 1 cup
- COLLARD GREENS — 858% in 1 cup

Nutrients for Brain Health:

IRON

Drew Ramsey, M.D.

- You need IRON in form of HEMOGLOBIN to transport OXYGEN into your BRAIN
- IRON helps as a cofactor to make the major MOOD-REGULATING neurotransmitters (serotonin, dopamine...)

2 BILLION people are iron-deficient! → low energy, focus problems, higher irritability

Tips for better iron absorption

1. Use a cast-iron skillet for cooking.
2. Add some acid (lemon juice, vinegar).

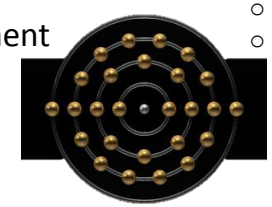
Top IRON sources:

- non-heme iron (plant-based): SESAME SEEDS, PUMPKIN SEEDS, SPINACH, DARK CHOCOLATE
- RED MEAT, OYSTERS (heme iron)

Iron

Function in the Brain:

1. Transports oxygen to the brain
2. NT Synthesis (dopamine, NE and serotonin)
3. Essential for brain development
4. 10-15% Women 18-40 are deficient, IRREVERSIBLE



Link to Illness:

- Low cognitive ability
- Poor learning
- Poor Concentration
- Anemia
- Depression

Recommended Intake:

- Ages 9-13 years require 8 mg
- Ages 14-18 years require 11-15 mg
- Teenage girls are at great risk of deficiency

Top Food Sources:

- Grass-fed beef and lamb
- Beans
- Spinach
- Pumpkin seeds
- Dark chocolate

Chen et al. BMC Psychiatry 2013, 13:161
http://www.biomedcentral.com/1471-244X/13/161

BMC Psychiatry

RESEARCH ARTICLE Open Access

Association between psychiatric disorders and iron deficiency anemia among children and adolescents: a nationwide population-based study

Mu-Hong Chen[1], Tung-Ping Su[1,2], Ying-Sheue Chen[1], Ju-Wei Hsu[1], Kai-Lin Huang[1], Wen-Han Chang[1], Tzeng-Ji Chen[3,4] and Ya-Mei Bai[1,2*]

2957 patients with IDA, with an increased risk of:

unipolar depressive disorder (OR = 2.34, 95% CI = 1.58 ~ 3.46)
bipolar disorder (OR = 5.78, 95% CI = 2.23 ~ 15.05)
anxiety disorder (OR = 2.17, 95% CI = 1.49 ~ 3.16)
autism spectrum disorder (OR = 3.08, 95% CI = 1.79 ~ 5.28)
attention deficit hyperactivity disorder (OR = 1.67, 95% CI = 1.29 ~ 2.17)
tic disorder (OR = 1.70, 95% CI = 1.03 ~ 2.78)
developmental delay (OR = 2.45, 95% CI = 2.00 ~ 3.00)
mental retardation (OR = 2.70, 95% CI = 2.00 ~ 3.65)

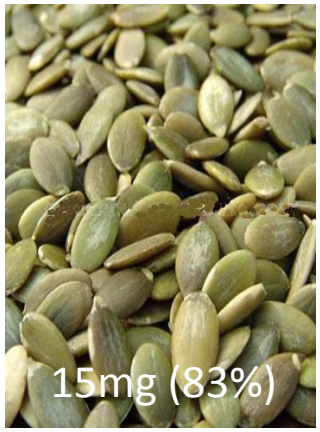
17mg (97%)

Top Iron Foods (per 100grams)

28mg (155%)

23 mg (129%)

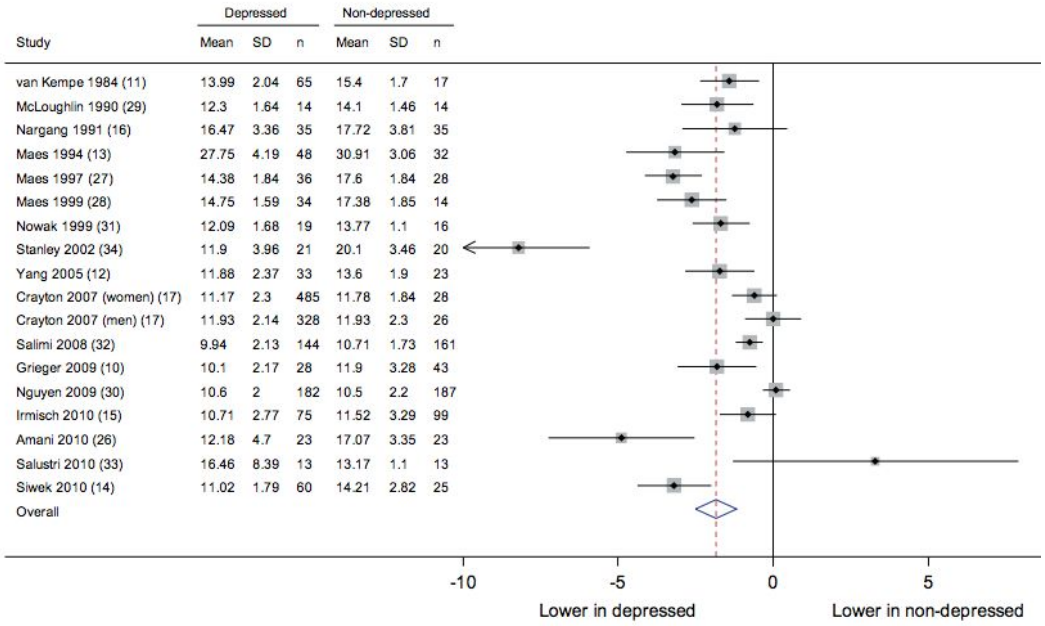
6.1mg (34%)

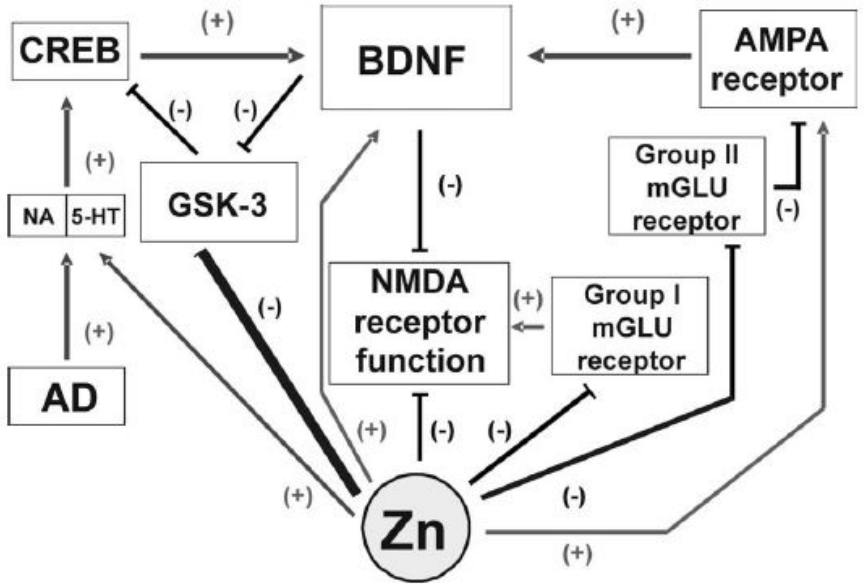


15mg (83%)

Swardfager, W et al (2013) Zinc in Depression: A Meta-Analysis. **Biological Psychiatry**

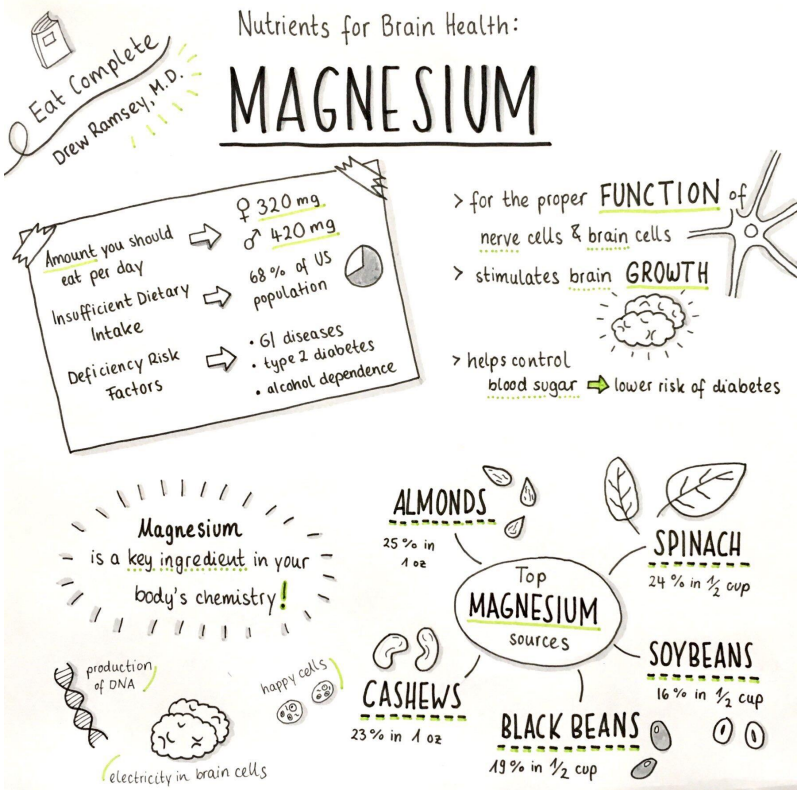
Volume 74, Issue 12, Pages 872-878





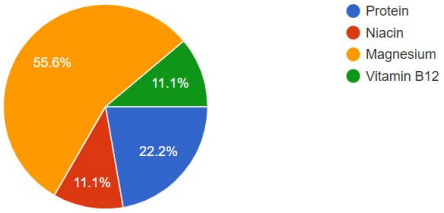
Zinc: Top Sources

Oysters 3oz	154mg (1029%)
Beef 3oz	7mg (47%)
Pork 3 oz	2.9mg (19%)
Yogurt 8oz	1.7mg (11%)
Kidney Beans (1/2cup)	1mg* (7%)
Fortified Cereal	15-30mg



12. Most Americans do not meet the RDA for which of the following nutrients?

9 responses



Magnesium

- 24 grams of Magnesium in a human
- Most ATP exist in body at MgATP
- Essential in Ion transport and LTP
- Low Mg leads to increased inflammation
- Mg depletion animal models → Depressive behaviors
- Essential to Vitamin D synthesis
- First Human Trial in Depression 1921

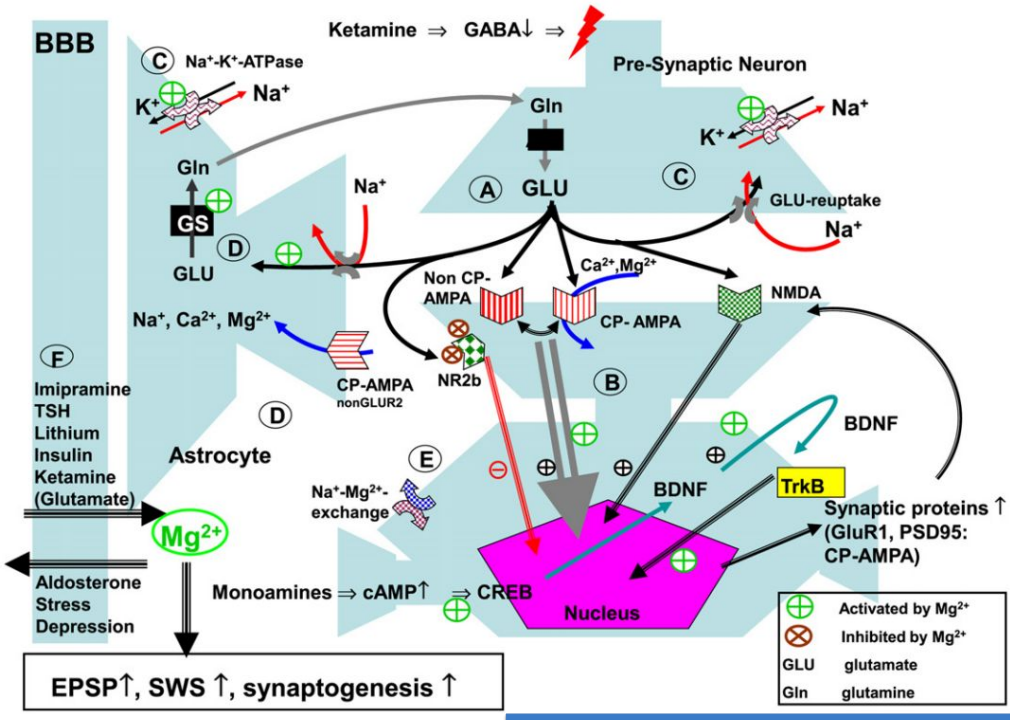
Magnesium intake association with depression

- Hordaland Health Study Norway
- 5708 Adult Age 46-76
- FFQ-169, HADS

Table 4.

Association of magnesium intake† and case level depression and anxiety‡: Hordaland Health Study

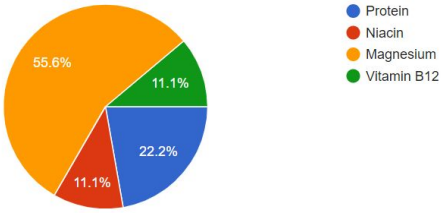
	Depression OR (95%CI)	Anxiety OR (95%CI)
Adjusted total energy intake	0.70 (0.56–0.88)	0.90 (0.76–1.06)
+Adjusted gender, age	0.72 (0.57–0.90)	0.84 (0.71–1.00)
+Adjusted WHR, BMI, SBP	0.72 (0.57–0.90)	0.84 (0.71–1.00)
+Adjusted education, income and health behaviours	0.86 (0.69–1.08)	0.91 (0.77–1.08)



Murck H. Psychiatric Res. 2013 Jul;47(7):955-65

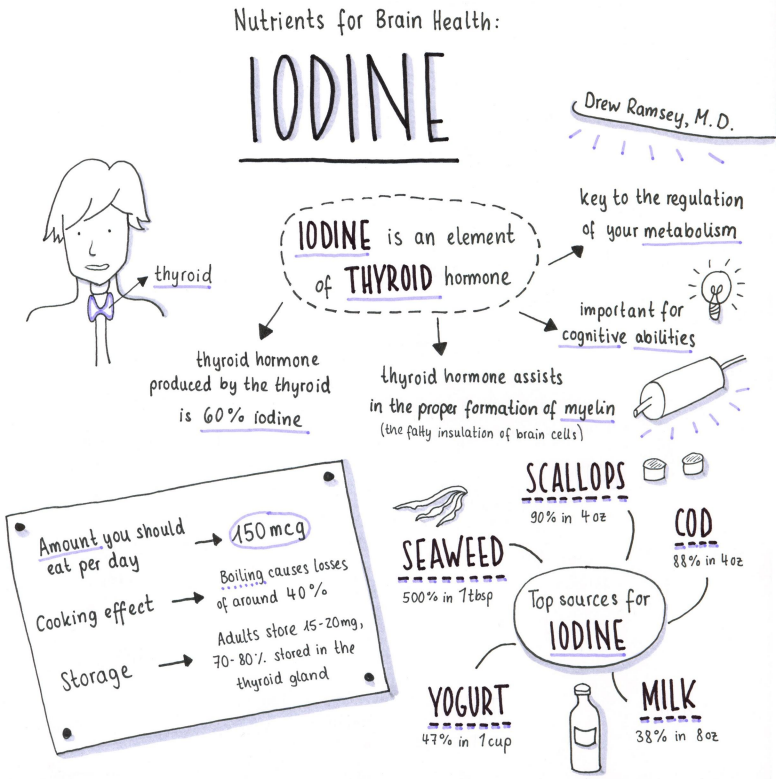
12. Most Americans do not meet the RDA for which of the following nutrients?

9 responses



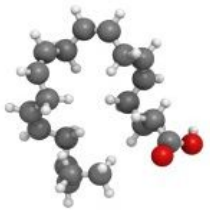
World's Healthiest Foods rich in magnesium

Food	Cals	DRI/DV
Pumpkin Seeds	180	47.7%
Spinach	41	39.1%
Swiss Chard	35	37.6%
Soybeans	298	36.9%
Sesame Seeds	206	31.5%
Black Beans	227	30.1%
Quinoa	222	29.6%
Cashews	221	29.2%
Sunflower Seeds	204	28.4%
Navy Beans	255	24.1%



Omega-3 Fatty Acids

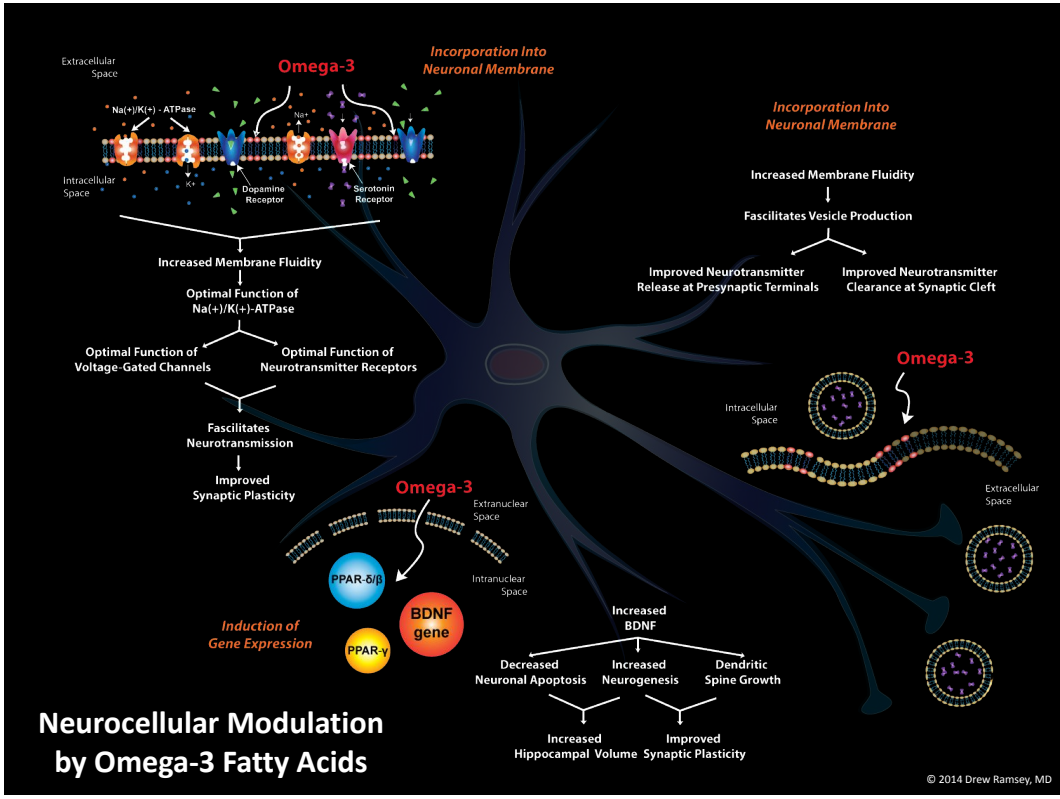
Docosahexaenoic acid (DHA) 22:6(n-3)
(8% of brain dry weight)



Eicosapentaenoic acid (EPA) 20:5(n-3)

Alpha-linolenic acid (ALA) 18:3(n-3)

Where Does DHA Come From?

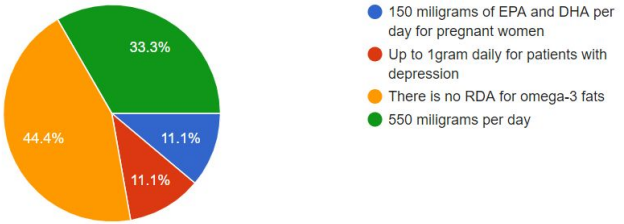


Omega-3s, Depression, Dementia

- O-3 fatty acid levels are lower in major depression vs. normal controls (Lin et al., 2010)
- O-3 levels are significant predictors of future suicide attempt (Sublette et al., 2006)
- O-3 PUFAs sig. improve depression in patients with clearly defined depression (ES = 0.69, p = .002) (Lin et al. 2007)
- Higher DHA (mol %) associated w/ better performance on tests of nonverbal reasoning, mental flexibility, working memory, and vocabulary (Muldoon et al., 2010)
- MIXED DATA, EPA>DHA appears best.
- Treatment vs. Prevention, Fish vs. Fish Oil

14. What is the Recommended Daily Allowance (RDA) of long-chained omega-3 fats?

9 responses



Liao et al. *Translational Psychiatry* (2019)9:190
https://doi.org/10.1038/s41398-019-0515-5

Translational Psychiatry

REVIEW ARTICLE Open Access

Efficacy of omega-3 PUFAs in depression: A meta-analysis

Yuhua Liao[1], Bo Xie[1], Huimin Zhang[1], Qian He[1], Lan Guo[2], M. Subramaniapillai[3], Beifang Fan[1], Ciyong Lu[2] and R. S. McIntyer[3]

Meta-analysis of double-blind randomized placebo-controlled trials of omega-3 fats to treat depression

Analyzed 26 studies, 2160 total participants.

The meta-analysis showed an overall beneficial effect of omega-3 polyunsaturated fatty acids on depression symptoms (SMD = −0.28, P = 0.004).

Compared with placebo, EPA-pure (=100% EPA) and EPA-major formulations (≥60% EPA) demonstrated clinical benefits with an EPA dosage ≤1 g/d, whereas DHA-pure and DHA-major formulations did not exhibit such benefits.

Current evidence supports omega-3 PUFAs EPA ≥ 60% dosed ≤1 g/d would have beneficial effects on depression.

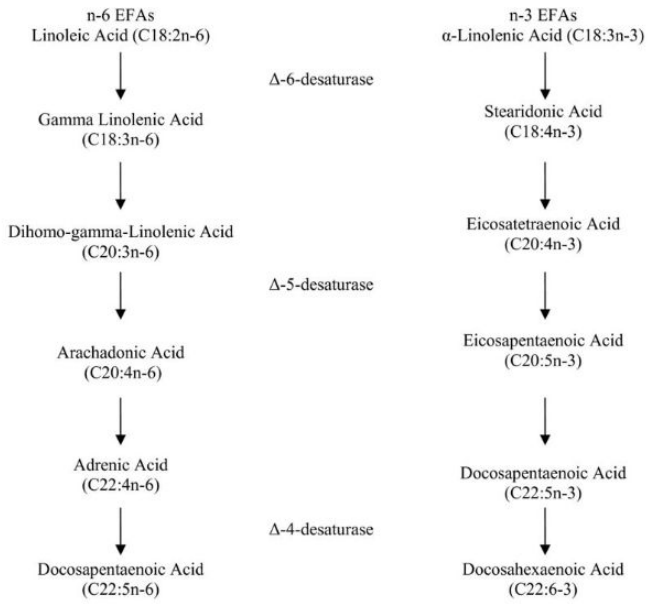


Figure 1
Linoleic (C18:2n-6) and α-Linolenic (C18:3n-3) Acid metabolism and elongation.
(Adapted from *Simopoulos et al., 1991*)

Daley, C et al (2010). A review of fatty acid profiles and antioxidant content in grass-fed and grain-fed beef. Nutrition Journal 9:10. https://doi.org/10.1186/1475-2891-9-10

Am J Clin Nutr. 2011 May; 93(5): 950–962.
Published online 2011 Mar 2. doi: 10.3945/ajcn.110.006643

PMCID: PMC3076650
PMID: 21367944

Changes in consumption of omega-3 and omega-6 fatty acids in the United States during the 20th century[1,2,3]

Tanya L Blasbalg, Joseph R Hibbeln, Christopher E Ramsden, Sharon F Majchrzak, and Robert R Rawlings

- Estimated consumption of soybean oil increased >1000-fold from 1909 to 1999.
- The availability of linoleic acid (LA) increased from 2.79% to 7.21% of energy
- The ratio of LA to ALA increased from 6.4 in 1909 to 10.0 in 1999.

Predicted net effects of these dietary changes:

- Declines in tissue n--3 highly unsaturated fatty acid status
  - (36.81%, 1909; 22.95%, 1999)
- Declines in the estimated omega-3 index (8.28, 1909; 3.84, 1999).

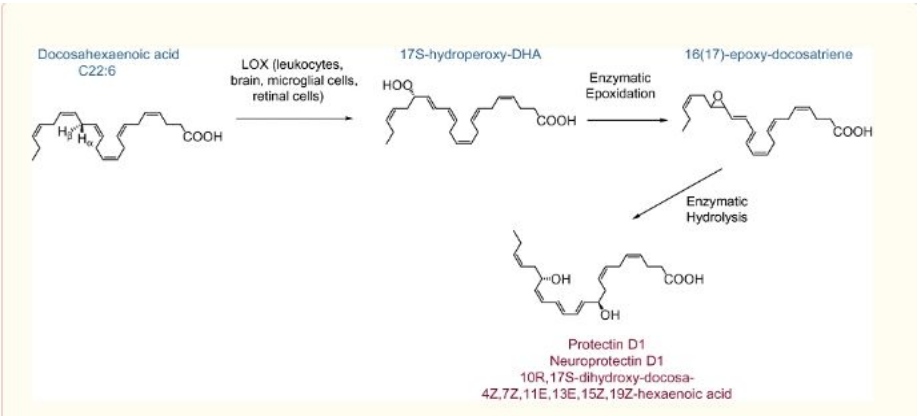
BJP British Journal of Pharmacology
BRITISH PHARMACOLOGICAL SOCIETY

Br J Pharmacol. 2009 Oct; 158(4): 960–971.
doi: 10.1111/j.1476-5381.2009.00290.x

PMCID: PMC2785519
PMID: 19594757

Resolvins and protectins: mediating solutions to inflammation

Payal Kohli and Bruce D Levy



REVIEWS IN
OBSTETRICS &
GYNECOLOGY

Omega-3 Fatty Acid Supplementation During Pregnancy

James A. Greenberg, MD,* Stacey J. Bell, DSc, RD,† Wendy Van Ausdal*

*Department of Obstetrics and Gynecology, Brigham and Women's Hospital, Faulkner Hospital, and Department of Obstetrics, Gynecology, and Reproductive Biology, Harvard Medical School, Boston, MA; †Twinlab, Grand Rapids, MI; ‡Twinlab, American Fork, UT

Children born to mothers eating more than 2 weekly servings of fish performed better on language and visual and motor tests at 3 years of age compared with children born to mothers who ate less than this amount.

ELSEVIER

Schizophrenia Research
Volume 193, March 2018, Pages 168-172

Predictors of longer-term outcome in the Vienna omega-3 high-risk study

Nilufar Mossaheb [a], Miriam R. Schäfer [c], Monika Schlögelhofer [b], Claudia M. Klier [d], Stefan Smesny [e], Patrick D. McGorry [c], Maximus Berger [f], G. Paul Amminger [c]

Abstract

Longer-term data on ω-3 polyunsaturated fatty acids (PUFA) for prevention of psychosis in (ultra high risk) UHR individuals have initially shown promising results.

This analysis aimed to assess clinical predictors of longer-term outcome in UHR individuals treated with ω-3 PUFAs versus placebo.

Data derived from an RCT in 81 UHR individuals treated with ω-3 PUFAs versus placebo for 12 weeks and follow-up assessment after a median of 6.7 years.

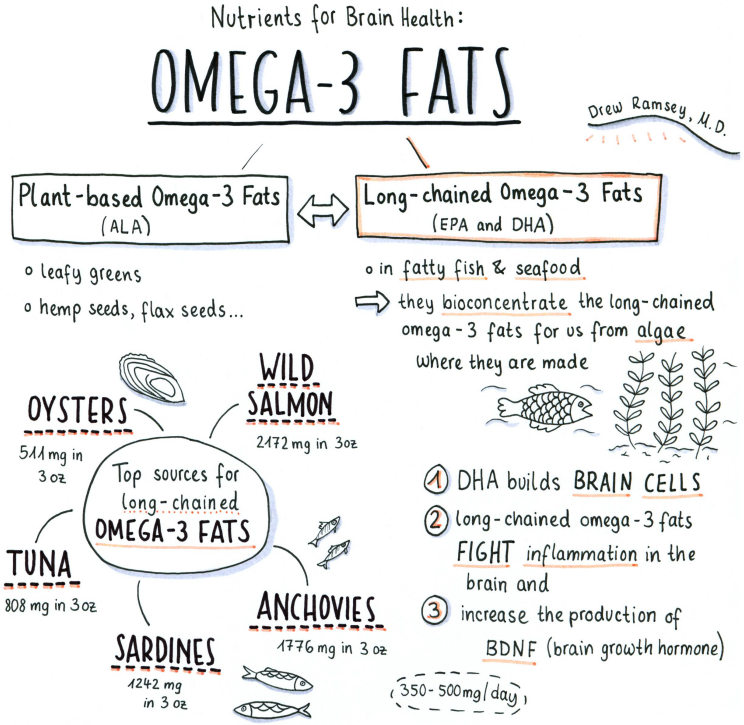
Baseline GAF, baseline PANSS global score, pre-to-post-intervention change in EPA (Eicosapentaenoic acid) level were significant predictors of transition to psychosis, PANSS negative score and baseline MADRS reached trend-levels. In the final multivariate Cox regression analysis change in EPA levels remained the only significant predictor.

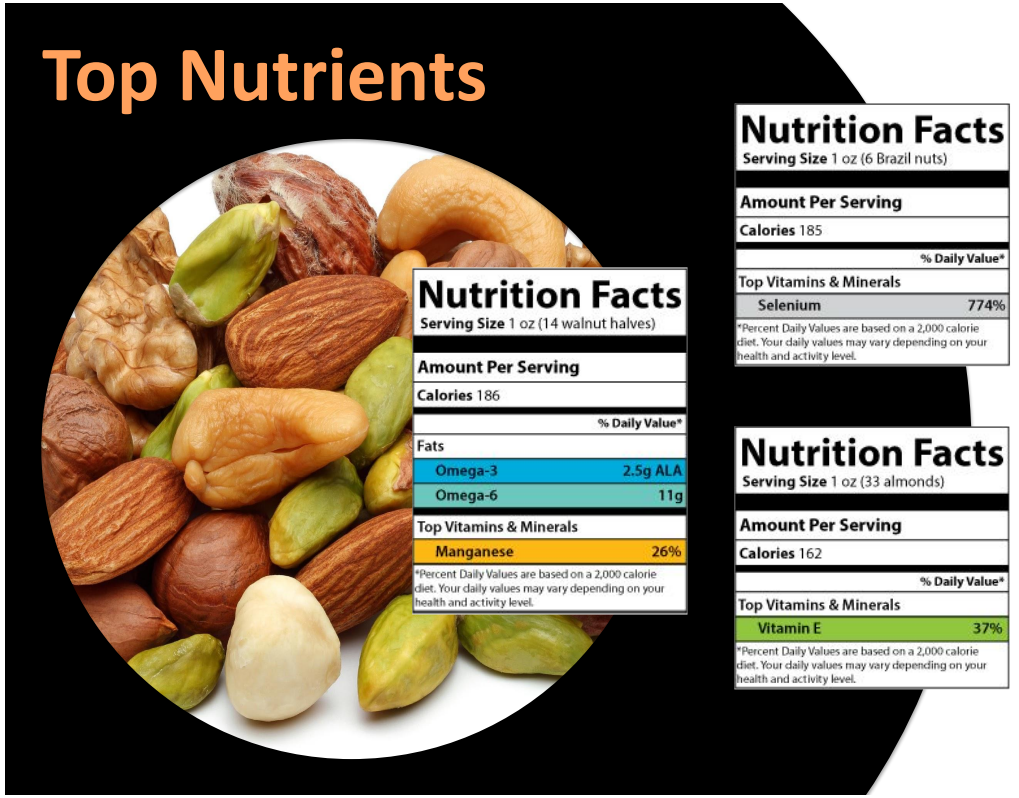
Taking into account all other significant predictors, changes in EPA levels were found to be the single most significant predictor for transition to psychosis in a longer term observation of UHR individuals.

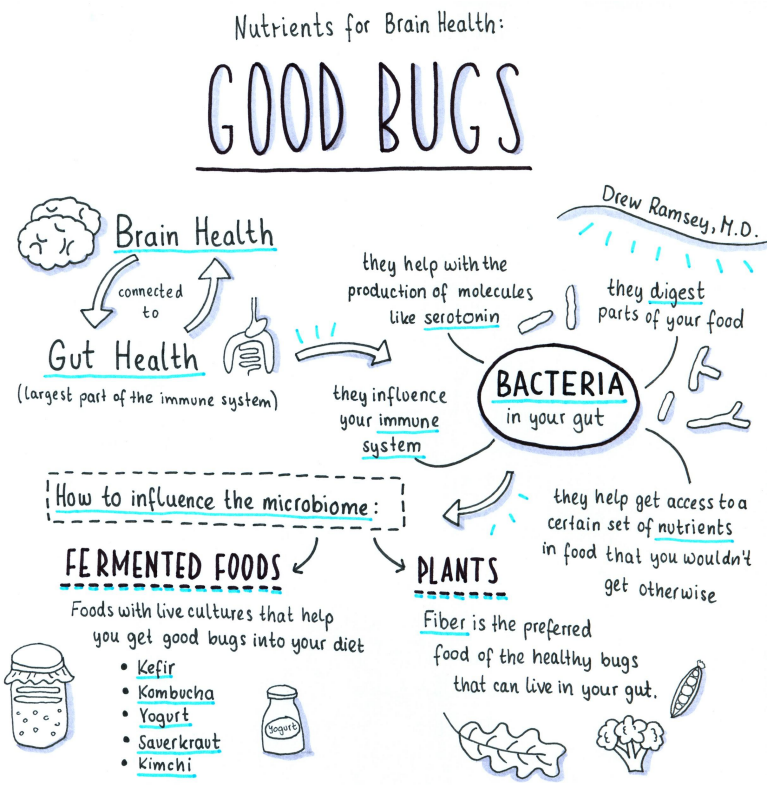
Fish and fat intake and prevalence of depressive symptoms during pregnancy

- 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

Miyake, Y. (2013). Fish and fat intake and prevalence of depressive symptoms during pregnancy in Japan: Baseline data from the Kyushu Okinawa Maternal and Child Health Study. Journal of Psychiatric Research, 572-578.

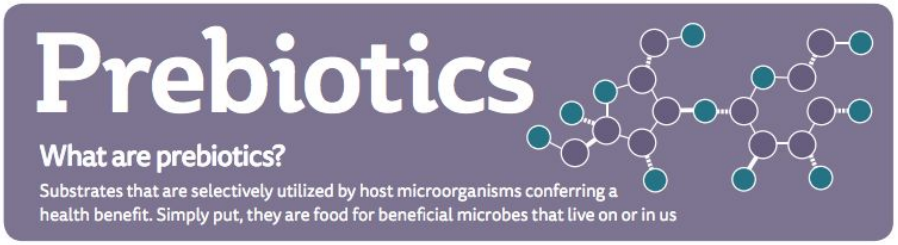


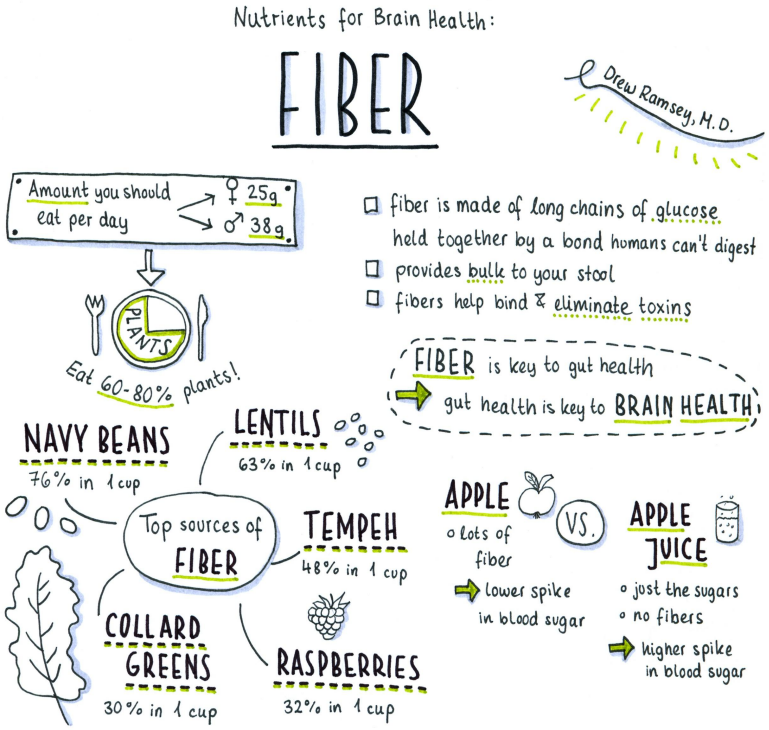




Probiotics

A substance which stimulates the growth of microorganisms, especially those with beneficial properties (such as those of the intestinal flora).





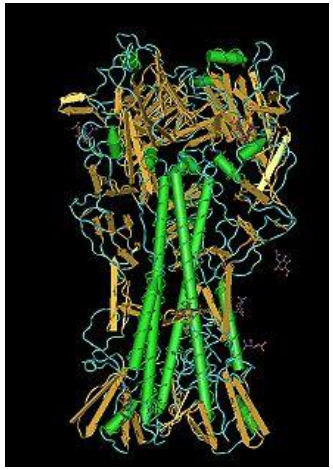
Antinutrients

Gluten
Lectin
Oxalates
Phytic Acid
Nightshades

Lectins

Proteins ubiquitous in plants
Bind to carbohydrates
Play role in immune system
Highest levels in legumes, tuber, grains, and nightshades
May be resistant enough to digestion especially when raw.
Can be useful to cook, soak or sprout.

Role in patients with autoimmune conditions?



Solanaceae The Nightshades

Many species are highly poisonous, including Atropa belladonna

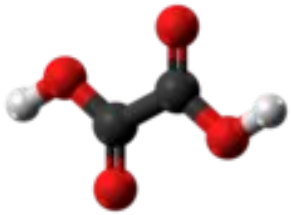
Solanine
May aggravate arthritis pain or inflammation?
Toxic in high doses

Common Edible nightshades: white potatoes, tomatoes, eggplant, bell peppers, cayenne pepper, paprika

Oxalates/ **Oxalic Acid**

Oxalic acid is organic compound
Common in plant as oxalates
Bind to cation mineral like calcium and prevent absorption
High intakes may contribute to calcium oxalate kidney stones(Hönow & Hesse, 2002; Ross et al., 1999).

WHY KALE WINS!



Volume 91, Issue 4 April 2004 , pp. 601-606

Cited by 23

Access

Fractional magnesium absorption is significantly lower in human subjects from a meal served with an oxalate-rich vegetable, spinach, as compared with a meal served with kale, a vegetable with a low oxalate content

Torsten Bohn [a1], Lena Davidsson [a1], Thomas Walczyk [a1] and Richard F. Hurrell [a1]

DOI: https://doi.org/10.1079/BJN20031081 Published online by Cambridge University Press: 09 March 2007

Abstract

The aim of the present study was to evaluate Mg absorption from a test meal served with an oxalate-rich vegetable, spinach, as compared with a test meal served with a vegetable with a low oxalate content, kale. Mg absorption was measured by a stable-isotope technique based on extrinsic labelling of the test meals and faecal monitoring of the excreted isotope labels. Nine healthy adults participated in the study. The test meals were based on 100g phytate-free white bread, served with 300g spinach (6·6mmol oxalate; 0·7mmol ^{25}Mg label added, 5·0mmol total Mg) or 300g kale (0·1mmol oxalate; 1·2mmol ^{26}Mg label added, 4·8mmol total Mg). The test meals were served on days 1 and 3, at breakfast and lunch, using a cross-over design. The results from the present study demonstrated that apparent Mg absorption was significantly lower from the meal served with spinach (26·7 (sd 10·4) %) than the meal served with kale (36·5 (sd 11·8) %) (P=0·01).

Phytic Acid

Protein found in plants especially seeds, nuts, beans, and grains.

Binds to the minerals such as calcium, copper, magnesium, iron and zinc. Decreases absorption in the gastrointestinal tract

High daily pulse consumption can result in anemia due to iron deficiency. (Tiwari & Singh, 2012)

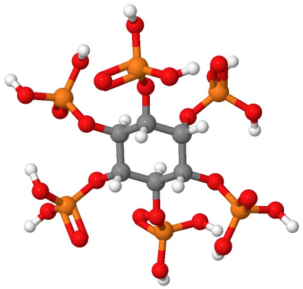
Other roles? Antioxidant?

Vegetarian and vegans minerals of concern

Soaking, sprouting,fermenting and cooking decreases

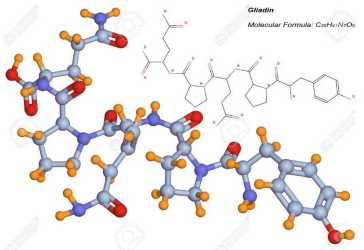
Diet Diversity!

Highest Phytic Acid Brainfoods: pumpkin seeds, almonds, wheat germ, beans, walnuts, soy, Brazil nuts



Gluten

Protein found primarily in wheat, barley, and rye.



.5-13% prevalence NCGS

Can contribute to the manifestation of chronic inflammation and autoimmune diseases by increasing intestinal permeability and initiating a pro-inflammatory immune response (de Punder, K and Pruimbroom, L, 2015)

Nutritional Psychiatry Demonstration Part 1

Food Categories

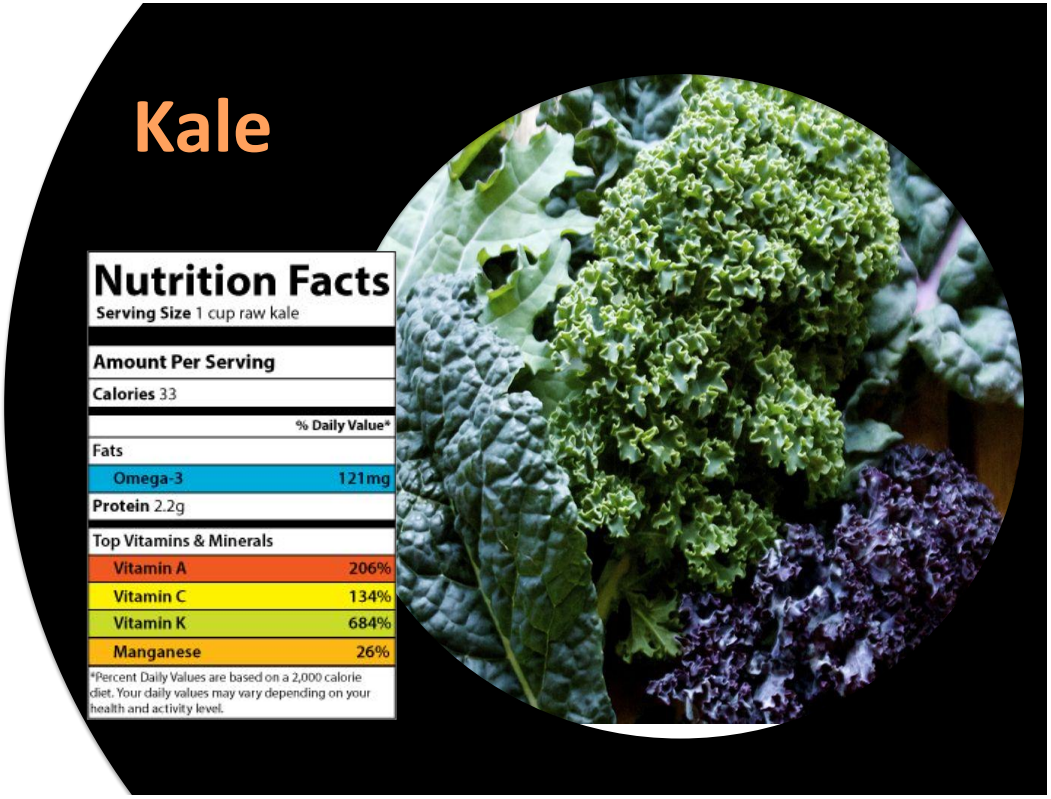
"*Seafood, greens, nuts, and beans...and a little dark chocolate.*"

Leafy Greens

- Folate "Folium"
- Fiber
- Vitamin K
- Vitamin C
- Calcium*
- Phytonutrients
- The Crucifers
- Nutrient Density

National Kale Day

Leafy Greens QUIZ!



World Journal of Psychiatry
Baishideng Publishing Group Inc

Antidepressant foods: An evidence-based nutrient profiling system for depression

Laura R LaChance and Drew Ramsey

Table 2

Antidepressant foods

Antidepressant animal foods	AFS range	Antidepressant plant foods	AFS range
Oyster	56%	Watercress	127%
Liver and organ meats (spleen, kidneys, or heart)	18%-38%	Spinach	97%
Poultry giblets	31%	Mustard, turnip, or beet greens	76%-93%
Clam	30%	Lettuces (red, green, romaine)	74%-99%
Mussels	28%	Swiss chard	90%
Octopus	27%	Fresh herbs (cilantro, basil, or parsley)	73%-75%
Crab	24%	Chicory greens	74%
Goat	23%	Pummelo	69%
Tuna	15%-21%	Peppers (bell, serrano, or jalapeno)	39%-56%
Smelt	20%	Kale or collards	48%-62%
Fish roe	19%	Pumpkin	46%
Bluefish	19%	Dandelion greens	43%

The Rule of Kale

BRAIN FOOD

Nutrient Density
Culinary Versatility
Local Availability

Concerns and Solutions

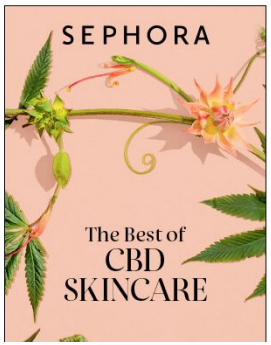
Gas/Too much fiber
Chewing
Cooking/raw
Oxalates
Organic or not

Kale and Thyroid Function

People Are Getting Seriously Sick From Eating Kale

Find out why this superfood is actually super-poisoning.

BY RHEANNA O'NEIL BELLOMO / JUL 16, 2015



The New York Times

The Opinion Pages

Opinionator

A GATHERING OF OPINION FROM AROUND THE WEB

PRIVATE LIVES

Kale? Juicing? Trouble Ahead

BY JENNIFER BERMAN JANUARY 1, 2014 11:16 PM 612

How much fiber do I need each day?

The American Heart Association = 25 to 30 grams a day from food, not supplements.

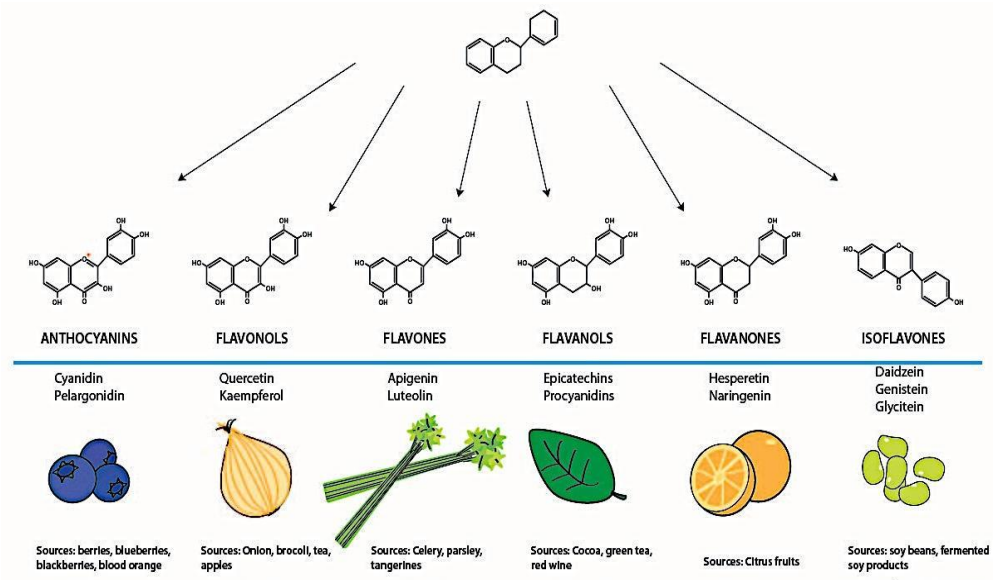
Currently, dietary fiber intakes among adults in the United States average about 15 grams a day.

Leafy Greens: Practical Advice

- Massage thicker greens (kale) before eating raw
- Experiment - many options, find ones you like
- Meal Prep: Sauté leafy greens in the beginning of the week and add to meals
- Add a handful of leafy greens to every meal (great with eggs for breakfast, in smoothies)
- The Pasta Trick
- Don’t overcook greens - Bright Green!
- Organic matters
- Pesto
- Beet Greens

RAINBOWS

The Flavonoids



Spencer JP. Beyond antioxidants: the cellular and molecular interactions of flavonoids and how these underpin their actions on the brain. Proc Nutr Soc. 2010 May;69(2):244-60.

DE GRUYTER Rev. Neurosci. 2015; 26(6): 699–719

Roodabeh Bahramsoltani, Mohammad Hosein Farzaei, Marzieh Sarbandi Farahani and Roja Rahimi*

Phytochemical constituents as future antidepressants: a comprehensive review

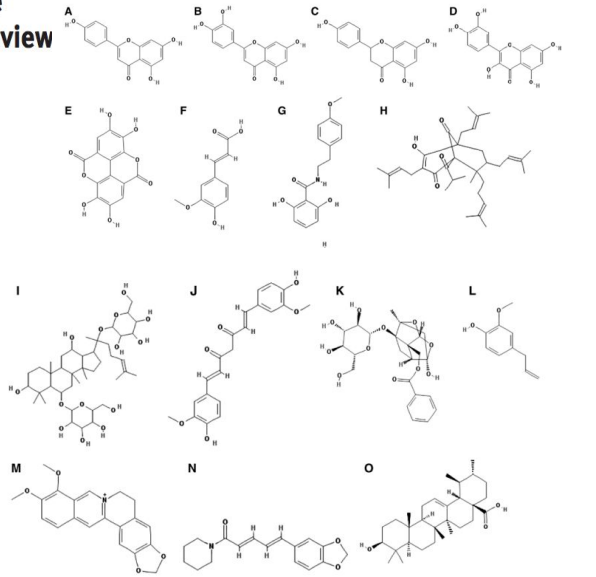


Figure 2: Chemical structure of some antidepressant molecules with plant origin. A: apigenin, B: luteolin, C: naringenin, D: quercetin, E: ellagic acid, F: ferulic acid, G: riparian III, H: hyperforin, I: ginsenoside Rg1, J: curcumin, K: paeoniflorin, L: eugenol, M: berberine, N: piperine, O: ursolic acid.

Photo by
Ellen Silverman

EWG'S 2019 DIRTY 12™

1. STRAWBERRIES
2. SPINACH
3. KALE
4. NECTARINES
5. APPLES
6. GRAPES
7. PEACHES
8. CHERRIES
9. PEARS
10. TOMATOES
11. CELERY
12. POTATOES

+ HOT PEPPERS

EWG'S 2019 CLEAN 15™

1. AVOCADOS
2. SWEET CORN
3. PINEAPPLES
4. SWEET PEAS FROZEN
5. ONIONS
6. PAPAYAS
7. EGGPLANTS
8. ASPARAGUS
9. KIWIS
10. CABBAGE
11. CAULIFLOWER
12. CANTALOUPES
13. BROCCOLI
14. MUSHROOMS
15. HONEYDEW MELONS

RAINBOWS

- Apples
- Blueberries
- Raspberries
- Citrus
- Avocados
- Chocolate

Spices and Herbs

- Turmeric
- Black Pepper
- Rosemary
- Spicy Peppers
- Garlic
- Cinnamon
- Ginger Root

Eat The Rainbow: Practical Advice

Shop in season for access to different colors

Rainbows = Variety

Fun to involve family

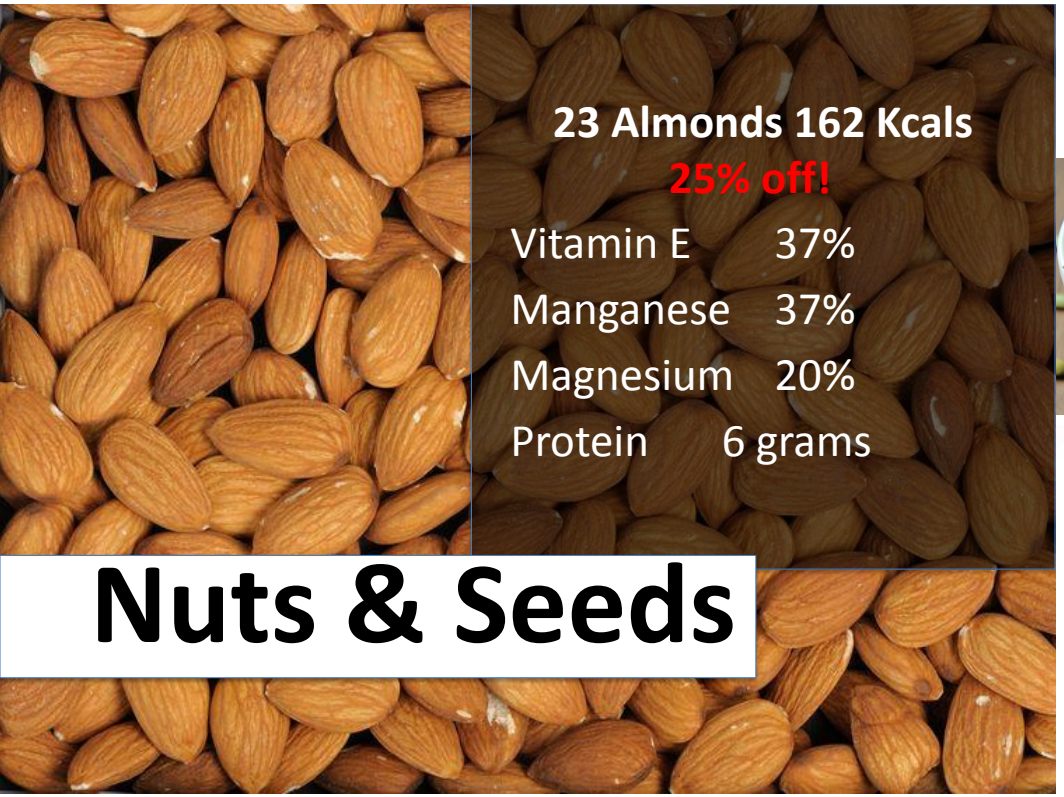
Can you eat 5 colors/day?

Vary cooking techniques: roast, saute, steam, raw

Where can you add an additional veggie to your meal? (i.e. add a pepper to your mire poix)

Like cabbage? Try purple, green or napa

Potatoes? Try blue, white or red



Nuts & Seeds

The Mystery of Nuts

- Walnuts
- Almonds
- Pecans
- Flax Seeds
- Chia Seeds
- Brazil Nuts
- Pumpkin Seeds
- Sesame Seeds

Nuts 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

	n	OR (95% CI)*	*P*
Control group	77	1 (ref.)	
MeDiet + VOO	91	1.02 (0.38–2.76)	0.97
MeDiet + Nuts	75	0.22 (0.05–0.90)	0.04

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).

Nuts and Seeds: Practical Advice

Raw vs roasted/salted

Great for snacks

Chocolate covered - great dessert

Add chopped nuts and seeds on top of dishes for texture

Add to breakfast yogurt, cereals or smoothies

Add to salads for more protein and crunch

Toast in a pan to bring out the flavors

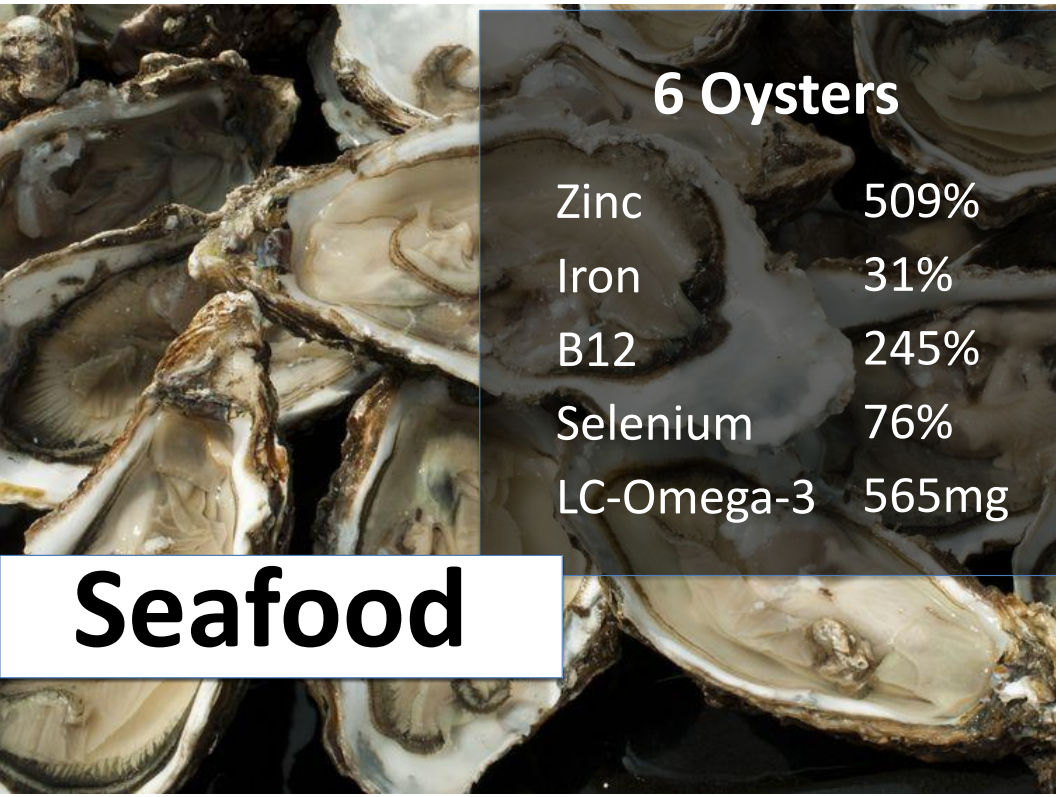
Make your own trail mix

Legumes and Pulses

- Protein
- Fiber
- Phytonutrient (Skin)
- Manganese
- Copper

- Small Reds
- Lentils
- Garbanzo Beans
- Black Beans
- Pinto Beans
- Navy Beans

Top Nutrients Lentils & Red Beans



Seafood

Legumes: Practical Advice

To save money, buy dry

Soak overnight for faster cooking time

Baking soda

Kombu

Quick cooking legumes

Add to diet slowly, can cause gas

Great in soups. Burritos anyone?

Diversity. Bean Rainbow

Easy add to salads/meals. Great for work.

Dips

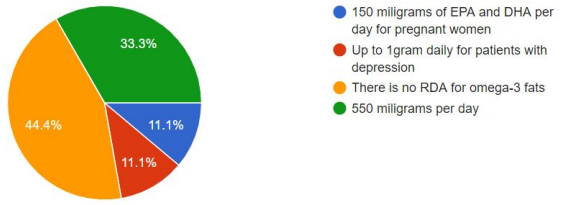
Photo by
Ellen Silverman

Seafood

- Omega-3 Fatty Acids
- B12
- Vitamin D
- Zinc
- Iodine
- Chromium

14. What is the Recommended Daily Allowance (RDA) of long-chained omega-3 fats?

9 responses



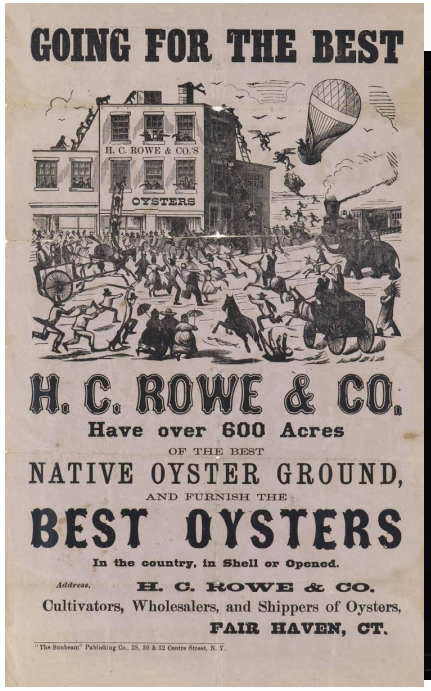
Top Nutrients Mussels

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.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Have over 600 Acres
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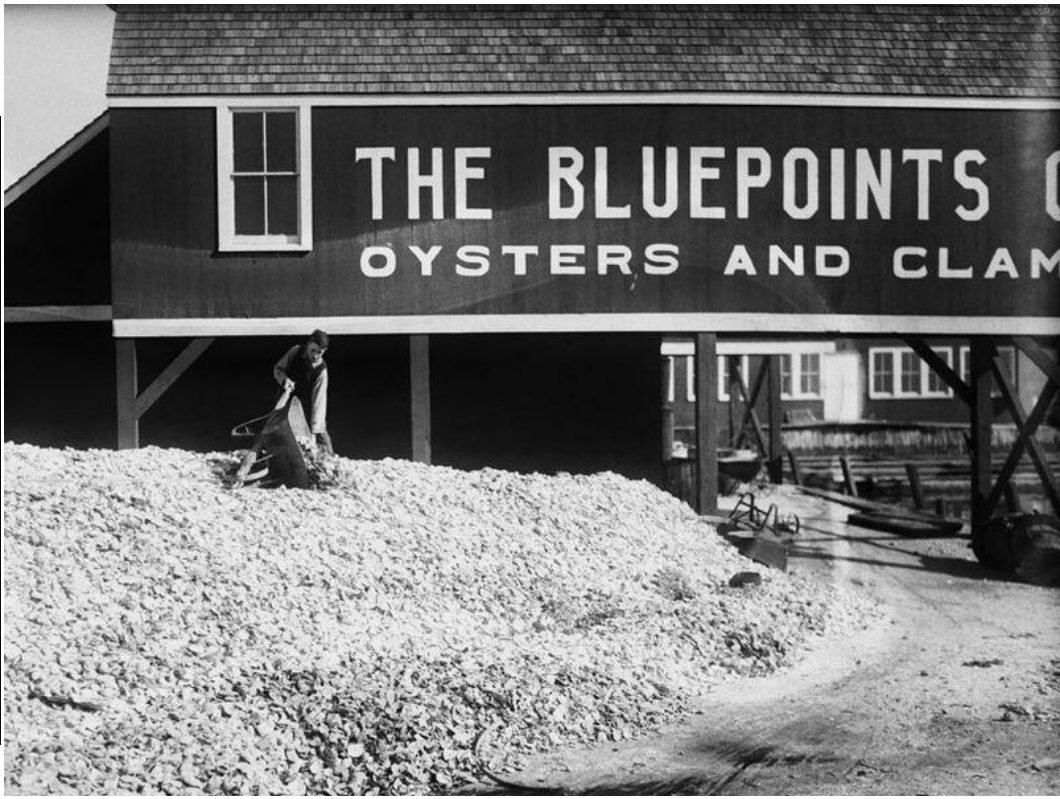
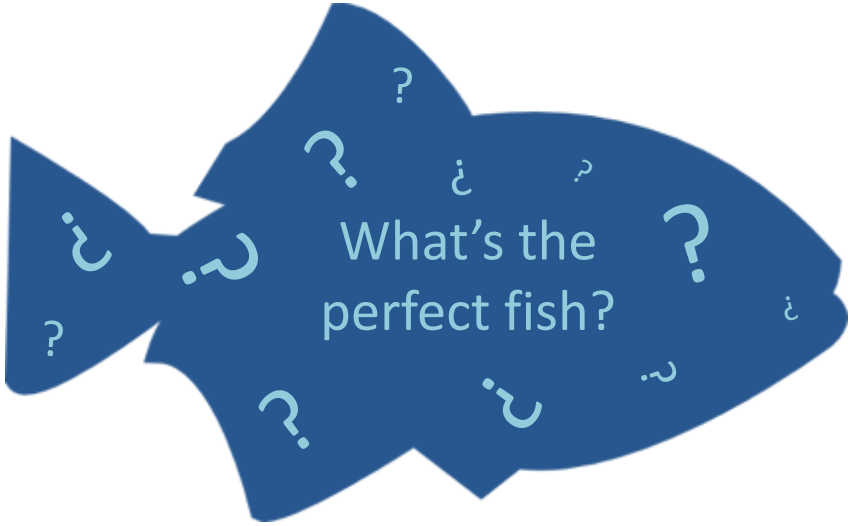
oyster is to its shell.
~ Plato
SEA FOOD
OYSTERS 1¢ EACH
AND CLAMS
23


THE BLUEPOINTS
OYSTERS AND CLAM



Fish: What Pregnant Women and Parents Should Know

Draft Updated Advice by FDA and EPA

June 2014

The FDA and the EPA are revising their joint fish consumption Advice and Questions & Answers to encourage pregnant women, those who may become pregnant, breastfeeding mothers, and young children to eat more fish and to eat a variety of fish from choices that are lower in mercury. This is a ***DRAFT*** *for which you may provide comment*. Once finalized, it will replace the current advice which was issued in 2004.

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.

High Omega-3/Low Mercury Fish

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

Farmed or Wild?

Source/Contamination

Sustainability

Nutrition

Monterey Bay Aquarium® Seafood Watch® | The Monterey Bay Aquarium Seafood Watch program creates science-based recommendations that help consumers and businesses make ocean-friendly seafood choices. Carry this pocket guide with you and share it with others to help spread the word.

BEST CHOICES	GOOD ALTERNATIVES	AVOID
Arctic Char (farmed)	Basa/Pangasius/Swai (farmed)	Caviar, Sturgeon* (imported wild)
Barramundi (US farmed)	Caviar, Sturgeon (US farmed)	Chilean Seabass/Toothfish*
Catfish (US farmed)	Clams (wild)	Cobia (imported farmed)
Clams (farmed)	Cod: Pacific (US trawled)	Cod: Atlantic and imported Pacific
Cobia (US farmed)	Crab: Blue*, King (US), Snow	Flounders, Halibut, Soles (Atlantic)
Cod: Pacific (US bottom longline)	Flounders, Soles (Pacific)	Groupers*
Crab: Dungeness, Stone	Herring: Atlantic	Lobster: Spiny (Brazil)
Halibut: Pacific (US)	Lobster: American/Maine	Mahi Mahi/Dolphinfish (imported)
Lobster: Spiny (US)	Mahi Mahi/Dolphinfish (US)	Marlin: Blue*, Striped*
Mussels (farmed)	Oysters (wild)	Monkfish
Oysters (farmed)	Pollock: Alaska	Orange Roughy*
Sablefish/Black Cod (Alaska or BC)	Sablefish/Black Cod (CA, OR and WA)	Salmon (farmed, including Atlantic)*
Salmon (Alaska wild)	Salmon (wild, WA* and north of Cape Falcon, OR)	Sharks* and Skates
Scallops (farmed off-bottom)	Scallops: Sea	Shrimp (imported)
Shrimp, Pink (OR)	Shrimp (US, Canada)	Snapper: Red
Striped Bass (farmed or wild*)	Squid	Swordfish (imported)*
Tilapia (US farmed)	Swordfish (US)*	Tilapia (Asia farmed)
Trout: Rainbow (US farmed)	Tilapia (Central & South America farmed)	Tuna: Albacore, Bigeye, Yellowfin (longline)*
Tuna: Albacore including canned white tuna (troll/pole, US and BC)	Tuna: Bigeye, Yellowfin (troll/pole)	Tuna: Bluefin* and Tongol
Tuna: Skipjack including canned light tuna (troll/pole)	Tuna: Canned white/Albacore (troll/pole except US and BC)	Tuna: Canned (except troll/pole)*

Support Ocean-Friendly Seafood

Best Choices are abundant, well-managed and caught or farmed in environmentally friendly ways.

Good Alternatives are an option, but there are concerns with how they're caught or farmed – or with the health of their habitat due to other human impacts.

Avoid for now as these items are overfished or caught or farmed in ways that harm other marine life or the environment.

Key
BC = British Columbia CA = California
OR = Oregon WA = Washington
* Limit consumption due to concerns about mercury or other contaminants.
Visit www.edf.org/seafoodhealth

Contaminant information provided by:
ENVIRONMENTAL DEFENSE FUND

Seafood may appear in more than one column

What to look for?

Packed in water or oil?

What kind of oil?

Sodium?

Seafood: Practical Advice

Fishmonger

Bivalves

The “no thank you” bite

Frozen

Ceviche, Sushi - raw fish/texture

> or = 2x per week

Start with mild seafoods

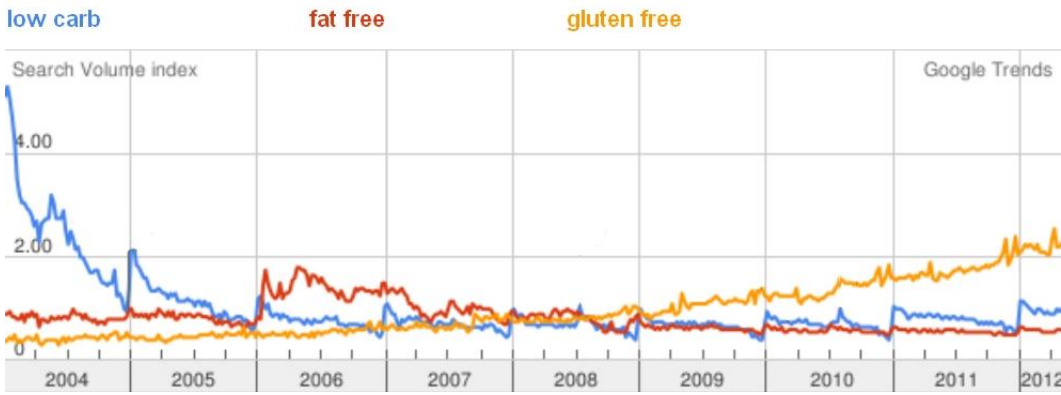
TACOS! Pasta Vongole (clams!). The Grill.

Use in dressings. All Kale Caesar (anchovy)

Be bold with sauces, herbs and spices

Kernels of Truth About Grains

- Rice
- Oats
- Barley
- Millet
- Quinoa



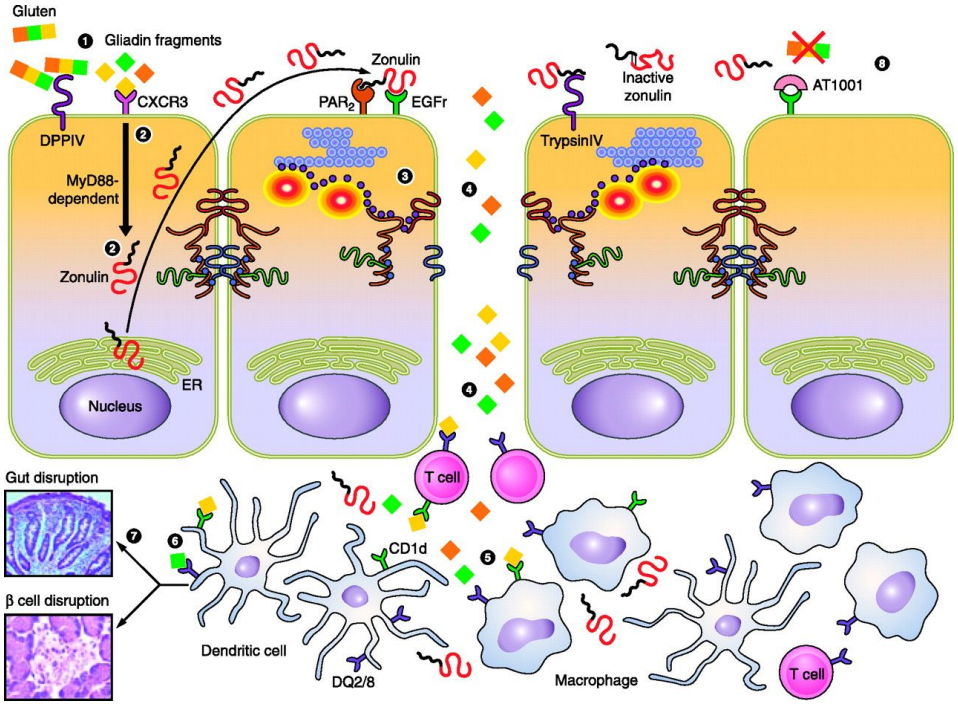
Facts on Gluten and Grain

- Celiac Disease 1.8% Adults — Auto-Immune Disorder
- Gluten sensitivity 0.63 - 6% — Innate Immune Reaction
- Wheat Allergy Rare 0.2% — IGE Mediated Food Allergy

- 2013 $10.5 billion USD
- 2018 $17 billion US is 50.3% of market
- 2025 $32.4 billion

- **3.17 Million people with Celiac, 2.6 million are undiagnosed!**

- CATIE: IGA antibodies to Gliadin 23% of patients vs 2.3% controls



Gluten Psychosis?

- 37 y/o F no previous or family psych hx increasingly paranoid and psychotic

Case Study: Delusional d/o

- Gluten-free diet in hospital for 3 months
- Psychosis remits from Aug 2013-Apr 2015
- Ate large amounts of gluten 3X in one week psychotic, hospitalized
- Remits spontaneously after 10 days gluten-free in hospital, no meds

Gluten Free Grains

- Amaranth
- Arrowroot
- Buckwheat
- Corn and cornmeal
- Gluten-free flours (rice, soy, corn, potato, bean)
- Hominy (corn)
- Millet
- Quinoa
- Rice
- Sorghum
- Tapioca

Grains: Practical Advice

Pasta method, rice cooker

Try combinations of different grains

Ancient grains

Add to salads, soups

Dress them up! Nuts, seeds, herbs, EVOO, lemon

Color em up - turmeric, saffron

Handout in your email

Whole Grains vs Processed

Sourdough

“Brain Food Delivery Vehicle”

Fermented Foods

Modulating Commensals

- Diet
- Fermented Foods
- Probiotics
- Prebiotics
- Antibiotics
- Fecal Transplant

ELSEVIER

Nutrition

Available online 28 September 2015

In Press, Corrected Proof — Note to users

Applied nutritional investigation

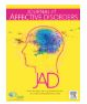
Clinical and metabolic response to probiotic administration in patients with major depressive disorder: A randomized, double-blind, placebo-controlled trial

Ghodarz Akkasheh, M.D.[a], Zahra Kashani-Poor, M.D.[a], Maryam Tajabadi-Ebrahimi, Ph.D.[b], Parvaneh

ELSEVIER

Journal of Affective Disorders

Volume 254, 1 July 2019, Page 144



Gut feeling: Systematic Review of Randomised Controlled Trials of Probiotics for the Treatment of Clinical Depression

Viktoriya Nikolova [1], Syed Yawar Zaidi [2], Allan H Young [1], James Stone [3]

3 studies, two administered probiotics as supplementary treatment to antidepressants (Kazemi et al. 2018; Akkasheh et al. 2016) and one as a standalone treatment (Romijn et al. 2017).

Both supplementation RCTs reported a significant improvement of depressive symptoms with probiotics compared to placebo after an 8-week treatment.

The standalone therapy study reported no significant difference in depressive scores between groups.

Brain, Behavior, and Immunity
Available online 7 April 2015
In Press, Corrected Proof — Note to users

A randomized controlled trial to test the effect of multispecies probiotics on cognitive reactivity to sad mood ☆

Laura Steenbergen[a, b], Roberta Sellaro[a, b], Saskia van Hemert[c], Jos A. Bosch[d], Lorenza S. Colzato[a, b]

Show more

doi:10.1016/j.bbi.2015.04.003

Open Access

Fermented Foods: Practical Advice

Start small, 1 tbs or ¼ cup of beverage per day.

Experiment: kimchii, sauerkraut, pickles

Make sure to choose live products (unpasteurized)

Take out with each meal - add to salads, eggs, cooked veggies, on top of stews, on sandwiches, as a snack

Make your own

Beverages

- Green Tea
- Coffee
- Milk
- Hot Chocolate

Beverages: Practical Advice

Water water water… water

Read labels, look at portions per serving

Avoid added sugar

Dilute sweeter drinks with water

Add fruit to your water for color and flavor

Tea

Sparkling beverages

Dairy

Lactose Intolerance or Dairy Allergy?

- 65% of population has a reduced ability to digest lactose after infancy.
- Lactose intolerance in adulthood most prevalent in people of East Asian descent > 90% of adults in some of these communities.
- Lactose intolerance lowest in populations with long history of dependence on unfermented milk products. About 5% of people of Northern European descent are lactose intolerant.
- Cow's milk allergy (CMA) affects 2% to 3% of young children

Is all dairy created equally?

-Harder to digest due to bigger fat globules

-Common allergies

-Common intolerance to high amount of lactose

-Least nutritious of the three

+Easier to digest because of small protein molecules

+Closest structure to human milk

+least amount of lactose

-Has an atypical musky, sweet and salty milk taste

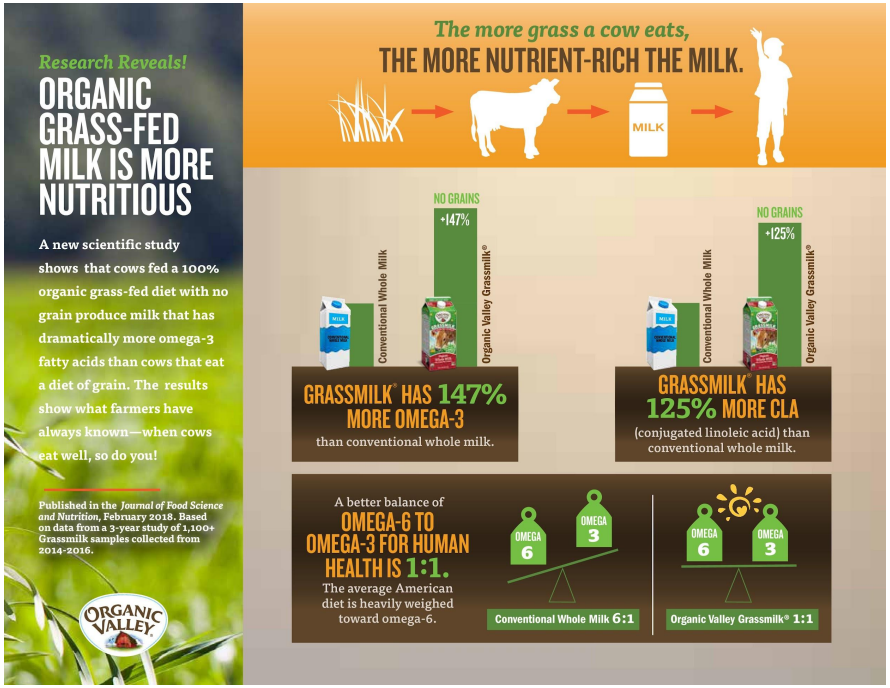
+Creamiest

+Cheap and efficient (sheep only eat grass)

+Easiest to digest because of small fat and protein molecules

+Less acidic than cow's milk

Grassmilk



Fermented Dairy

Yogurt

10-190 Billion CFU per cup (Dunlap 2009)

6-10 bacterial strains

Kefir

150-950 Billion CFU per cup per ConsumLab.com

12-20 bacterial strains

Sour Cream

Cheese

Lowfat Vanilla Yogurt

Nutrition Facts
Serving Size (150g)
Servings Per Container 1

Amount Per Serving	
Calories 130	Calories from Fat 20
	% Daily Value*
Total Fat 2g	3%
Saturated Fat 1.5g	8%
Trans Fat 0g	
Cholesterol 10mg	3%
Sodium 90mg	4%
Total Carbohydrate 22g	7%
Dietary Fiber 0g	0%
Sugars 22g	
Protein 7g	14%

*Percent Daily Values are based on a 2,000 calorie diet.

Whole Milk Vanilla Yogurt

Nutrition Facts
Serving Size (150g)
Servings Per Container 1

Amount Per Serving	
Calories 140	Calories from Fat 40
	% Daily Value*
Total Fat 4.5g	7%
Saturated Fat 3g	15%
Trans Fat 0g	
Cholesterol 15mg	5%
Sodium 70mg	3%
Total Carbohydrate 20g	7%
Dietary Fiber 0g	0%
Sugars 15g	
Protein 5g	10%

*Percent Daily Values are based on a 2,000 calorie diet.

Cheese

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Nutr J. 2016; 15: 35. PMCID: PMC4818854
Published online 2016 Apr 2. doi: 10.1186/s12937-016-0147-z PMID: 27039383

Effects of milk containing only A2 beta casein versus milk containing both A1 and A2 beta casein proteins on gastrointestinal physiology, symptoms of discomfort, and cognitive behavior of people with self-reported intolerance to traditional cows' milk

Sun Jianqin,[1] Xu Leiming,[2] Xia Lu,[3] Gregory W. Yelland,[4,5] Jiayi Ni,[6] and Andrew J. Clarke[7]

Consumption of milk containing A1 β-casein was associated with increased gastrointestinal inflammation, worsening of PD3 (post dairy digestive discomfort) delayed transit, and decreased cognitive processing speed and accuracy.

PD3: bloating, abdominal pain, flatulence, heavy stomach and stomach rumbling.

Dairy: Practical Advice

Most people don't need to eat more dairy

Beware of allergies and sensitivities

Organic and grass fed

Plain over sweetened

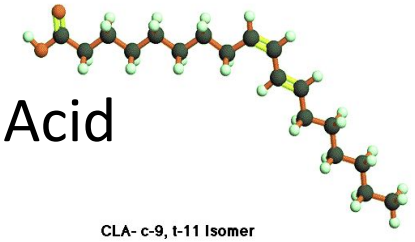
Full fat

Yogurt instead of cream to thicken sauces

Healthy breakfast option with berries, nuts and seeds

Yogurt with honey and fruit vs ice cream

Conjugated Linoleic Acid



CLA- c-9, t-11 Isomer

The American Journal of CLINICAL NUTRITION
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Am J Clin Nutr. 2010 Jul; 92(1): 34–40. PMCID: PMC2884320
Published online 2010 May 12. PMID: 20463040
doi: 10.3945/ajcn.2010.29524

Conjugated linoleic acid in adipose tissue and risk of myocardial infarction[1,2,3]

Liesbeth A Smit, Ana Baylin, and Hannia Campos

Family of 28 isomers of linoleic acid (Omega-6)
"body composition modulator" at high doses
Supplement used by body builders
Anti-carcinogenic properties?
Cows grazing pasture 500% increase CLA

Meat and Eggs

- Why talk about meat?
- 270.7 lbs eaten per year
- Heme-iron
  - 2 Billion People Deficient
- Protein
- Grass Fed
- Environmental effects and regenerative agriculture

Nutrition Facts	
Serving Size 2 eggs, pasture raised	
Amount Per Serving	
Calories 140	
	% Daily Value*
Fats	
Omega-3	(ask farmer)
Protein 12g	
Cholesterol	134%
Top Vitamins & Minerals	
Choline	69%
Iodine	36%
B2	40%
B12	46%

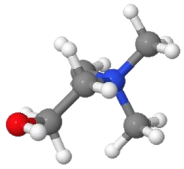
*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may vary depending on your health and activity level.

Eggs
Top Nutrients

CHOLINE

Function in the Brain:

1. Key to regulating learning, memory and anxiety
2. Plays a crucial role in child brain development
3. ATTENTION!



Link to Illness:

- Depression
- Anxiety disorders
- Alzheimer's disease

Recommended Intake:

- Ages 9-13 years require 375 mg
- Girls 14-18 years require 400 mg
- Boys 14-18 require 550 mg
- Vegetarians and vegans are at risk for deficiency

Top Food Sources:

- Eggs
- Wild salmon
- Grass-fed beef
- Chicken

THE INTERNATIONAL JOURNAL OF CLINICAL PRACTICE

Dietary cholesterol and the risk of cardiovascular disease in patients: a review of the Harvard Egg Study and other data

P. J. H. Jones

Research

Egg consumption and risk of coronary heart disease and stroke: dose-response meta-analysis of prospective cohort studies

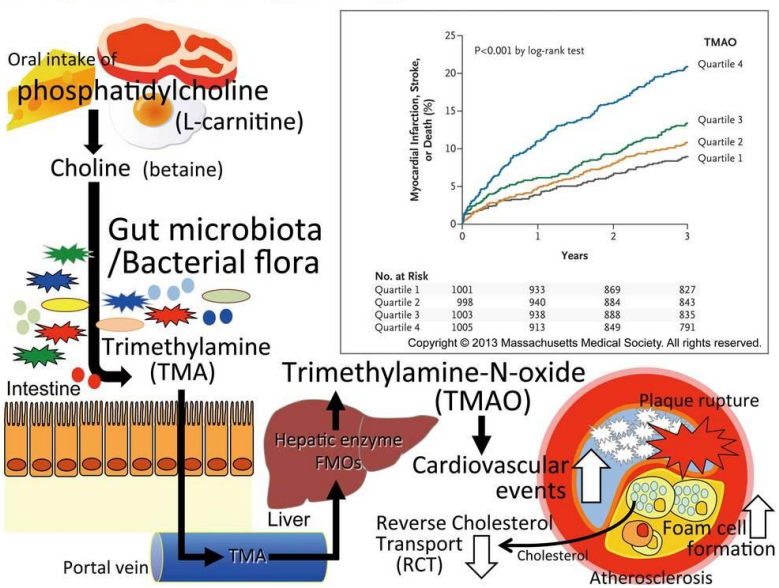
BMJ 2013 ; 346 doi: https://doi.org/10.1136/bmj.e8539 (Published 07 January 2013)

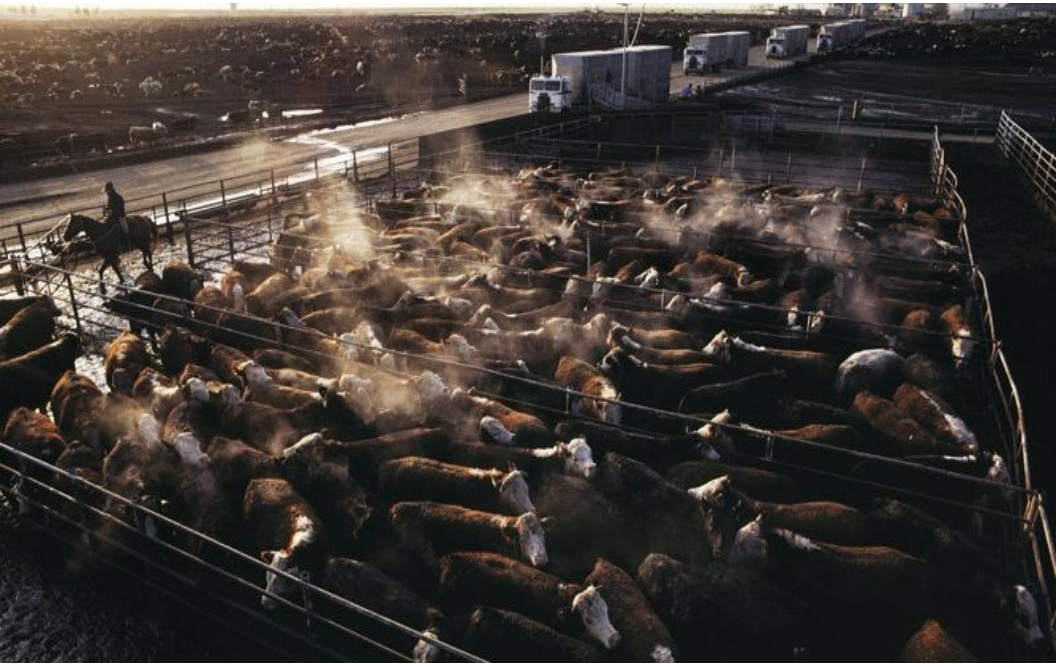
"Conclusions: *Higher consumption of eggs (up to one egg per day) is not associated with increased risk of coronary heart disease or stroke. The increased risk of coronary heart disease among diabetic patients and reduced risk of hemorrhagic stroke associated with higher egg consumption in subgroup analyses warrant further studies."*

nutrients MDPI

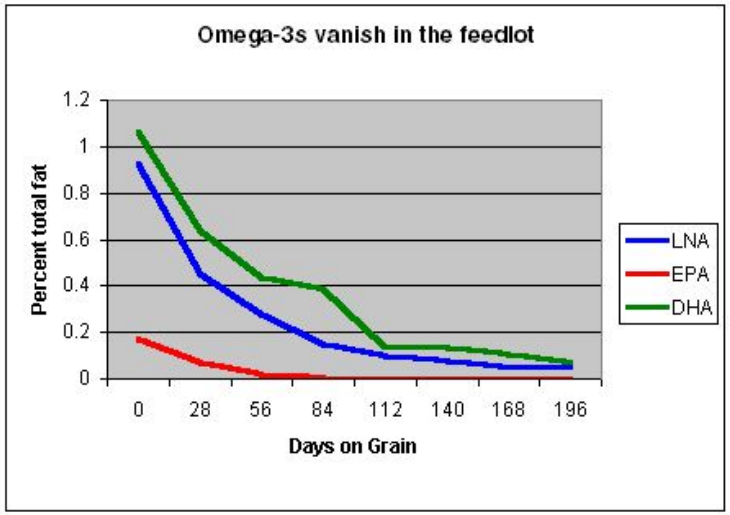
Nutrients. 2018 Oct; 10(10): 1398. PMCID: PMC6213249
Published online 2018 Oct 1. doi: 10.3390/nu10101398 PMID: 30275434

Implication of Trimethylamine N-Oxide (TMAO) in Disease: Potential Biomarker or New Therapeutic Target





Grain-fed Cows Lower In Omega-3 Count



Corn Fed vs. Grass Fed

A review of fatty acid profiles and antioxidant content in grass-fed and grain-fed beef

Cynthia A Daley, Amber Abbott, Patrick S Doyle, Glenn A Nader and Stephanie Larson

Nutrition Journal 2010 **9**:10
https://doi.org/10.1186/1475-2891-9-10
Received: 29 July 2009 | **Accepted:** 10 March 2010 | **Published:** 10 March 2010

Grassfed Beef

Lower in overall fats

Shift in fatty acid profile

- Less myristic (14:0) and palmitic (16:0)
  - Increased Stearic (18:0)
  - Increased LC-PUFA
  - Increased Vit A (pre)3x Vit E, glutathione
  - Increased CLA

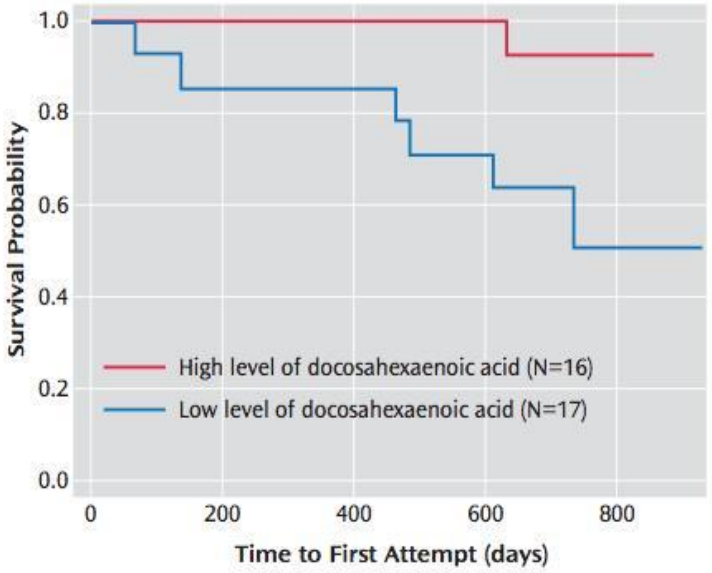
Vitamin E in Grassfed Beef

Table 4
Comparison of mean α-tocopherol vitamin content in fresh beef from grass-fed and grain-fed cattle.

	α-tocopherol	
Author, year, animal class	**Grass-fed (ug/g tissue)**	**Grain-fed (ug/g tissue)**
De la Fuente et al., 2009, Mixed cattle	4.07*	0.75*
Descalzo, et al., 2008, Crossbred steers	3.08*	1.50*
Insani et al., 2007, Crossbred steers	2.1*	0.8*
Descalzo, et al., 2005, Crosbred steers	4.6*	2.2*
Realini et al., 2004, Hereford steers	3.91*	2.92*
Yang et al., 2002, Crossbred steers	4.5*	1.8*

* Indicates a significant difference (at least $P < 0.05$) between feeding regimens was reported within each respective study.

FIGURE 1. Kaplan-Meier Survival Analysis of Suicide Attempt Outcome by Docosahexaenoic Acid Percentages of Total Phospholipid Fatty Acid Status Categorized by a Median Split of Percentage of Plasma Phospholipid Levels



Low DHA & Suicide

Sublette E. **(Am J Psychiatry 2006)**

Meet the New "Meat"

Fake Meat: Is It Food?

LIVESCIENCE NEWS TECH HEALTH PLANET EARTH

Live Science > Health

The Truth About Nitrite in Lunch Meat

By Luke Yoquinto, MyHealthNewsDaily Contributor | December 30, 2011 10:45am ET

Credit: Deli meat photo via Shutterstock

HOW TO AVOID ADDED NITRATES AND NITRITES IN YOUR FOOD

WEDNESDAY, JUNE 24, 2015

World Health Organization Says Processed Meat Causes Cancer

Oct 26, 2015

The International Agency for Research on Cancer (IARC) has classified processed meat as a carcinogen, something that causes cancer. And it has classified red meat as a probable carcinogen, something that probably causes cancer. IARC is the cancer agency of the World Health Organization.

Processed meat includes hot dogs, ham, bacon, sausage, and some deli meats. It refers to meat that has been treated in some way to preserve or flavor it. Processes include salting, curing, fermenting, and smoking. Red meat includes beef, pork, lamb, and goat.

PAUL J. RICHARDS/AGENCE FRANCE-PRESSE — GETTY IMAGES

Eat Less Red Meat, Scientists Said. Now Some Believe That Was Bad Advice.

The evidence is too weak to justify telling individuals to eat less beef and pork, according to new research. The findings "erode public trust," critics said.

Molecular Psychiatry
https://doi.org/10.1038/s41380-018-0105-6

ARTICLE

Nitrated meat products are associated with mania in humans and altered behavior and brain gene expression in rats

Seva G. Khambadkone[1,2] · Zachary A. Cordner[1] · Faith Dickerson[3] · Emily G. Severance[4] · Emese Prandovszky[4] · Mikhail Pletnikov[1] · Jianchun Xiao[4] · Ye Li[4] · Gretha J. Boersma[1,8] · C. Conover Talbot Jr.[5] · Wayne W. Campbell[6] · Christian S. Wright[6] · C. Evan Siple[7] · Timothy H. Moran[1,2] · Kellie L. Tamashiro[1,2] · Robert H. Yolken[4]

Received: 6 November 2017 / Revised: 31 March 2018 / Accepted: 1 May 2018

A history of eating nitrated dry cured meat but not other meat or fish products was strongly associated with current mania (adjusted odds ratio 3.49, 95% confidence interval (CI) 2.24–5.45, $p < 8.97 \times 10-8$).

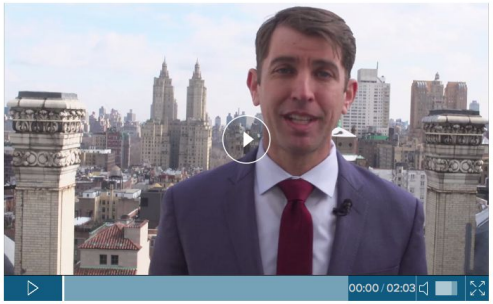
Lower odds of association were found between eating nitrated dry cured meat and other psychiatric disorders.

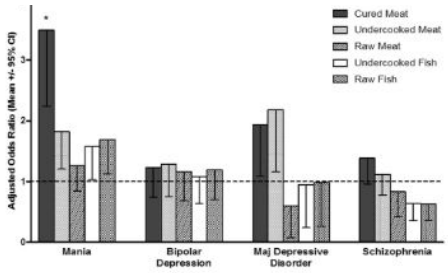
Feeding of meat preparations with added nitrate to rats resulted in hyperactivity reminiscent of human mania, alterations in brain pathways that have been implicated in human bipolar disorder, and ***changes in intestinal microbiota.***

COMMENTARY

Does Consuming Bacon Increase Mania Risk?

Drew Ramsey, MD
DISCLOSURES | April 09, 2019





Meat And Eggs: Practical Advice

Avoid Processed Meats
Go grassfed and local
Move beyond steaks, burgers and chicken
Meat shares
Meat as a flavor, not as the focus of the meal
Meat snacks - read ingredients
Hard-boiled eggs, egg salad, frittata
Harvard Egg Study

Nutritional Psychiatry Demonstration Part 2: BrainFoodRx

Day 3 Overview

The Therapeutic Relationship
Dietary Trends
Mental Health Assessment
Nutritional Psychiatry Assessment
Practice Session
Summary of Nutritional Psychiatry Interventions

The Therapeutic Relationship

- Alliance building
- Frame
- Transference and Countertransference
- Psychoeducation
- Harm Reduction
- Motivational Interviewing and Stages of Change
- Creativity
- Stigma
- Culture
- Goals

Alliance building

How do we build alliance?

Engagement

Judgement free zone

Better treatment outcomes
Report higher satisfaction
More likely to bring up challenges
Higher retention rate

Frame

- Sets the therapeutic relationship apart from other relationships
- Structure, Rules and Expectations
- Allows comfort and disclosure

Transference and Countertransference

- Transference occurs when a client projects feelings about someone else onto their therapist.
- Countertransference occurs when a practitioner projects his or her feelings unconsciously onto the client.
- Countertransference can be helpful or problematic.

Psychoeducation

- Important component of nutritional psychiatry
- The process of providing education and information to patients/clients.
- Basics of nutrition, cooking, food selection
- Improves outcomes and enhances buy-in
- Do not assume what patients know

Harm reduction

- Taken from drug treatment
- Emphasis on non-judgement and non-coercive treatment
- Goal is to reduce risky or harmful behavior - does not require cessation of use
- Meet patients where they are
- Encouraging agency

"I eat like a 12 year old boy. Plus Pina Colados."

- 32 yr old single woman, executive assistant with long history of anxiety, depression, and ADD
- Lexapro 20mg, WellbutrinXL 300mg, Adderall XR 10mg, Ativan 1mg qhs prn
- "I'm nervous a lot, especially at night. I smoke and watch netflixs and order in. That helps."
- *"I'm lazy. I dunno. Cereal or a shake, sandwich and chips, pizza or burger or mac-n-cheese. Plus Pina Colodas."*

Stages of Change

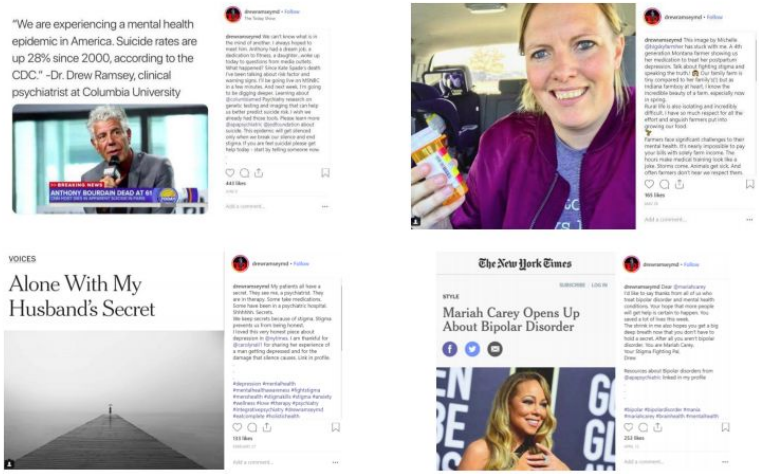
Motivational Interviewing Strategies and Techniques: Rationales and Examples

ASKING PERMISSION **Rationale:** Communicates respect for clients. Clients are more likely to discuss changing when asked, than when being lectured or told to change. • *Do you mind if we talk about …?* • *Can we talk a bit about your …?* • *Would you feel comfortable talking about…?*	**OPEN-ENDED QUESTIONS** **Rationale**: Allows for a richer, deeper conversation that flows and builds empathy. • *Tell me what you like about your …* • *What makes you think it might be time for a change?* • *What happens when you behave that way?* • *Tell me more about when this first began….*
ELICITING/EVOKING "CHANGE TALK" **Rationale:** "Change talk" tends to be associated with successful outcomes. This strategy elicits reasons for changing from clients by having them give voice to the need or reasons for changing. • *What makes you think you need to change?* • *What would you like to see different about your current situation?* • *What will happen if you don't change?* • *What would be the good things about changing your …?* Change talk for clients having difficulty changing: • *How can I help you get past some of the difficulties you are experiencing?* • *If you were to decide to change, what would you have to do to make this happen?* Change talk by looking forward • *If you make changes, how would your life be different from what it is today?* • *How would you like things to turn out for you in 6 months?*	**REFLECTIVE LISTENING** **Rationale:** Way of responding to clients that involves listening carefully and making a reasonable guess about what they are saying. This gets clients to state the arguments for change rather than trying to persuade them that they need to change. • *It sounds like…* • *What I hear you saying …* • *It seems as if…* • *I get the sense that…* Reflective listening (specific) • *It sounds like you recently became concerned about your …* • *I get a sense that you are wanting to change, and you have concerns about …* • *What I hear you saying is that your … is not really much of a problem right now. What do you think it might take for you to change in the future?* • *I get the feeling there is a lot of pressure on you to change, and you are not sure you can do it because of difficulties you had when you tried in the past.*
READINESS TO CHANGE RULER **Rationale:** Assessing readiness to change is a critical aspect of MI. Ask clients to give voice to how ready they are to change using a 10-point scale ruler where 1 = definitely not ready to change and 10 = definitely ready to change. Knowing a client's level of motivation for change can guide the direction of the conversation. The Readiness to Change Ruler can also be used to have clients give voice to how they changed, what they need to change further, and how they feel about changing. • *On the following scale from 1 to 10, where 1 is definitely not ready to change and 10 is definitely ready to change, what number best reflects how ready you are at the present time to change …?*	**EXPLORING IMPORTANCE AND CONFIDENCE** **Rationale:** Clients view the importance of changing and the extent to which they feel change is possible (e.g., Readiness to Change Ruler) so they give voice to what they would need to do to change. • *What do you think you might do to increase the importance/confidence about changing your …?* • *What would need to happen for your importance/confidence score to move from a (insert #) to a (insert higher #)?* • *What would it take to move from a (insert #) to a (insert higher #)?*
SUMMARIES **Rationale:** Used judiciously to relate or link what clients have already expressed, especially in terms of reflecting ambivalence, and to move them on to another topic or have them expand the current discussion further. • *Over the past three months you have been talking about stopping …, and it seems that just recently you have started to recognize that less good things are outweighing the good things. That, coupled with… (e.g. relationship breakup due to substance use) …. makes it easy to understand why you are now committed to not using….anymore.*	**STATEMENTS SUPPORTING SELF-EFFICACY** **Rationale:** Objective is to increase clients' self-confidence that they can change. • *It seems you've been working hard to quit …. That is different than before. How have you been able to do that?* • *So even though you have not been (substance- free) every day this past week, you have managed to cut your use down significantly. How were you able to do that?* After asking about changes clients have made, it is important to follow-up with a question about how clients feel about the changes they made. • *How do you feel about the changes you made?*

Creativity

- What does creativity mean for you in the clinical space?
- Trust associations
- Be open to the process
- Be curious
- Multi-determined
- Not necessarily a right answer

Non-Stigmatizing



Understanding Cultural Differences

USA

Turkey

Kuwait

Mexico

Free Yourself From Dietary Tribes

Nutritional Psychiatry Clinician Goals

- Increase knowledge, skill, confidence and self-efficacy
- Gradual and culturally appropriate change
- Dietary Pattern, not perfection
- Work with what they have/meet them where they are

Mental Health Assessment

Mental Status Exam

Client Name				**Date**		
OBSERVATIONS						
Appearance	□ Neat	□ Disheveled	□ Inappropriate	□ Bizarre	□ Other	
Speech	□ Normal	□ Tangential	□ Pressured	□ Impoverished	□ Other	
Eye Contact	□ Normal	□ Intense	□ Avoidant	□ Other		
Motor Activity	□ Normal	□ Restless	□ Tics	□ Slowed	□ Other	
Affect	□ Full	□ Constricted	□ Flat	□ Labile	□ Other	
Comments:						
MOOD						
□ Euthymic	□ Anxious	□ Angry	□ Depressed	□ Euphoric	□ Irritable	□ Other
Comments:						
COGNITION						
Orientation Impairment	□ None	□ Place	□ Object	□ Person	□ Time	
Memory Impairment	□ None	□ Short-Term	□ Long-Term	□ Other		
Attention	□ Normal	□ Distracted	□ Other			
Comments:						
PERCEPTION						
Hallucinations	□ None	□ Auditory	□ Visual	□ Other		
Other	□ None	□ Derealization	□ Depersonalization			
Comments:						
THOUGHTS						
Suicidality	□ None	□ Ideation	□ Plan	□ Intent	□ Self-Harm	
Homicidality	□ None	□ Aggressive	□ Intent	□ Plan		
Delusions	□ None	□ Grandiose	□ Paranoid	□ Religious	□ Other	
Comments:						
BEHAVIOR						
□ Cooperative	□ Guarded	□ Hyperactive	□ Agitated	□ Paranoid		
□ Stereotyped	□ Aggressive	□ Bizarre	□ Withdrawn	□ Other		
Comments:						
INSIGHT	□ Good	□ Fair	□ Poor	Comments:		
JUDGMENT	□ Good	□ Fair	□ Poor	Comments:		

Basic Labs and Blood Work

B12/MMA
Homocysteine
CRP and inflammatory markers
Iron and Ferritin
Folate
Thyroid panel
Vitamin D
Celiac?

A mood by any other name

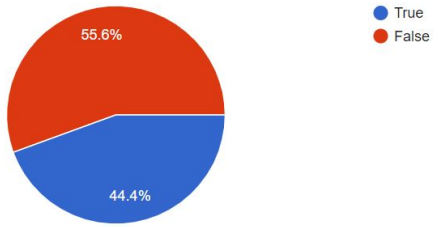
Suicide and Safety

Screening for Eating Disorders

- Anorexia
- Bulimia
- Binge Eating Disorder
- Orthorexia

9. Nutritional Psychiatry should not be the primary treatment for patients diagnosed with an eating disorder.

9 responses



Anorexia

- Persistent restriction of energy intake leading to significantly low body weight
- Either an intense fear of gaining weight or of becoming fat, or persistent behaviour that interferes with weight gain
- Disturbance in the way one's body weight or shape is experienced, undue influence of body shape and weight on self-evaluation, or persistent lack of recognition of the seriousness of the current low body weight.

Bulimia

- Recurrent episodes of binge eating. An episode of binge eating is characterised by both of the following:
  - Eating, in a discrete period of time (e.g. within any 2-hour period), an amount of food that is definitely larger than most people would eat during a similar period of time and under similar circumstances.
  - A sense of lack of control over eating during the episode.
- Recurrent inappropriate compensatory behaviour in order to prevent weight gain, such as self-induced vomiting, misuse of laxatives, diuretics, or other medications, fasting, or excessive exercise.
- The binge eating and inappropriate compensatory behaviours both occur, on average, at least once a week for three months.
- Self-evaluation is unduly influenced by body shape and weight.
- The disturbance does not occur exclusively during episodes of Anorexia Nervosa.

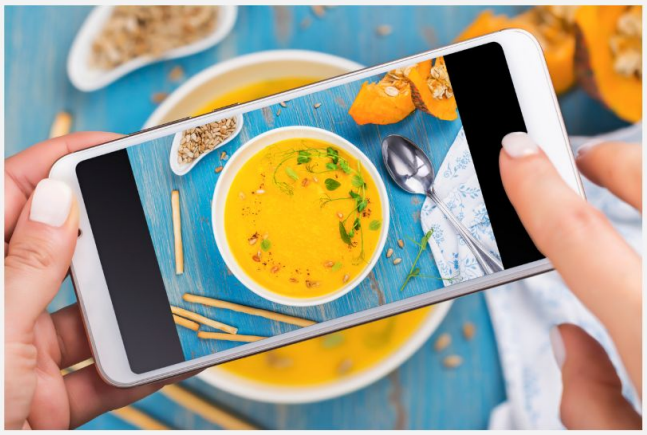
Binge Eating Disorder

- Recurrent episodes of binge eating.
- The binge eating episodes are associated with three or more of the following:
  - eating much more rapidly than normal
  - eating until feeling uncomfortably full
  - eating large amounts of food when not feeling physically hungry
  - eating alone because of feeling embarrassed by how much one is eating
  - feeling disgusted with oneself, depressed or very guilty afterward
- Marked distress regarding binge eating is present
- Binge eating occurs, on average, at least once a week for three months
- Binge eating not associated with the recurrent use of inappropriate compensatory behaviours as in Bulimia Nervosa and does not occur exclusively during the course of Bulimia Nervosa, or Anorexia Nervosa methods to compensate for overeating, such as self-induced vomiting.

NUTRITION

Orthorexia: Eating Clean, but Crumbling on the Inside

Celebrities like Tom Brady and Instagram "health gurus" may be contributing to the rise of what's known as the clean eating disorder



Self-proclaimed nutrition coaches, including celebrity book authors like Tom Brady as well as social media food bloggers, stand to make a profit by stoking body anxiety in their followers, say BU researchers, and may be contributing to a rise in orthorexia. Oftentimes, these "coaches" dole advice about what people should eat but lack an actual education in nutrition science. Credit: iStock/happy_lark