

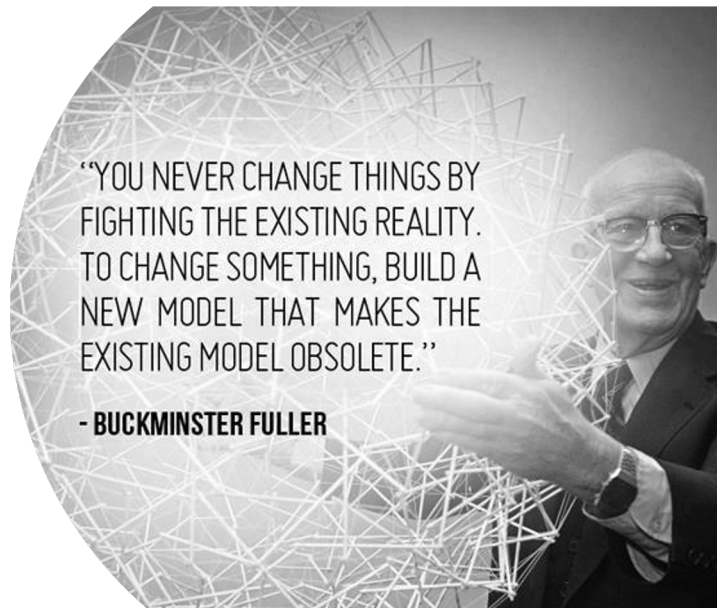
An Integrative Health Approach to Mind and Mood

March 12, 2021

Mark C. Pettus MD
Director Population Health and Community Care
Berkshire Health Systems
Associate professor of Medicine
University of Massachusetts Medical School



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Disclosures



- Chief Innovation Officer Novolux lighting technologies
- Medical Director Preventia Technologies
- Consultant Functional Formularies
- Faculty of The Center for Mind-Body Medicine
- The Health Edge Podcast
- No conflicts to report or off-label use to be discussed



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Learning Objectives

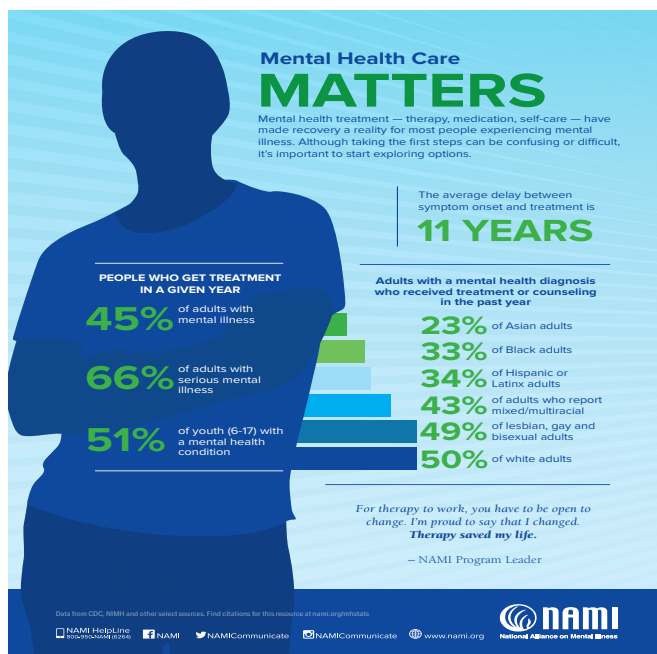
- Review the role lifestyle and environment play as drivers of mind and mood health.
- Examine the core metabolic disruptors of mind and mood with an emphasis on inflammation-insulin resistance, circadian entrainment and gut ecology.
- Provide specific lifestyle strategies that can create greater mind and mood resiliency.



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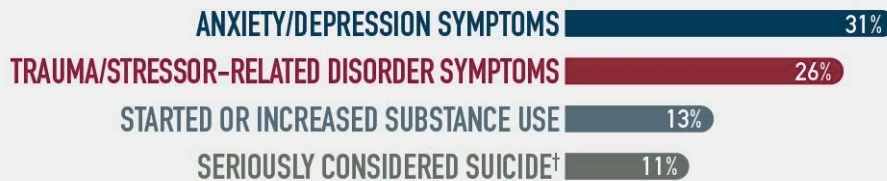
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Figure. Mental Health Symptoms During COVID

During late June, 40% of US adults reported struggling with mental health or substance use*



*Based on a survey of US adults aged ≥18 years during June 24-30, 2020

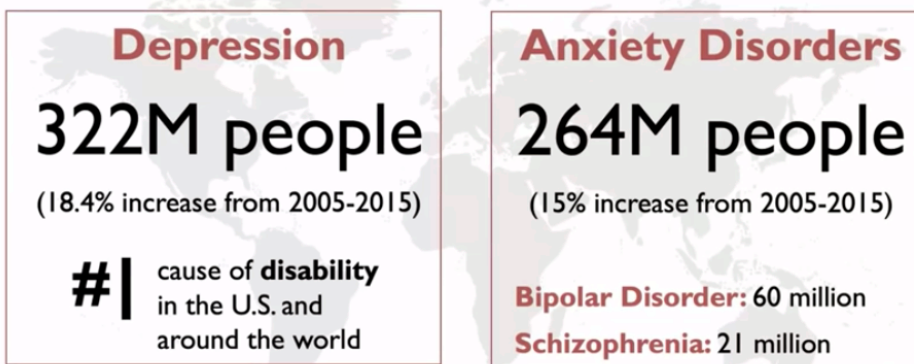
†In the 30 days prior to survey

SOURCE: CDC.gov



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Global Mental Health Decline

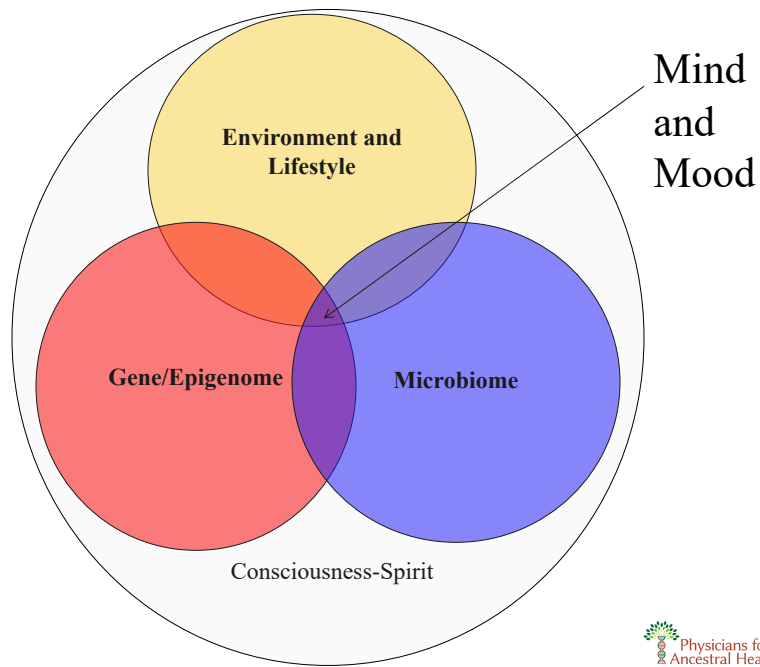


Global population: 7.6 billion; US population: 326 million

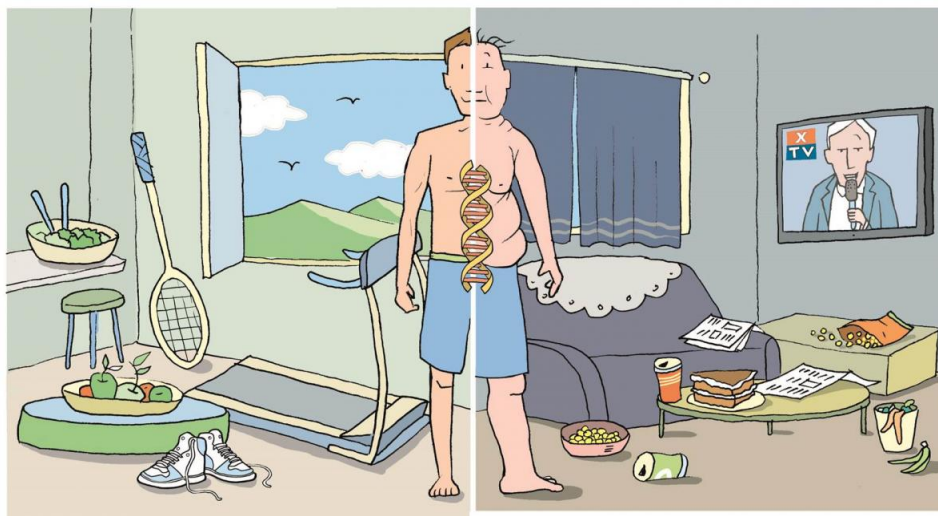
World Health Organization. Depression fact sheet. Updated February 2017.; Depression and other common mental disorders: global health estimates. Geneva:WHO; 2017.



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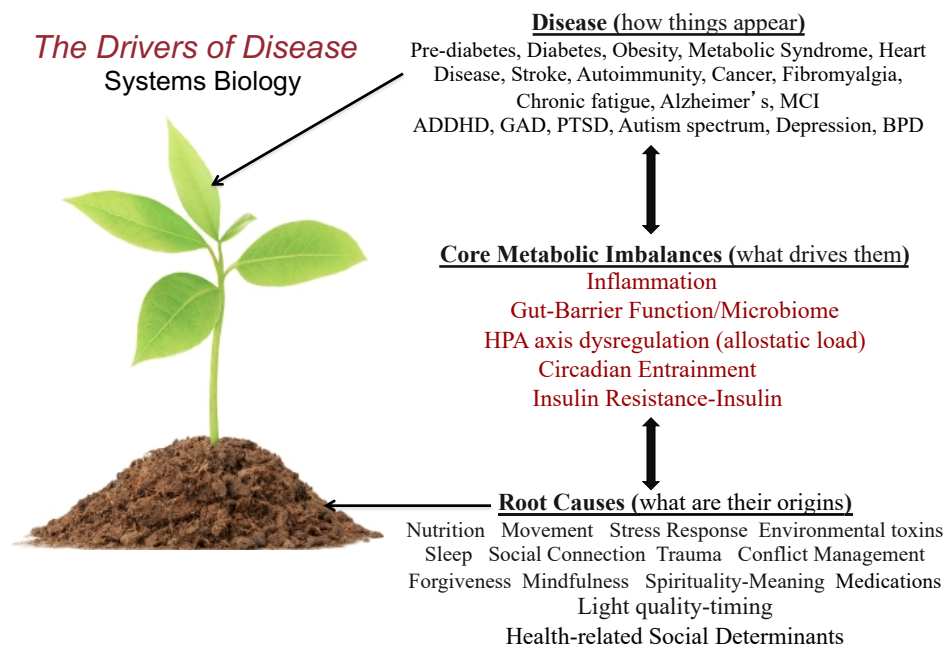
Epigenetics: A life with many possibilities.



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Health as a byproduct of gene-environmental compatibility:

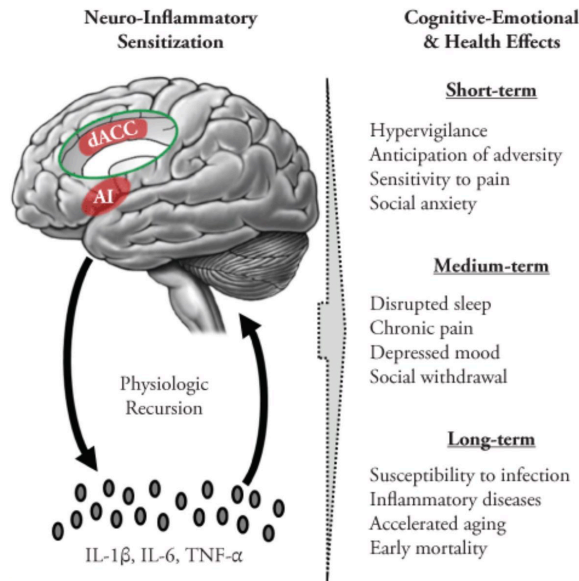
Ancestral fine-tuning meets modern life!



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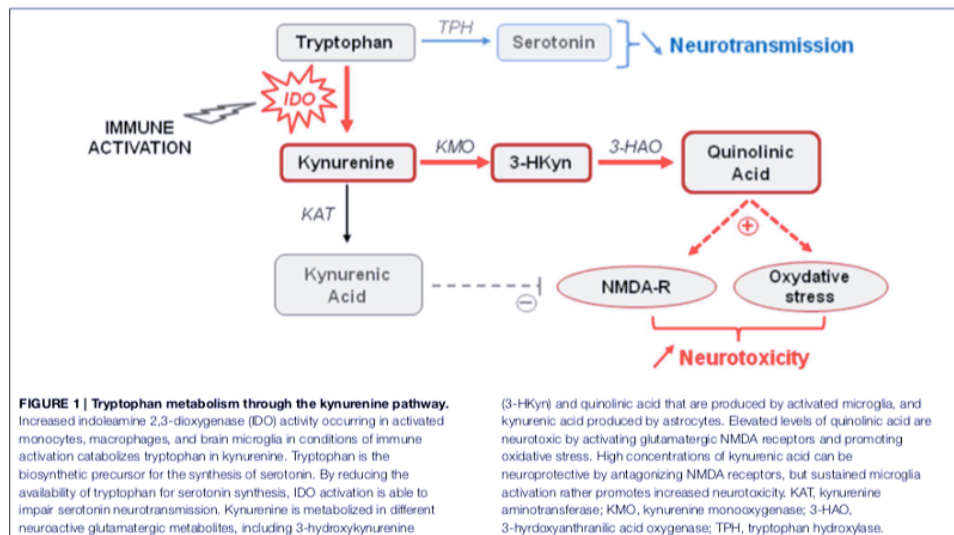
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George M. Slavich The Oxford Handbook of Stress and Mental Health Edited by Kate Harkness and Elizabeth P. Hayden 2019



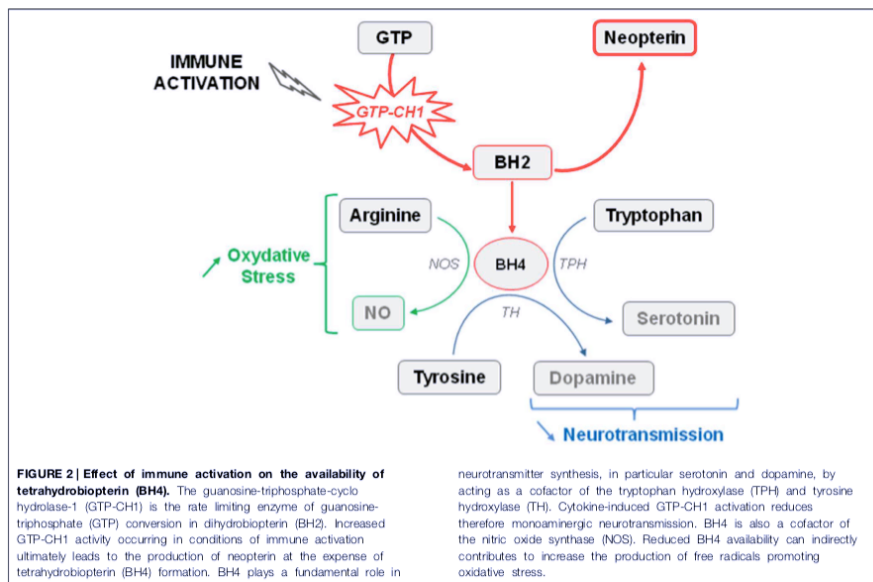
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Castenon et al. *Frontiers in Neuroscience* July 2015 Vol 9



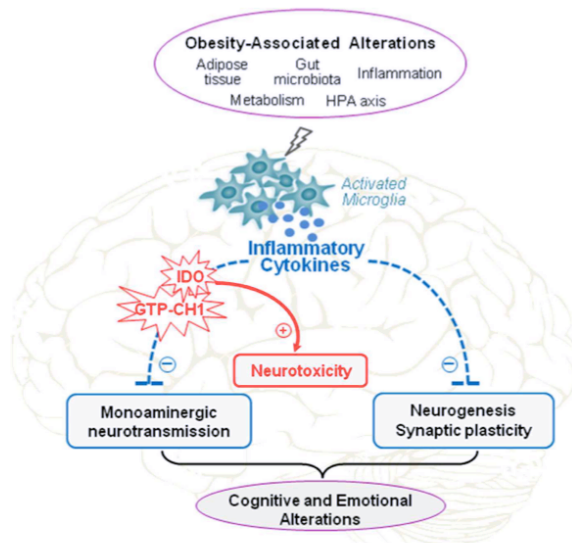
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Castanon et al. *Frontiers in Neuroscience* July 2015 Vol 9



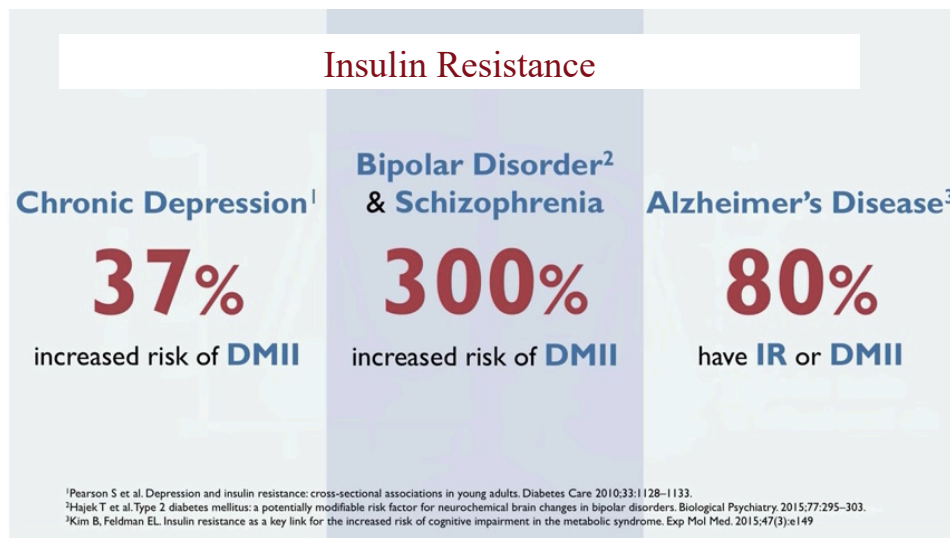
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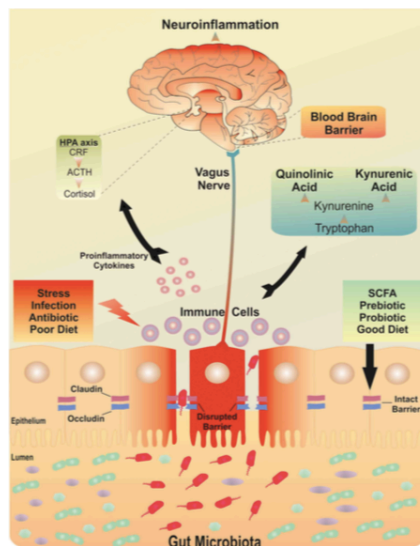
Castanon et al. *Frontiers in Neuroscience* July 2015 Vol 9



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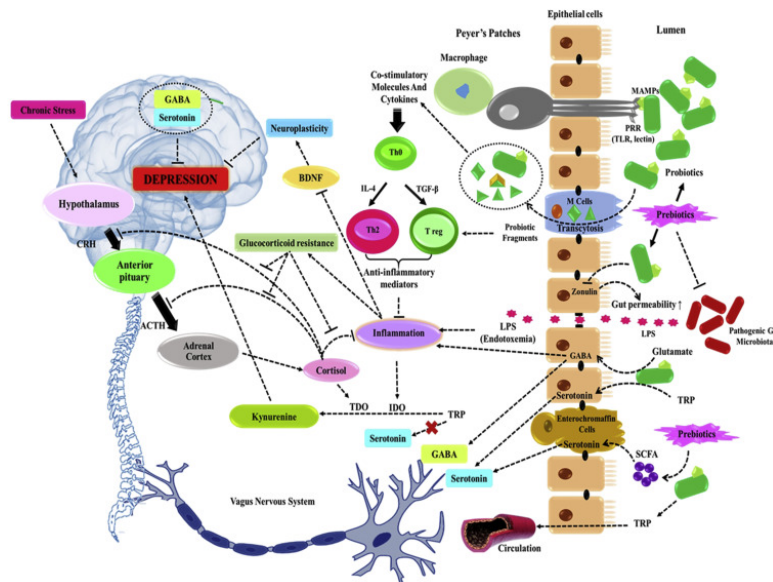
Gut Barrier Function

- SAD
- Sustained allostatic load
- NSAIDs
- PPIs
- Abx
- Too little fermentable fiber
- Toxins e.g. glyphosate; mold biotoxins
- Loss of circadian entrainment

MS Desai et al. "A Dietary Fiber-Deprived Gut Microbiota Degrades the Colonic Mucus Barrier and Enhances Pathogen Susceptibility" *Cell* 167, no. 5 (2016): 1339-53



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CLINICAL NUTRITION VOLUME 25, P1395-1410, MAY 01, 2020



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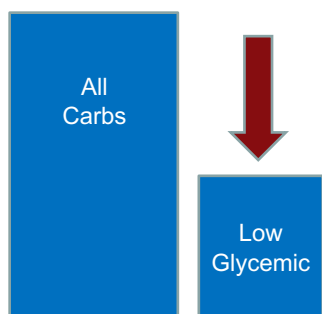


Nutrition and Stress Resilience



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Reduce poor quality, highly processed, carbohydrate-dense foods

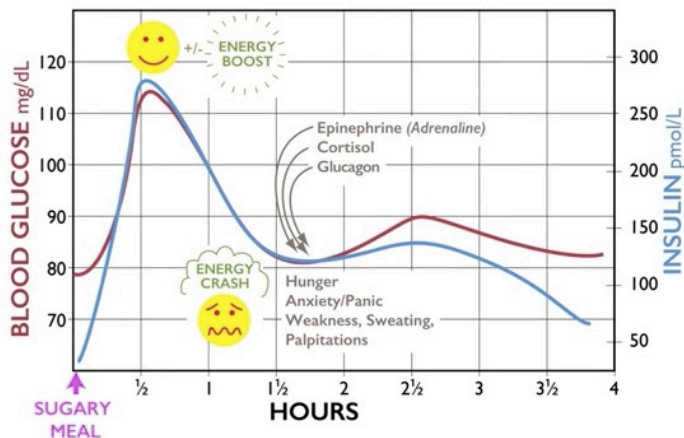


- Added Sugar
- Grain-based flour e.g. breads, cereal grains, pasta, pastries, desserts, chips, pretzels, granola bars.
- Higher fructose fruits e.g. mango, grapes, pear, watermelon, apple, banana
- Dried fruits e.g. raisins, apricots, cherries
- Sweetened soft drinks
- Beer-liquid bread
- Gradual reintroduction of starchy vegetables after 8-12 weeks, e.g. white rice, carrots, parsnips, white potatoes
- Lowered insulin and reduced inflammation “unlock” fat burning



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Sugar, flour and high-glycemic carbohydrates



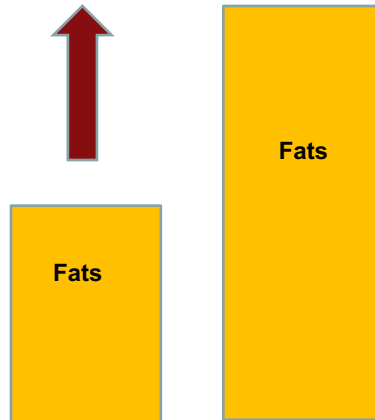
Data sources: Benton D. Carbohydrate ingestion, blood glucose and mood. Neurosci Biobehav Rev 2002;26:293-308.; Daly ME et al. Acute effects on insulin sensitivity and diurnal metabolic profiles of a high-sucrose compared with a high-starch diet. Am J Clin Nutr. 1998; 67:1186-96.



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More fat of better quality

- Reduce omega 6 vegetable oils e.g. corn, canola, soybean, sunflower
- Eliminate trans fats
- Include healthy fat sources e.g.
 - eggs
 - butter, ghee, full-fat dairy
 - nuts (macadamia, walnuts, pecans, walnuts)
 - fatty fish e.g. salmon, sardines, trout, mackerel, anchovies
 - grass fed meats
 - avocados
 - extra virgin olive oil, coconut oil, macadamia nut oil, avocado oil



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Plant-based foods



- Fill ½ plate with vegetables
- 2 cups greens/day is a nice goal (spinach, romaine, asparagus, etc.)
- Cruciferous e.g. broccoli, cauliflower, collards, cabbage, kale, arugula, etc.
- Allium family e.g. onions, leeks, garlic
- Beans and lentils; soaking and pressure cooking can be easier on the gut, reducing lectins
- Lower glycemic fruits e.g. berries, grapefruit, kiwi
- Anti-inflammatory spices e.g. turmeric, basil, ginger, rosemary, cayenne pepper
- Fermentable fiber essential for gut biome diversity
- Fermentable foods e.g. yogurt, sauerkraut

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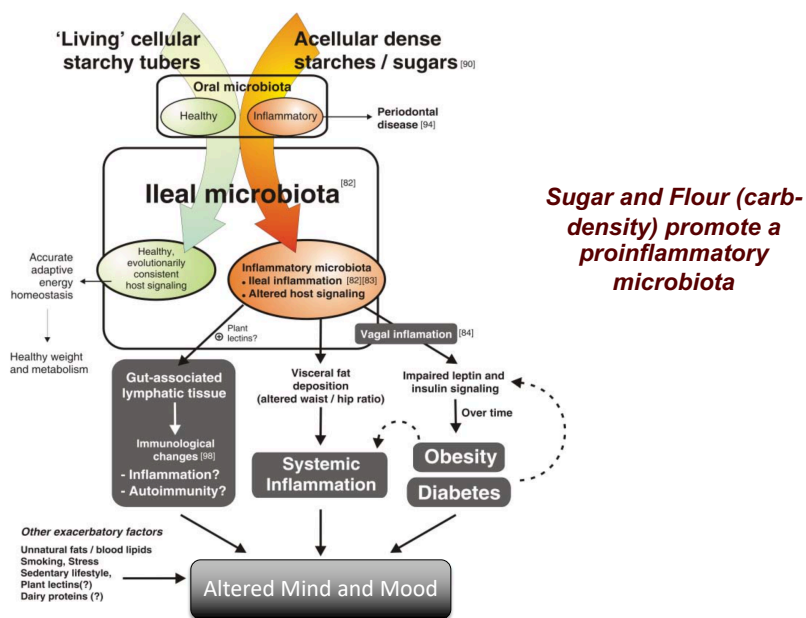


“About 75% of the food in the Western diet is of limited or no benefit to the microbiota in the lower gut. Most is comprised specifically of refined carbohydrates, is readily absorbed in the upper GI tract, and what eventually reaches the large intestine is of limited value, as it contains only small amounts of the minerals, fiber, and other nutrients necessary for maintenance of the microbiota.”

Nutrients 2013;5:162-207



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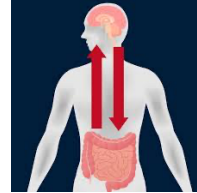


Courtesy Ian Spreadbury PhD, McGill University DovePress 2012



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Psychobiotics



- Protection of intestinal barrier function
- Influence on local and systemic antioxidant status
- Direct neurochemical production e.g. Gamma Amino Butyric Acid
- Indirect influence on neurotransmitter function
- Prevention of stress-induced alterations in microbiota
- Direct activation of neural pathways between gut and brain
- Modulation of inflammatory cytokines
- Modulation of Brain derived neurotrophic factor (BDNF)

Psychobiotics in mental health, neurodegenerative and neurodevelopmental disorders.

Li-Hao Cheng Yen-Wenn Liu Chien-Chen Wu Sabrina Wang Ying-Chieh Tsa
Journal of Food and Drug Analysis July 2019, Pages 632-648



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[Bipolar Disord.](#) 2018 Apr 25. doi: 10.1111/bdi.12652. [Epub ahead of print]

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

Dickerson F¹, Adamos M¹, Katsafanas E¹, Khushalani S¹, Origoni A¹, Savage C¹, Schweinfurth L¹, Stallings C¹, Sweeney K¹, Goga J¹, Yolken RH².

⊕ Author information

Abstract

OBJECTIVE: Immunological abnormalities play a role in the pathophysiology of mania and have been associated with relapse. Probiotic organisms such as Lactobacilli and Bifidobacteria modulate inflammation in humans and animal models. The trial examined whether the administration of probiotic organisms prevents psychiatric rehospitalizations in patients recently discharged following hospitalization for

- 66 patients with BPD hospitalized with psychosis
- RCT at d/c to receive 24 weeks probiotics (lactic and Bifidobacterium vs placebo)
- 24 vs 8 pts readmitted (8.3 vs 2.8 days)
- Better response with higher CRP at baseline

RESULTS: During the 24-week observation period there were a total of 24 rehospitalizations in the 33 individuals who received placebo and eight rehospitalizations in the 33 individuals who received the probiotics ($z = 2.63$, $P = .009$). Hazard functions indicated that the administration of the probiotics was associated with a significant advantage in time to all psychiatric rehospitalizations (hazard ratio [HR] = 0.26, 95% confidence interval [CI] 0.10, .69; $P = .007$). Probiotic treatment also resulted in fewer days rehospitalized (mean 8.3 vs 2.8 days for placebo and probiotic treatment, respectively; $\chi^2 = 5.17$, $P = .017$). The effect of the probiotic treatment on the prevention of rehospitalization was increased in individuals with elevated levels of systemic inflammation at baseline.

CONCLUSION: Probiotic supplementation is associated with a lower rate of rehospitalization in patients who have been recently discharged following hospitalization for mania.



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RCTs of Diet and Psychiatric Disorders

1. **SMILES** (Mediterranean + nuts/olive oil)
2. **HELFIMED** (Mediterranean + fish oil)

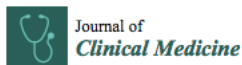
Mediterranean Diet (modestly) improves symptoms of depression (when added to pre-existing treatments)



Jacka F et al. A randomised controlled trial of dietary improvement for adults with major depression (the 'SMILES' trial). *BMC Medicine* 2017;5:23.
 Parletta N et al. A Mediterranean-style dietary intervention supplemented with fish oil improves diet quality and mental health in people with depression: a randomized controlled trial (HELFIMED). *Nutr Neuro* 2017 Dec;7:1-14.
 Image Credit: julijadm / 123RF Stock Photo



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Review

Supplementation with Omega-3 Fatty Acids in Psychiatric Disorders: A Review of Literature Data

Paola Bozzatello, Elena Brignolo, Elisa De Grandi and Silvio Bellino *

Centre for Personality Disorders, Department of Neuroscience, University of Turin, 10126 Turin, Italy; paola.bozzatello@unito.it (P.B.); elena.brignolo@yahoo.com (E.B.); elisa.degrandi@gmail.com (E.D.G.)

* Correspondence: silvio.bellino@unito.it; Tel.: +39-0116634848; Fax: +39-011673473

The main evidence for the effectiveness of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) has been obtained in mood disorders, in particular in the treatment of depressive symptoms in unipolar and bipolar depression. There is some evidence to support the use of omega-3 fatty acids in the treatment of conditions characterized by a high level of impulsivity and aggression and borderline personality disorders. In patients with attention deficit hyperactivity disorder, small-to-modest effects of omega-3 HUFAs have been found.



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The Emerging Role for Zinc in Depression and Psychosis

Matthew A. Petrilli¹, Thorsten M. Kranz², Karine Kleinhaus³, Peter Joe³, Mara Getz³, Porsha Johnson³, Moses V. Chao² and Dolores Malaspina^{3*}

¹Creedmore Psychiatric Center, Queens, NY, United States; ²Departments of Cell Biology, Physiology and Neuroscience

Well powered clinical studies have shown beneficial effects of supplemental zinc in depression and it important to pursue research using zinc as a potential therapeutic option for psychosis as well. Meta-analyses support the adjunctive use of zinc in major depression and a single study now supports zinc for psychotic symptoms.

OPEN ACCESS

anti-inflammatories and others also impact zinc absorption. Furthermore, inefficient genetic variants in zinc transporter molecules that transport the ion across cellular membranes impede its action even when circulating zinc concentrations is in the normal



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Psychiatry Res. 2017 May;251:41-47. doi: 10.1016/j.psychres.2017.02.006. Epub 2017 Feb 3.

Dietary zinc and iron intake and risk of depression: A meta-analysis.

Li Z¹, Li B¹, Song X¹, Zhang D².

Author information

Abstract

A total of 9 studies for dietary zinc intake and 3 studies for dietary iron intake were finally included in present meta-analysis. The pooled RRs with 95% CIs of depression for the highest versus lowest dietary zinc and iron intake were 0.67 (95% CI: 0.58-0.76) and 0.57 (95% CI: 0.34- 0.95), respectively. In subgroup analysis by study design, the inverse association between dietary zinc intake and risk of depression remained significant in the cohort studies and cross-sectional studies.

0.57), respectively. In subgroup analysis by study design, the inverse association between dietary zinc intake and risk of depression remained significant in the cohort studies and cross-sectional studies. The pooled RRs (95% CIs) for depression did not substantially change in the influence analysis and subgroup analysis by adjustment for body mass index (BMI). The present meta-analysis indicates inverse associations between dietary zinc and iron intake and risk of depression.

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Biol Psychiatry. 2013 Dec 15;74(12):872-8. doi: 10.1016/j.biopsych.2013.05.008. Epub 2013 Jun 24.

Zinc in depression: a meta-analysis.

Swardfager W¹, Herrmann N, Mazereeuw G, Goldberger K, Harimoto T, Lanctôt KL.

Author information

Abstract

BACKGROUND: Zinc is an essential micronutrient with diverse biological roles in cell growth, apoptosis and metabolism, and in the regulation of endocrine, immune, and neuronal functions implicated in the pathophysiology of depression. This study sought to quantitatively summarize the clinical data on zinc status and blood zinc concentrations between depressed and

CONCLUSIONS: Depression is associated with a lower concentration of zinc in peripheral blood. The pathophysiological relationships between zinc status and depression, and the potential benefits of zinc supplementation in depressed patients, warrant further investigation.

quantitatively in random-effects meta-analysis, and summarized as a weighted mean difference (WMD).



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Review

The Effects of Magnesium Supplementation on Subjective Anxiety and Stress—A Systematic Review

Neil Bernard Boyle *, Clare Lawton and Louise Dye

School of Psychology, University of Leeds, Leeds LS2 9JT, UK; c.l.lawton@leeds.ac.uk (C.L.); l.dye@leeds.ac.uk (L.D.)

* Correspondence: n.b.boyle@leeds.ac.uk; Tel.: +44-113-343-1403

Received: 31 January 2017; Accepted: 17 April 2017; Published: 26 April 2017

18 studies were included in the review. All reviewed studies recruited samples based upon an existing vulnerability to anxiety: mildly anxious, premenstrual syndrome (PMS), postpartum status, and hypertension. Four/eight studies in anxious samples, four/seven studies in PMS samples, and one/two studies in hypertensive samples reported positive effects of Mg on subjective anxiety outcomes.

was performed in May 2016. Ovid Medline, PsycInfo, Embase, CINAHL and Cochrane databases were searched using equivalent search terms. A grey literature review of relevant sources was also undertaken. Results: 18 studies were included in the review. All reviewed studies recruited samples based upon an existing vulnerability to anxiety: mildly anxious, premenstrual syndrome (PMS), postpartum status, and hypertension. Four/eight studies in anxious samples, four/seven studies in PMS samples, and one/two studies in hypertensive samples reported positive effects of Mg on

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Review

B Vitamins and the Brain: Mechanisms, Dose and Efficacy—A Review

David O. Kennedy

Brain, Performance and Nutrition Research Centre, Northumbria University, Newcastle-upon-Tyne NE1 8ST, UK; david.kennedy@northumbria.ac.uk; Tel.: +44-191-243-7720

Received: 24 September 2015; Accepted: 21 January 2016; Published: 28 January 2016

Abstract: The B-vitamins comprise a group of eight water soluble vitamins that perform essential

Evidence from human studies clearly shows a significant proportion of people suffer from deficiencies or insufficiencies in one or more of B-vitamins. Supplementing, in the absence of an optimal diet at doses greatly in excess of current recommendations would be a rational approach for preserving brain health.

this group of micronutrients are essential for optimal physiological and neurological functioning. Furthermore, evidence from human research clearly shows both that a significant proportion of the populations of developed countries suffer from deficiencies or insufficiencies in one or more of this group of vitamins, and that, in the absence of an optimal diet, administration of the entire B-vitamin group, rather than a small sub-set, at doses greatly in excess of the current governmental recommendations, would be a rational approach for preserving brain health.

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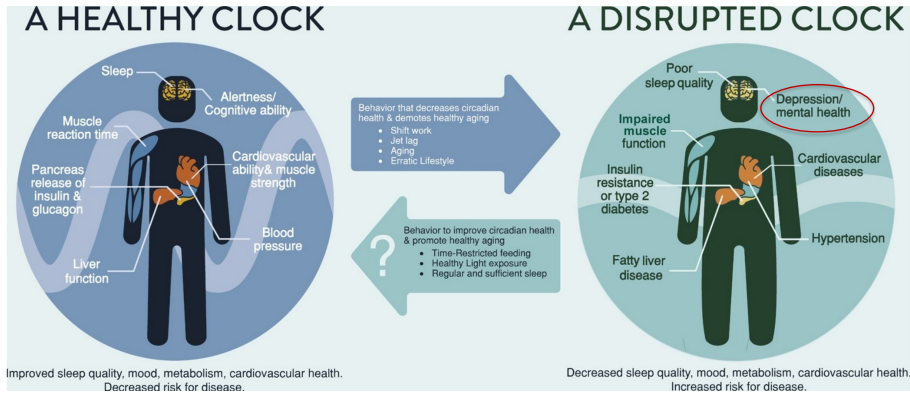
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Circadian Disruption



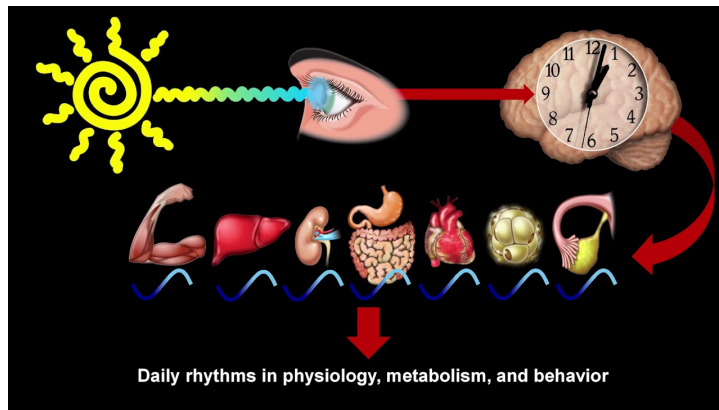
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Satchin Panda PhD, Salk Institute



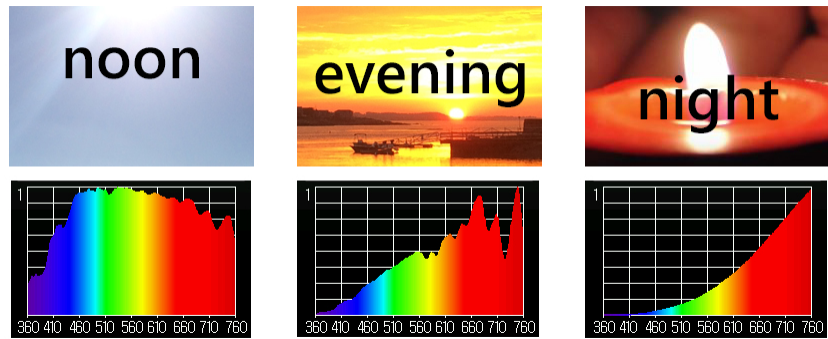
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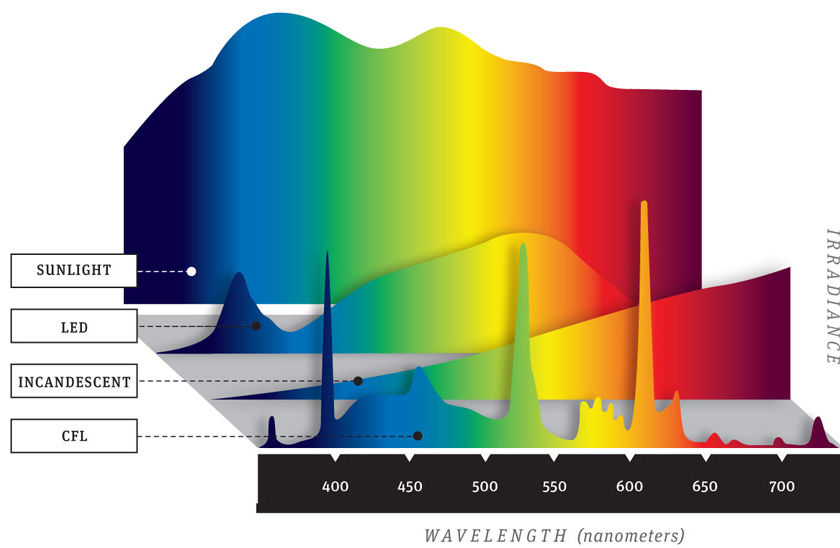
Satchin Panda PhD, The Salk Institute



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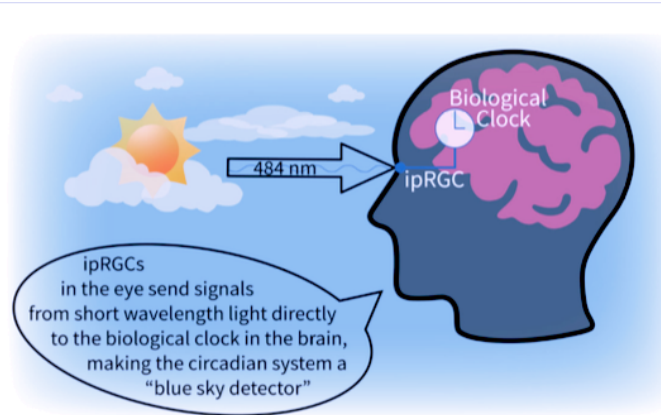


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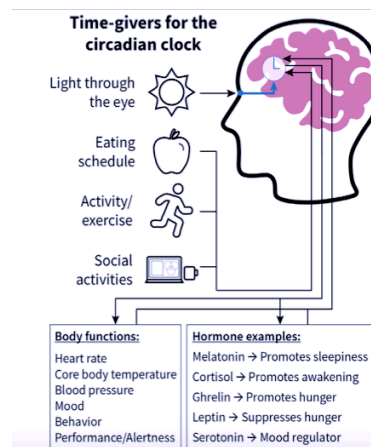
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Circadian Entrainment



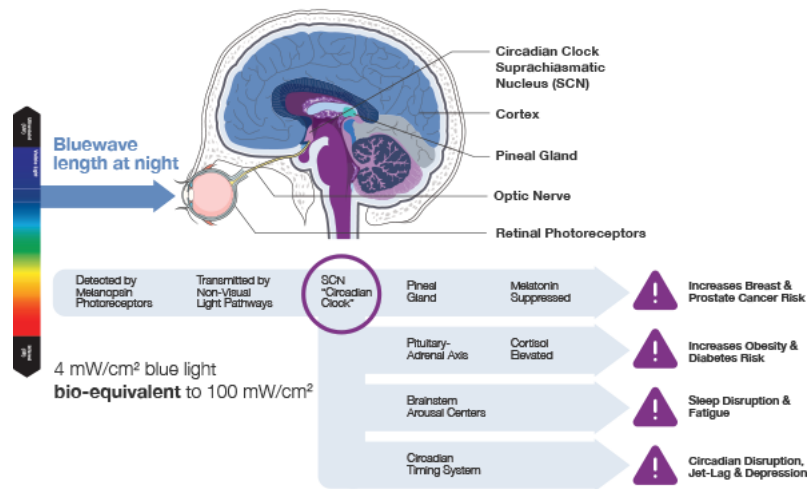
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Circadian Entrainment



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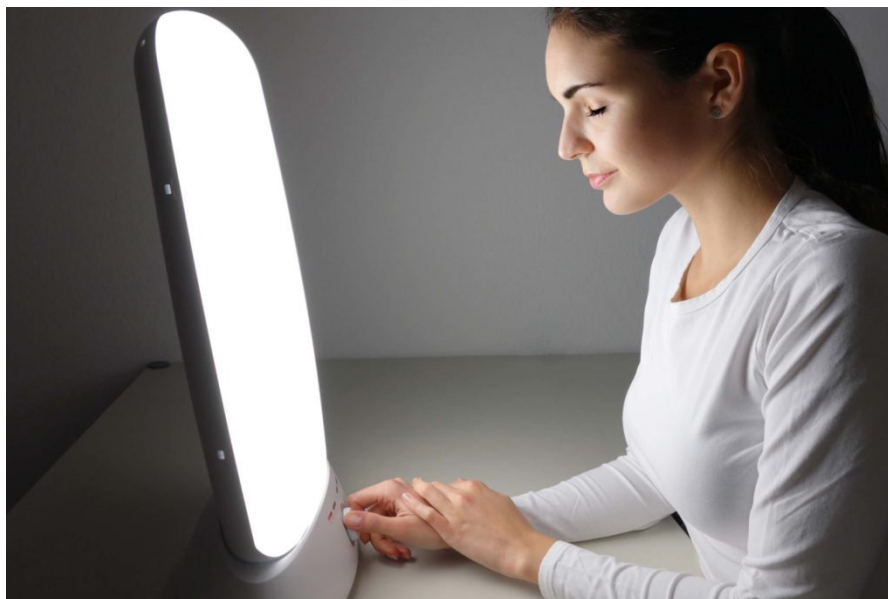
Blue Light at Night Suppresses Melatonin and Damages Health



Aging and Mechanisms of Disease (2017) 3:9 ;



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Full-spectrum light box: 10,000 lux



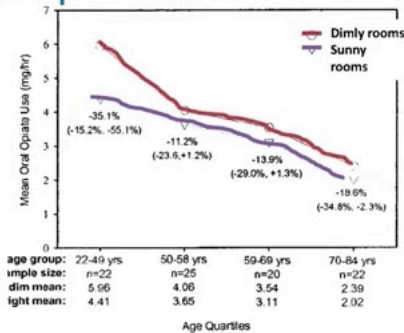
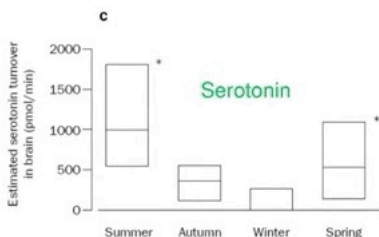
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The effect of sunlight on pain stress and depression



- ✓ Stress
- ✓ Pain
- ✓ Analgesic use (21%)



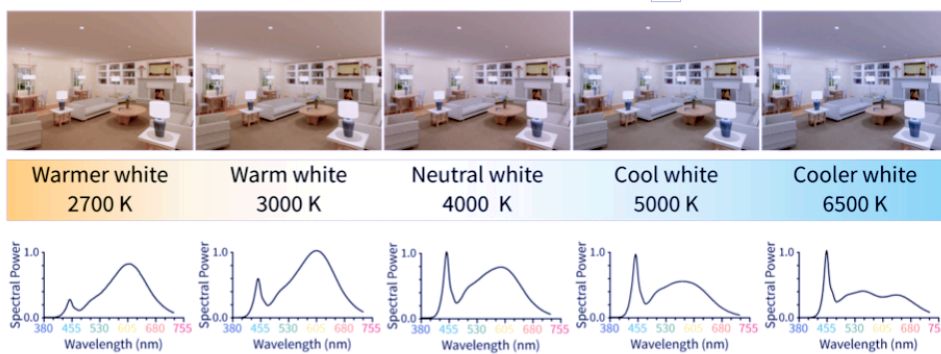
Light (470 nm) increases the concentration of serotonin.

Walch et al (2005) *Psychosomatic Medicine*



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Circadian Entrainment



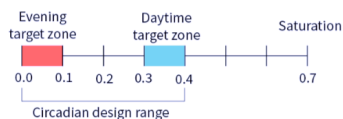
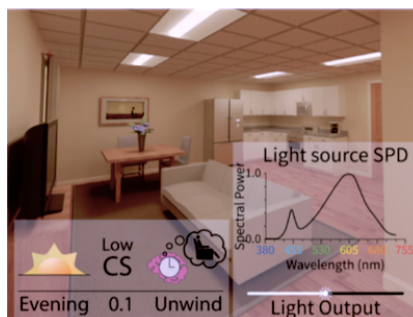
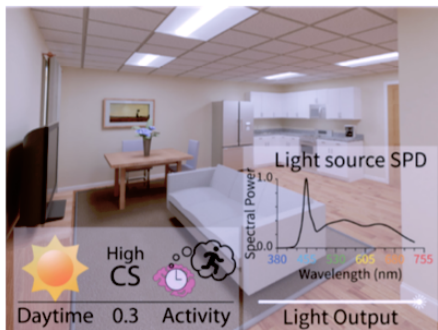
Lighting Research Center

©2020 Lighting Research Center, Rensselaer Polytechnic Institute



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👍 Robust circadian- effective lighting design



Circadian Entrainment



- Sleep hygiene basics
- 30-60" full spectrum lighting/day; morning and late afternoon times with less UVB
- Vitamin D as a nuclear transcription factor
- Blue light during the day is important
- Evening light: Warm LED 2700k, Halogen 3,000k or less; warm LED on dimmer
- Blue light filters 2-3 hrs before bedtime
- Blue blocker glasses 2-3 hrs before bedtime
- Time Restricted Feeding: 10-hr window a powerful intervention; nothing to eat 2-3 hrs prior to bedtime.

Satchin Panda, PhD *The Circadian Code*

R. M. Lunn et al. "Health Consequences of Electric Lighting Practices in the Modern World: A Report on the National Toxicology of Shift Work, Artificial Light and Circadian Disruption." *Sci Tot Environment* (2017): 1073-84

Intermittent Fasting Time Restricted Eating (TRE)



- Time restricted feeding e.g. consume all food within 10-hour window. No eating 2-3 hrs before bedtime
- Excellent Circadian rhythm “calibration”
- Decreases in body weight and visceral fat, insulin and glycemic control
- Fasting mimicking diet (Longo, Cheng et al., 2017, Cell 168, 775–788)
- Significant reductions in breast cancer recurrence and improved prognosis (Patterson et al. UCSD 2016)
- Improved cardiovascular disease risk profile
- Decreased neuroinflammation (Neurobiol Aging. 2015 May;36(5):1914-23)
- Upregulated Autophagy (Autophagy, 2014;10:11, 1879-1882)
- Improved sleep!!

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Original Investigation

June 2018

Association of Efficacy of Resistance Exercise Training With Depressive Symptoms Meta-analysis and Meta-regression Analysis of Randomized Clinical Trials

Brett R. Gordon, MSc¹; Cillian P. McDowell, BSc¹; Mats Hallgren, PhD²; [et al](#)[» Author Affiliations](#)*JAMA Psychiatry*. 2018;75(6):566-576. doi:10.1001/jamapsychiatry.2018.0572

In this meta-analysis of 33 clinical trials including 1877 participants, resistance exercise training was associated with a significant reduction in depressive symptoms, with a moderate-sized mean effect.



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Forest Bathing



- Shinrin-Yoku
- Global health and quality of life improvements
- Improvements in mind and mood
- Lower inflammation
- www.shinrin-yoku.org

Int. J. Environ. Res. Public Health **2017**, *14*, 851;
doi:10.3390/ijerph14080851



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Social Connection and Health



- From an evolutionary biologic perspective we are born to bond
- Powerful predictor of longevity and health, of the magnitude that smoking has.
- Mirror neurons...EMF receivers/transmitters
- Reduced stress states
- Improved coping and resiliency
- Reductions in chronic disease risk

Am Psychol. 2017 September ; 72(6): 517–530.



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Embracing the moment you are in:

The Power of the “Pause”



- Mindfulness practices powerfully proven to reduce disease risk
- Epigenetic effects shown to reduce inflammation, improve insulin sensitivity
- Heart rate variability (www.heartmath.com)
- Improved mood, resilience, reduced anxiety
- Improved performance, creativity and problem-solving capacity
- MBSR, meditation, prayer, yoga, journaling, tai chi

J Psychol Med 2020 May 14 : 1–3.

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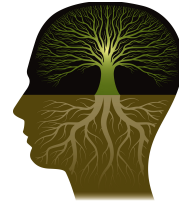
Lifestyle Considerations for Healthy Mind & Mood



- Whole foods with reductions in sugar, refined grain-based flour, acellular carbohydrate dense foods
- Elimination 30-day trials sugar, grains; dairy-casein
- More healthy fats e.g. olive oil, coconut oil, nuts, avocados, butter, fatty fish, eggs
- Plant-based fiber for the microbiome; prebiotics e.g. psyllium husk, acacia; synbiotics (prebiotics and probiotics)
- Cruciferous, allium, berries great for detoxification
- Consider MTHFR testing; methylfolate supplementation
- Nutrients: Vitamin D, Zinc, Magnesium, B-complex, choline

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Lifestyle Considerations for Healthy Mind & Mood



- Liberal outdoor, full-spectrum light exposure; light box over fall-winter months
- Connection with others
- Motion is the lotion!
- HPA management e.g. yoga, tai chi, music, breath, meditation, HRV biofeedback
- Healing the gut-immune barrier function e.g. elimination diet, pre-probiotics; testing/Rx for SIBO
- Sleep hygiene; consider OSA evaluation



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Thank you.



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