

Optimal Aging: Strategies for Life



Tieraona Low Dog, MD

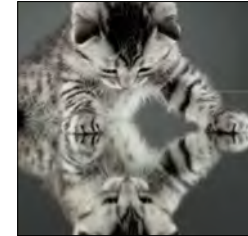
www.DrLowDog.com

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Reflection

- What if someone could predict with 90% accuracy how long you will live?
- Would you want to know?
- How would it affect the way you live?
- What if you planned to live to 100?
- Would it change the way you...
 - work and play?
 - manage your money?
 - spend time with your family?



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When Does “Late Life” Begin?



- Studies have defined older populations in different ways: some as 65 and older, others at 60, and some at 50.
- Consensus seems to be growing:
 - Young-old: 65-80 years
 - Old-old: 80-99 years
 - Oldest-old: centenarians

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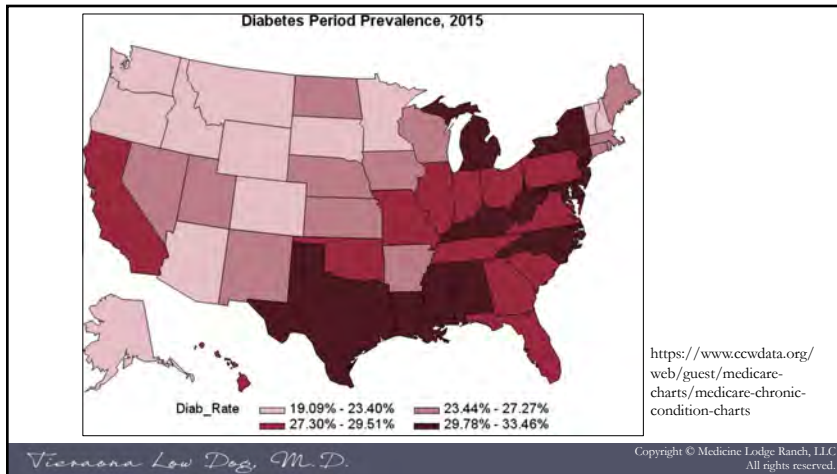
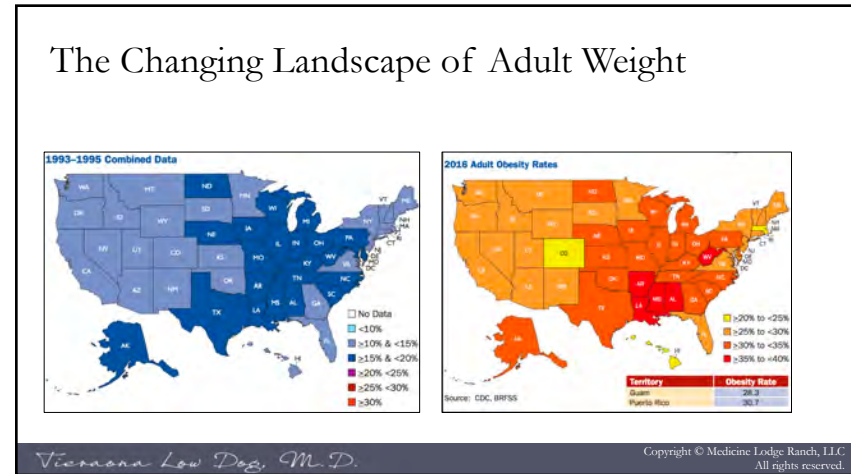
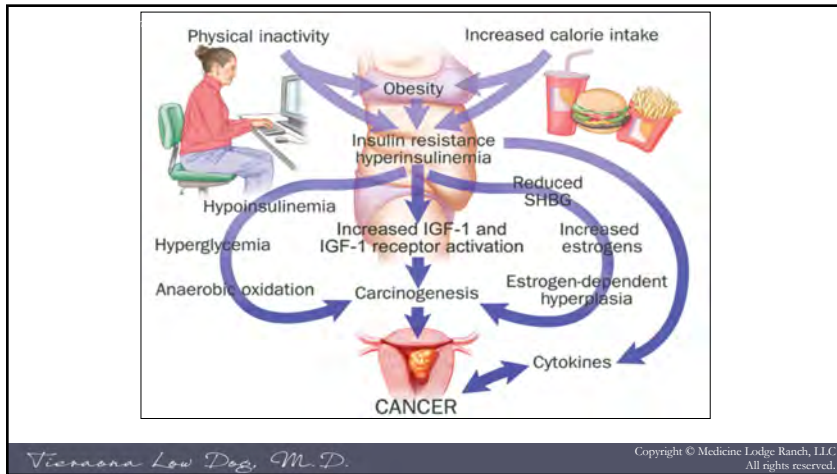
Life Span and Expectancy

- **Life Span:** the **maximum number of years** an individual can live; has remained between 120–125 years
- **Life Expectancy:** the **number of years** that the **average person born in a particular year will probably live**
 - Between 1975 and 2015, life expectancy at birth increased from 72.6 to 78.8 years for the total U.S. population.
 - **Men - 76.3 years**
 - **Women - 81.2 years**

www.cdc.gov/nchs/data/hestat/hestat16.pdf#015

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SCIENTIFIC AMERICAN

PUBLIC HEALTH

The Hunger Gains: Extreme Calorie-Restriction Diet Shows Anti-Aging Results

A new study shows five days of hunger a month may reduce risk factors for aging and age-related diseases

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Caloric Restriction?



Canto is 27 year old monkey on CR diet, Owen is 29 year old on unrestricted diet.

news.wisc.edu/monkey-caloric-restriction-study-shows-big-benefit-contradicts-earlier-study/

- 25 year study University of Wisconsin Madison: 76 rhesus monkeys who between ages 7-14 years, began eating a diet **reduced in calories by 30%**.
- Disease was **3 fold greater** in control group. **No evidence of diabetes in any caloric-restricted animal.**
- National Institutes of Aging reported one monkey on 30% CR diet at age 16 years lived to be 43 years old, a longevity record for the species, and equivalent of a human living to 130.

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CALERIE (Comprehensive Assessment of the Long-term Effects of Reducing Intake of Energy)

- National Institute of Aging sponsored study: 218 non-obese individuals, **randomized to maintain current diet or 25% caloric restriction for 2 years. (11.7% caloric restriction was actually maintained on average).**
- Study found **statistically significant reduction in cardiometabolic risk factors and inflammatory markers; weight loss, improved mood, sleep duration.**

Ravussin E, et al. : A 2-Year Randomized Controlled Trial of Human Caloric Restriction: Feasibility and Effects on Predictors of Health Span and Longevity. *J Gerontol A Biol Sci Med Sci.* 2015;70(9):1097-104.

Martin CK, et al. Effect of Calorie Restriction on Mood, Quality of Life, Sleep, and Sexual Function in Healthy Nonobese Adults: The CALERIE 2 Randomized Clinical Trial. *JAMA Intern Med* 2016 Jun 1;176(6):743-52.

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CALERIE 2

- 2-year **follow-up study of 39 nonobese adults** who went through the CALERIE trial (12 and 24 months post trial completion).
- After the CR intervention, a mean weight loss of **9.0 ± 0.6 kg** was observed in the CR group, in which only 54% of the weight was regained 2 y later.
- **Despite the regain, weight, percentage of body fat, and fat mass remained significantly reduced from baseline throughout follow-up and remained significantly less than in the control group (P < 0.05).**
- After a 2-y intensive CR intervention, **~50% of CR-induced weight loss was maintained 2 y later**, which was probably the result of lasting effects on acquired behaviors and dietary restraint.

Marlatt KL, et al. Persistence of weight loss and acquired behaviors 2 y after stopping a 2-y caloric restriction intervention. *Am J Clin Nutr* 2017 Apr;105(4):928-935.

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Fasting-Mimicking Diets (FMD)?



Wei M, et al. Fasting-mimicking diet and markers/risk factors for aging, diabetes, cancer, and cardiovascular disease. *Sci Transl Med* 2017; 9(377).

- USC study of 100 healthy participants randomized into 2 study arms and tested the effects of FMD done **5 consecutive days each month for 3 months.**
 - **1100 calorie first day, 700 calories for 4 days** (plant based, multivitamin). Ate whatever they wanted rest of the month.
- Three FMD cycles **reduced body weight and total body fat; lowered blood pressure, cholesterol, triglycerides and IGF-1.** Lean muscle mass remained unchanged. **Note: 25% drop-out rate**
- Effects still noted **3 months AFTER** study ended.

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Promising and.....



- Much of initial research on yeast and rodent models. Research in rhesus monkeys impressive.
- CALERIE study showed that even 11% reduction in calories can improve weight loss and certain biomarkers associated with aging. Most people could not sustain 25% reduction in cal.
- What is unclear: do these diets extend *longevity* in humans? **The data suggest that they have a favorable impact on many metabolic parameters associated with better health.**

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Omega 3 Fatty Acids from Plants and Animals

Dark green vegetables, walnuts, freshly ground flax seeds and other plant foods.



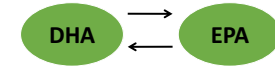
Contains

ALA



Converts to

Intermediate Molecules



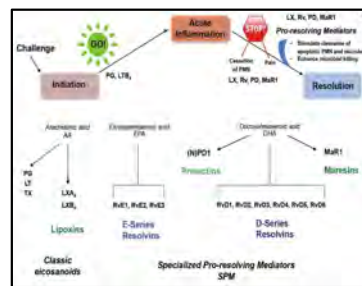
Cold water fish, fish oil, fresh seaweed, clean animal foods like free range chicken, eggs, and grass fed beef.

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Resolution Biology

- Research shows that resolution of self-limited acute inflammation is an active, programmed response.
- **Omega 3 fatty acids** produce specialized **pro-resolving mediators (SPM)** – resolvins, protectins and maresins.
- **A lifetime of consuming fish or seafood may keep inflammation in check, reducing risk of certain chronic diseases.**



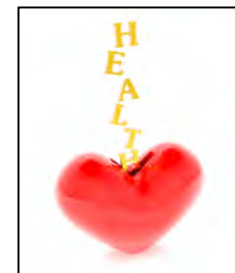
VanDyke TE. Pro-resolving mediators in the regulation of periodontal disease. *Mol Aspects Med* 2017 Dec;58:21-36.

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American Heart Association

- **“Omega-3 fish oil supplements prescribed by a healthcare provider may help *prevent death* from **heart disease** in patients who recently had a **heart attack** and may *prevent death and hospitalizations* in patients with **heart failure.**”**

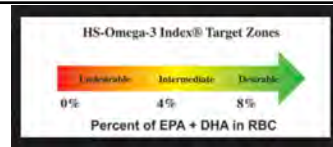


Siscovick DS, et al. *Circulation* 2017; Mar 13.

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No Fish Story



- Omega-3 Index test is the **gold standard for omega-3 biostatus** testing. It is used as a compliance marker for randomized controlled trials with fish oil supplements, and in epidemiological research.
- In 2008 Dr. Bernadine Healy said, “Before long, your personal Omega-3 Index just could be the new cholesterol—the number you want to brag about.”
- Canadian government found that **mean Omega-3 Index level of Canadians aged 20-79 was 4.5%**.
- Fewer than 3% of adults had levels associated with low CHD risk; **43% had levels associated with high risk.**

Langlois K, et al. *Health Rep* 2015; Nov 18;26(11):3-11

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Omega 3 Fatty Acids – Healthy Muscles

- Chronic low-grade inflammation also contributes to the **loss of muscle mass, strength and functionality**, referred to as sarcopenia, as it affects both **muscle protein breakdown and synthesis through several signaling pathways.**
- Omega-3 fatty acids **stimulate muscle protein synthesis in older adults** and may be useful for the **prevention and treatment of sarcopenia.**



Dalle S, et al. *Front Physiol* 2017; Dec 12;8:1045
Ticinesi A, et al. *Nutrients* 2016; Mar 29;8(4):186

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Choose Your Seafood Wisely

The Seafood Watch App

Available for iOS and Android

It's easier than ever to get the latest recommendations for seafood and sushi, learn more about the seafood you eat, and locate or share businesses that serve sustainable seafood.

Download on the App Store | GET IT ON Google play

View our App FAQs

Features

- Get free, up-to-date seafood recommendations
- Search for seafood quickly and easily by common market name
- Search for sushi by Japanese name as well as common market name
- Find restaurants and stores near you that serve ocean-friendly seafood
- Access in-depth conservation notes and reports

<https://www.seafoodwatch.org/seafood-recommendations/our-app>

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Nutrient Needs Change with Aging

- The need for certain micronutrients increases with age. These are current recommendations but they may not be sufficient....
 - **Vitamin D** increases from 600 to 800 IU (20 mcg) per day
 - **Calcium** increases from 1000 to 1200 mg/day for women over the age of 50 and for men over the age of 70
 - Due to decreased ability to absorb food bound **vitamin B12**, the Institute of Medicine recommends adults over the age of 50 get their B12 from fortified foods or supplements.

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Fragility Fractures

- **Fragility fractures** associated with **decreased quality of life**, increased disability, more frequent hospital admission and **increased risk of mortality**.
- While a multimodal approach is important, **vitamin D supplementation alone, or in combination with calcium**, has been shown to **significantly reduce the risk of falling in elders**.



WHO. Nutrition for Older Persons. <http://www.who.int/nutrition/topics/ageing/en/index.html> Accessed January 3, 2018

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- Vitamin D deficiency can cause **osteomalacia** (lower bone mineralization), leading to **musculoskeletal pain**, usually in the pelvis, shoulders, low back, and proximal muscles.
- Deficiency is common worldwide but often **more severe in elders** due to environmental and biological factors.
- Impaired mobility can limit time spent outdoors and **decreased synthesis of vitamin D in skin** makes it difficult to maintain adequate levels even with sun exposure.
- As aging advances, intestinal resistance to 1,25(OH)₂D **impairs the uptake of calcium** and a **decline in renal function reduces activation of vitamin D**.

Vitamin D



Wintermeyer E, et al. Crucial Role of Vitamin D in the Musculoskeletal System. *Nutrients* 2016; Jun 1;8(6). pii: E319.

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Vitamin D: Bones, Balance, and Infection

- Low vitamin D increases risk of **falls** and **gait instability**. Exercise, calcium and vitamin D supplementation all decrease falling in elders.
- Meta-analysis by National Osteoporosis Foundation: eight studies (n=30,970 participants) showed **calcium plus vitamin D supplementation** produced a significant **15% reduced risk total fractures and 30% reduced risk hip fracture**.

Tricco AC, et al. Comparisons of Interventions for Preventing Falls in Older Adults: A Systematic Review and Meta-analysis. *JAMA* 2017; Nov 7;318(17):1687-1699.

Weaver CM. Calcium plus vitamin D supplementation and risk of fractures: an updated meta-analysis from the National Osteoporosis Foundation. *Osteoporosis Int* 2016 Jan;27(1):367-76

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Vitamin D and Respiratory Infection



Martineau AR, et al. Vitamin D supplementation to prevent acute respiratory tract infections: systematic review and meta-analysis of individual participant data. *BMJ* 2017; 356: i6583.

- Acute respiratory infection kills ~2.65 million people/year.
- **25 eligible randomized controlled trials (n=10,933, aged 0-95 years)**.
- Vitamin D supplementation **reduced risk of acute respiratory infection among all participants and those who were vitamin D deficient experienced the most benefit (NNT=4)**.

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Endocrine Society Guidelines

- Serum 25(OH)D level is used to determine vitamin D status
 - **Sufficiency** is **30 ng/mL** (75 nmol/L) and above
 - **Insufficiency** defined as **21-29 ng/mL**
 - **Deficiency** defined as **<20 ng/mL**
- **66.8 million Americans** 1 year and older had levels between **12-20 ng/ml**
- **23 million Americans** 1 year and older had levels **less than 12 ng/ml**

CDC 2nd National Report on Biochemical Indicators of Diet and Nutrition in the U.S. Population
 Holick MF, et al. *J Clin Endocrinol Metab* 2011; 96(7):1911-30

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Endocrine Society Guidelines for Treating Deficiency

- All adults who are vitamin D deficient should be treated with **50,000 IU of vitamin D2/D3 once per week for 8 weeks** or **6000 IU of vitamin D2/D3 daily** to achieve a blood level of 25(OH)D *above 30 ng/ml*, followed by **maintenance therapy of 1500–2000 IU/d.**



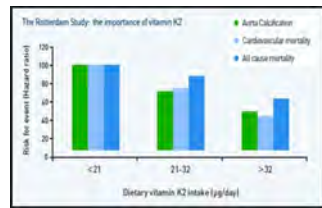
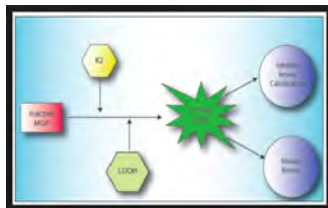
Holick MF, et al. *J Clin Endocrinol Metab* 2011; 96(7):1911-30

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Calcium: Not too Much and Not Alone

- Calcium and vitamin D crucially important for healthy bone, however, vitamin K2 is necessary for ensuring calcium is taken up by bone and not in the kidney or blood vessels. A multivitamin or supplement that contains K1 and/or K2 is important when taking calcium supplements.



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A Note on Protein



- Framingham Osteoporosis Study found **higher protein** intakes (**60-83g/d** versus 46g/d) in elder men and women (mean 75 years) associated with a **37% decreased risk of hip fracture.**
- Women's Health Initiative found **20% increase in protein intake** improved bone mineral density maintenance and marginally lowered forearm fracture risk.
- European guidelines recommend **20-25 grams high quality protein with each meal for women over age 50 with regular physical activity/exercise 3-5 times/week.**
- Current recommendations are 0.8 grams protein per kg of body weight.

Misra D, et al. Does dietary protein reduce hip fracture risk in elders? The Framingham Osteoporosis Study. *Osteoporosis Int* 2011; 22(1):345-349.
 Beasley JM, et al. Biomarker-calibrated protein intake and bone health in the Women's Health Initiative clinical trials and observational study. *Am J Clin Nutr* 2014; 99(4):934-940.
 Rizzoli R, et al. The role of dietary protein and vitamin D in maintaining musculoskeletal health in postmenopausal women: a consensus statement from the European Society for Clinical and Economic Aspects of Osteoporosis and Osteoarthritis (ESCEO). *Maternal* 2014 Sep;79(1):122-32.

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Case 41-year old Female

- Strict vegan for 2.5 years. Disturbance of taste (unable to sense flavor of variety of fruits and vegetables), fatigue after simple daily activities, paresthesia of the anatomic structures innervated by the mandibular division of the trigeminal nerve on her left side, disturbance of memory and slowing mental faculty. No meds. No significant medical or dental history.

Pontes HA, et al. *J Can Dent Assoc* 2009; 75(7):533-7.

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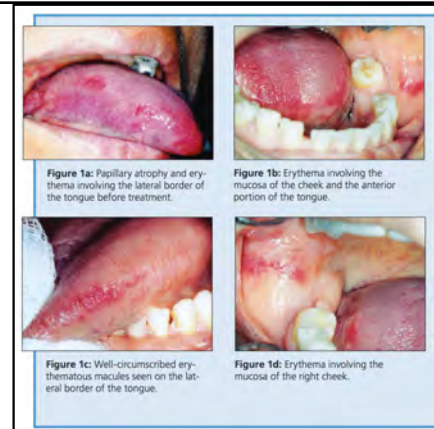


Figure 1a: Papillary atrophy and erythema involving the lateral border of the tongue before treatment.

Figure 1b: Erythema involving the mucosa of the cheek and the anterior portion of the tongue.

Figure 1c: Well-circumscribed erythematous macules seen on the lateral border of the tongue.

Figure 1d: Erythema involving the mucosa of the right cheek.

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Laboratory Tests

Test	Normal range (female)	Patient's values
RBC count (cells/ μ L)	3.90–5.03	1.63
Hemoglobin (g/dL)	12.0–15.5	7.2
MCV (fL)	80–100	144
Hematocrit (%)	36–45	23.4
RDW (%)	13 \pm 1.5	25
Serum folate (ng/mL)	3–16	7.73
Serum cobalamin (pmol/L)	118–716	71.8

MCV = mean corpuscular volume; RBC = red blood cell; RDW = red cell distribution width.

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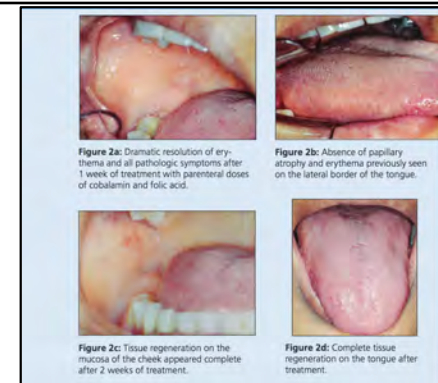


Figure 2a: Dramatic resolution of erythema and all pathologic symptoms after 1 week of treatment with parenteral doses of cobalamin and folic acid.

Figure 2b: Absence of papillary atrophy and erythema previously seen on the lateral border of the tongue.

Figure 2c: Tissue regeneration on the mucosa of the cheek appeared complete after 2 weeks of treatment.

Figure 2d: Complete tissue regeneration on the tongue after 2 weeks of treatment.

Patient treated with 1000 mcg B12 IM per week for 4 weeks and 1 mg folate daily. Symptoms disappeared after 14 days of treatment.

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Vitamin B12

- Found in **animal and fortified foods**. Key role in DNA synthesis, hematopoiesis and neurological function.
- Deficiency: **megaloblastic anemia, neurological disorders (numbness/tingling feet, difficulty walking, memory loss, dementia) tongue soreness, constipation**.
- Risk for deficiency: **inadequate intake, impaired absorption, vegan, meds (metformin, PPIs), obesity, elders, alcoholism**
- With increasing prevalence of **type-2 diabetes**, we will continue to see increase in **metformin use, a drug known to deplete vitamin B12**.
- Recommend **20-100 mcg/d for those over age 50**



Niafar M, et al. *Intern Emerg Med* 2015; 10(1):93-102.

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Prescription Meds and Nutrients: Just a Glimpse

- Widespread use of **prescription drugs** for management of chronic health conditions can make it difficult to **maintain adequate levels of specific nutrients**.
- **PPI drugs** are one of the most commonly prescribed medications and are also available over-the-counter in the United States. Long-term use can **increase the risk of fracture, cause magnesium levels to plummet, and interfere with B12 absorption, as well as increasing the risk of C. difficile infection**.

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Magnesium

- **Low magnesium intakes/serum levels** associated with type 2 diabetes, metabolic syndrome, inflammation, high blood pressure, atherosclerotic vascular disease, sudden cardiac death, osteoporosis, migraine headache, asthma, and colon cancer.
- **50% of U.S. population** consumes less than the required amount of daily magnesium.
- Deficiency associated with negative effects on calcium and vitamin D homeostasis. **Magnesium required for the activation of vitamin D**.
- Many medications can deplete magnesium (e.g., diuretics, PPIs, OCPs, gout medication, B2-agonists, steroids, etc)



Rosanoff A, et al. *Nutr Rev* 2010;70(3):153-64

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Magnesium and Diabetes

- **Insulin resistance** repeatedly shown to **decrease magnesium** levels and **diabetics** with low magnesium show a **more rapid disease progression** and an increased risk for **diabetes-related complications**.
- A vicious forward cycle is created.
- **Magnesium supplementation** has been shown to **improve glucose metabolism and insulin sensitivity** in those with type-2 diabetes.



Gommers LM, Hoenderop JG, Bindels RJ, de Baaij JH (2016) Hypomagnesemia in Type 2 Diabetes: A Vicious Circle? *Diabetes*, 65(1):3-1

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Magnesium and Heart Disease



- 2013 **meta-analysis** of 16 studies with more than **313,000 participants** found:
 - Higher blood levels associated with a **30% lower risk of cardiovascular disease**.
 - Dietary magnesium (per 200-mg/d increment) associated with a **22% lower risk of fatal ischemic heart disease**.
- Magnesium important in maintaining blood pressure and **supplementation (365 to 450 mg/d)** shown to **significantly lower blood pressure** in those with **insulin resistance, prediabetes, and other chronic diseases**.

Del Gobbo LC, et al. Circulating and dietary magnesium and risk of cardiovascular disease: a systematic review and meta-analysis of prospective studies. *Am J Clin Nutr* 2013; 98(1):160-73.

Dibaba DT, et al. The effect of magnesium supplementation on blood pressure in individuals with insulin resistance, prediabetes, or noncommunicable chronic diseases: a meta-analysis of randomized controlled trials. *Am J Clin Nutr* 2017; 106(3):921-929.

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Lack of Sleep



- **1 in 3 Americans** do not get sufficient sleep. Research shows chronic sleep problems can lead to **weight gain, obesity, diabetes** (33% increased risk type 2 DM), and **heart disease**.
- **Biological clock** most important regulator of the sleep wake cycle. Responsible for 24 hour fluctuations in hormone secretion, body temperature and other bodily functions.
- **Lack of exposure to sunlight** and use of **bright lights at night** increases the likelihood of disordered circadian clock. Consider **dawn simulation device/app**, use **blue light blocking glasses** at night with technology.
- **Controlled release melatonin** now first line therapy for those older than 60 (**3-5 mg**)

Shan Z, et al. *Diabetes Care* 2015;38(3):529-37

Matheson E, et al. *Insomnia: Pharmacologic Therapy. Am Fam Physician* 2017; Jul 1;96(1):29-35.

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Cognitive Behavioral Therapy

- **CBT has emerged as a recommended first-line therapy for insomnia**. Digital CBT has been shown to be effective for improving sleep, as well as mental health and well-being.
- CBT-I typically consists of:
 - Psychoeducation about sleep and insomnia
 - Stimulus control
 - Sleep restriction
 - Sleep hygiene
 - Relaxation training
 - Cognitive therapy



Luik AI, et al. Digital cognitive behavioral therapy for insomnia: a state of the science review. *Curr Sleep Med Rep* 2017; 3(2): 48-56

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Sleep Evaluation

- There are numerous medications that can impair sleep (e.g., beta blockers antidepressants, steroids, ADHD meds, possibly statins, etc.) Do some online research and/or talk to your pharmacist. If you are taking medication that disrupts sleep, talk to your health care provider.
- Restless leg syndrome impacts many people. Talk to you provider, it could be due to low iron, vitamin D or meds you are taking – though the cause is really not known.
- Sleep apnea is a condition where breathing is interrupted during the night. A sleep study can be ordered and treatments are available (e.g., CPAP, dental appliances which reposition lower jaw and tongue)

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Guided Imagery: *Imagine Yourself*.....

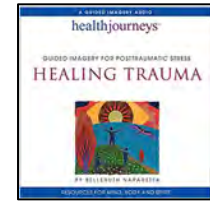
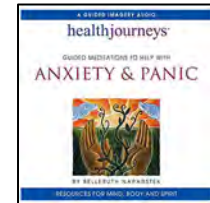
- An immersive, deeply relaxing intervention that uses calming words, soothing music and positive images to structure a healing experience.
- Like meditation, it focuses attention and calms the mind, working on those parts of the brain where the emotional self dwells.
- Imagery has been shown in clinical trials to reduce stress, anxiety, and depression; help with sleep; lower blood pressure, and help with posttraumatic stress.
- I have found guided imagery a fabulous tool for patients. Very helpful for those with anxiety, depression, pain, insomnia. And often an easier transition to meditation.

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Belleruth Naparstek

- Love, love, love her. Something for everyone.
- She has Guided Imagery Meditations for:
 - Anxiety and Panic
 - Anger and Forgiveness
 - Depression
 - Healing Trauma
 - Ease Grief
 - Relieving Stress
 - Undergoing Surgery
 - Chemotherapy and Radiation



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Loneliness, Social Isolation & Your Health

- Review found poor social relationships associated with **29% increase in risk of incident CHD** and **32% increased risk of stroke**.
- 148 studies on the effects of **social isolation on health** found it is:
 - As bad as **smoking** 15 cigarettes a day.
 - As dangerous as being an **alcoholic**.
 - As harmful as **never exercising**.
 - Twice as dangerous as **being obese**

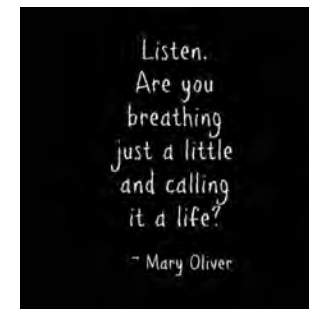


- Valtorta NK, et al Loneliness and social isolation as risk factors for coronary heart disease and stroke: systematic review and meta-analysis of longitudinal observational studies. *Heart*. 2016; Jul 1;102(13):1009-16.
- Cacioppo JT, et al. *Ann N Y Acad Sci* 2011; 1231:17-22

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Meaning and Purpose



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Letting Go.....

"Healing may not so much be about getting better, but about letting go, of all the expectations, all of the beliefs, and becoming who you are."

— Rachel Naomi Remen, M.D.



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