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Eating for Optimal Dental Health, Mental Health, & Longevity

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- “Food is the single strongest lever to optimize human health.” (The Lancet, Jan. 2019)
- Do people reach 100 by surviving, delaying, or avoiding diseases? Centenarians not only delay the onset of diseases, but also avoid many diseases altogether, especially heart disease. (GeroScience, Aug. 2024)
- Our physical & mental health are deeply interconnected. (Nature Communications, Sept. 2023)
- “We found lifestyle counselling as effective as psychological therapy. Our findings suggest dietitians and exercise physiologists may one day play a role in managing depression.” (The Lancet Regional Health, July 2024)
- “The list of connections between oral health & systemic health — conditions that affect the entire body — is remarkable.” (Scientific American, March 2024)

How Oral Health Impacts Overall Health & Risk of Disease

- The oral cavity, though sterile at birth, becomes the habitat for more than 700 microbial species. It is the 2nd most heavily colonized part of the human body. (Biomedicines, March 2022)
- The oral microbiome - both disease and health-oriented bacteria live in the oral cavity. The health-oriented bacteria: produce alkali & buffer pH, anti-microbial properties, and convert nitrate to nitrite. (Advanced Dental Research, Feb. 2018)
- Oral microbiome dysbiosis is driven by multiple factors (genetic, diet, stress, smoking, antibiotics, tissue injury, infection).
- Research shows a bidirectional causal relationship between gut microbes and periodontitis. (Journal of Translational Medicine, Sept. 2023)
- Oral bacteria can reach the gut through swallowing of saliva and/or enter the blood via ulcerated gingival tissues. Systemic spread of the oral microbiota can lead to inflammatory changes and contribute to the pathogenesis of many diseases. (Nutrients, Aug. 2023)
- Review of 32 studies - the strongest links are found between periodontitis and chronic disease, especially for type 2 diabetes and heart disease. (Preventing Chronic Disease, Sept. 2019)
- *P. gingivalis*, the primary bacteria linked to the pathogenesis & progression of periodontal disease, is “a master at engineering its environment to survive & persist in the host”. (Frontiers In Cellular & Infection Microbiology, Sept. 2023)
- The main pathogen involved in periodontal disease (*P. gingivalis*) has been linked to nearly every disease that has been described as an inflammatory, systemic disease that occurs simultaneously with periodontitis - Cardiovascular disease, Rheumatoid arthritis, Alzheimer's disease, Type II diabetes, Non-alcoholic fatty liver disease. (Frontiers in Oral Health, May 2022)
- Oral microbiome dysbiosis plays a crucial role in the initiation & development of many autoimmune diseases - inflammatory bowel disease, rheumatoid arthritis, multiple sclerosis. Targeting oral microbes might be a promising strategy for treating these diseases. (Journal of Translational Medicine, March 2023)

- “Current research strongly confirms a correlation between cardiovascular risk & periodontal disease.” (Journal of Inflammation Research, Feb. 2024)
- Periodontal disease increases the proinflammatory markers linked to endothelial dysfunction which increases the risk of atherosclerosis, high blood pressure, blood clot formation, & stroke. Periodontal treatment reduces inflammatory markers related to cardiovascular disease and may reduce the risk of cardiovascular events. (Frontiers in Cardiovascular Medicine, Aug. 2023)
- In the Kuopio Oral Health & Heart study, involving 354 participants, better oral hygiene self-care was linked to 51% lower risk of dying from cardiovascular disease. (British Dental J., Feb. 2023)
- Periodontal disease is linked to a significantly higher risk of cognitive decline & dementia. (GeroScience, Oct. 2024)
- Six-month study, 66 patients with mild Alzheimer’s Disease. Oral health intervention effectively modified subgingival microbiome and slowed cognitive decline. (Geriatric Nursing, Dec. 2022)
- In the UK Biobank Study, involving MRI images of 40,000 adults, those with poor oral health (prone to cavities, missing teeth, needing dentures) had increased damage to both white matter and microstructure of the brain. (American Stroke Assoc. International Conference, Feb. 2023)
- Prevalence of six oral health conditions were compared to severity of mental health problems. All six adverse oral health outcomes were linked to a statistically significant greater prevalence and increasing severity of mental health problems. (American Association for Dental, Oral, & Craniofacial Research, 47th Annual Conference, March 2023)
- Poor periodontal status is linked to poor treatment outcomes for depression - independently of depression severity and 14 sociodemographic and clinical predictors of treatment outcome. (Clinical & Experimental Dental Research, Feb. 2022)
- Poor oral health linked to triple the risk of liver disease. (Liver International, March 2019)
- Diabetes and oral health. Even slightly elevated blood sugar levels adversely affect oral health. Any oral infection adversely affects blood glucose levels. Treatment of inflammation (non-surgical periodontal treatment or extraction of infected teeth) can lower blood sugar levels significantly. (Diabetes Research in Clinical Practice, Nov. 2019)
- Periodontal disease triggers a specific inflammatory immune response that results in repeated flare-ups of arthritis. (Science Translational Medicine, Feb. 2023)
- In a study involving 125,324 participants (age 40 to 79), the risk of osteoporosis and fractures doubled with periodontitis. (BMC Oral Health, March 2021)
- Risk of osteoporosis and fractures doubled with periodontitis. (BMC Oral Health, March 2021)
- There is a close relationship between oral microbiota and tumor occurrence. (Cancer Medicine, Sept. 2020)
- Animal study - *P. gingivalis* can travel from the mouth to the pancreas resulting in lesions that lead to cancer. It appears to accelerate pancreatic cell transformation & protects cancerous cells from death. (Gut, April 2024)
- Korean National Health Insurance Cohort Database. Cancer incidence in periodontitis group was double that of the control group. (Frontiers in Oncology, Aug. 2022)
- Meta-analysis - Composition of the oral microbiome appears to play significant role in predicting survival outcomes for cancer patients. Low oral microbiome diversity or the presence of *P. gingivalis* in cancer tissues is linked to a less favourable prognosis. (Systemic Reviews, Jan. 2024)

Nitrate & Oral Health

- Dietary nitrate found in dark leafy greens in the diet is converted in the mouth by “nitrate-reducing bacteria” to nitrite and ultimately, to nitric oxide, which helps control blood pressure,

defend against invading bacteria, and maintain a healthy oral and gut microbiome. (Dentistry Journal, May 2022)

- Nitric oxide-generating potential of the oral microbiome is strongly and consistently associated with cardiometabolic risk. (Journal of the American Heart Association, May 2022)
- Nitrate-reducing bacteria (*Rothia* & *Neisseria*) are consistently found at higher levels in those free of disease (compared to those with caries, periodontitis, and/or halitosis) and increase when nitrate is consumed. Bacteria normally associated with oral disease (*Veillonella* – caries, *Prevotella* - periodontal diseases & halitosis) decrease in the presence of nitrate. (Journal of Dental Research, Feb. 2022)
- Chronic mouthwash use may endanger beneficial bacteria. Those who gargled at least twice a day were about 50% more likely to develop prediabetes or diabetes than those who used it less frequently or not at all. “Chronic mouthwash use can be likened to the effect of antibiotics on gut bacteria. Few would contemplate going on antibiotics permanently, while more than 20% of Americans use mouthwash daily.” (Nitric Oxide, Dec. 2017)
- Twice-daily chlorhexidine usage was associated with a significant increase in systolic blood pressure after 1 week of use. Recovery from use resulted in an enrichment in nitrate-reducing bacteria on the tongue. (Biomedical Journal, March 2019)
- Study - 87 participants gargled with mouthwash twice a day for 5-7 days. Listerine reduced some nitrate-reducing bacteria, however, chlorhexidine, targeted more and to a greater degree. (Frontiers in Cellular & Infection Microbiology, Feb. 2023)
- “It is clear now that antiseptic mouthwash disrupts nitrate metabolism to nitric oxide leading to clinical symptoms of nitric oxide deficiency. Based on the science, nitrate should be considered an indispensable nutrient that should be accounted for in dietary guidelines.” (Nitric Oxide, March 2023)
- Our professional opinion & advice - high frequency & prolonged use of mouthwash should not be routine component of maintenance of good oral health. (International Dental Journal, Nov. 2023)
- “The ideal mouthwash, whilst combatting oral disease, should “balance” antimicrobial communities, especially those associated with health. Which antimicrobial mouthwash best fits this ideal remains uncertain.” (International Dental Journal, Nov. 2023)

Water Fluoridation & Oral Health

- Caries Prevention White Paper (World Dental Federation): Fluoride has altered the dose-response relationship between sugar consumption and caries experience by delaying when cavitation occurs and thus a higher cariogenic diet can be tolerated before caries occurs in many individuals.
- The National Child Oral Health Study, involving 24,664 Australian children (age 5 to 14) - Lack of fluoridated water and high sugar intake (4 or more servings/day of food or drinks high in free sugars) increased risk of tooth decay in permanent teeth by 70%. (J. of Den. Research, April 2021)
- Study of 2,649 Grade 2 schoolchildren in two different Canadian cities. Water fluoridation stopped in Calgary in 2011, but not in Edmonton. The prevalence of caries in the primary dentition was significantly higher in Calgary – the differences were consistent and robust and widened over time since cessation. (Community Dentistry & Oral Epidemiology, Oct. 2022)
- Fluoridated water & periodontal health study - Fluoridated communities consistently displayed lower mean probing depth, clinical attachment level, & gingival inflammation. (Journal of Pharmacy & BioAllied Sciences, Feb. 2024)

- 263 mother-child pairs, 3-year study - Prenatal fluoride exposure was linked to increased neurobehavioral problems among children, including emotional reactivity & anxiety. Conclusion: “There may be a need to establish recommendations for limiting exposure to fluoride from all sources during the prenatal period, a time when the developing brain is known to be especially vulnerable to injury from environmental insults.” (JAMA Network Open, May 2024)
- Drinking water containing more than 1.5 mg of fluoride/L is consistently associated with lower IQs in kids. (National Toxicology Program, Dept. of Health & Human Services, Aug. 2024)
- Fluoride & Health (comprehensive research review): Strong evidence for dental fluorosis and reduction in IQ scores in children. “The evidence supports a conclusion that fluoride exposure reduces IQ levels in children at concentrations close to those seen in North American drinking water...” Moderate evidence for thyroid dysfunction. Weak evidence for kidney dysfunction. Limited evidence for hormone disruption. (Critical Reviews in Toxicology, Feb. 2024)
- A federal judge in California has ordered the EPA to strengthen regulations for fluoride in drinking water, saying the compound poses an unreasonable potential risk to children at levels that are currently typical nationwide. (Sept. 2024)

The Gut Microbiome & Health

- “Virtually every chronic disease & infectious disease is linked to the microbiome.” (*Jens Walter, PhD, APC Microbiome Ireland*)
- Your diet is the most powerful tool for shaping gut microbiome health. (Gut Microbiota for Health, Oct. 2020)
- The vagus nerve is the communication superhighway between the gut and the brain. It can stimulate parts of the brain involved in mood, emotion, & stress response.
- Gut bacteria produce hundreds of chemicals that impact brain health & mood – they orchestrate thousands more chemical reactions than human cells. (Chemistry World, March 2024)
- Short-chain fatty acids (SCFAs) reduce depression risk by promoting tight junctions (intestinal barrier & blood brain barrier) which reduces inflammation; contributing to synthesis and release of neurotransmitters; promoting neurogenesis; acting as strong epigenetic modulators (BDNF). (Experimental Biology & Med., Feb. 2021)
- “The gut microbiota is capable of producing every human neurotransmitter that we currently know of.” *Ted Dinan, PhD, APC Microbiome Ireland*
- Serotonin is known as the happy chemical – 90% is produced in the gut.
- GABA is the body’s most important anti-anxiety neurotransmitter. An unhealthy or disordered microbiome is a major cause of low GABA production.
- Gut bacteria produce chemicals that help regulate the body’s stress response. An unhealthy microbiome results in an exaggerated stress response.
- Your intake of prebiotic foods and fermented foods can significantly impact your feelings and thoughts about how much stress you are under at a given point in time. (Molecular Psychiatry, Oct. 2022)
- HELENA Study, 242 teens (13 - 18 years old) - Cortisol levels were inversely associated to adherence to the Mediterranean Diet. (Nutrients, Nov. 2018)
- Resilience: the capacity to withstand or recover quickly from difficulties. Highly resilient people have an especially healthy gut barrier with low inflammation. (Nature Mental Health, June 2024)
- “There is increasing evidence that certain microbes have anti-depressant action, that certain microbes have anti-anxiety action, and that there may be microbes that also improve cognitive function.” *Ted Dinan, APC Microbiome Ireland*

- Gut microbes influence microglial health and development which impacts risk of depression. Microglial cells are on constant to patrol to respond to pathogens and damage. They help brain cells connect and clean the brain of waste and dead/injured cells. (Molecular Psychiatry, March 2023)
- When the gut bacteria of depressed humans are transplanted into rodents – they too become depressed. (J Psychiatric Research, Nov. 2016)
- When you introduce the gut bacteria of a bold mouse into a timid mouse, you provide the mouse equivalent of a dose of courage. (American Psychological Assoc., Sept. 2012)
- Transferring gut microbes from Alzheimer's patients to rats causes symptoms of dementia and impairs new nerve cell growth in the hippocampus (part of brain responsible for memory, cognition & mood). The more severe the donor's disease, the greater the cognitive loss in the rats. (Brain, Dec. 2023)
- Social anxiety disorder (SAD): psychiatric condition defined by fear & avoidance of social scenarios due to the preconception of possible scrutiny by others. The microbiota-gut-brain axis as a key biological factor that is relevant to social fear responses. (Brain, Behavior, & Immunity, Aug. 2024)
- When you introduce the gut bacteria of a bold mouse into a timid mouse, you provide the mouse equivalent of a dose of courage. (American Psychological Association, Sept. 2012)
- A more diverse microbiome promotes better physical health, mental health & longevity. Factors that lead to gut dysbiosis: poor diet, stress, lack of exercise, poor sleep, medications.
- Gut microbiome of centenarians: greater diversity, higher number of anti-inflammatory microbes, lower number of pathogenic microbes. (Nature Aging, April 2023)
- A healthy diverse microbiome is ruthlessly efficient at consuming different types of food. When pathogens arrive late to the party, they simply starve. (Science, Dec. 2023)
- The Hazda from Tanzania are one of the last hunter-gatherer communities in the world. They have extremely high gut microbial diversity (730 different bacterial species versus 277 species in people living in California. (Cell, July 2023)
- HELIUS Project, Six Different Ethnicities - The more diverse an individual's gut bacterial population the less likely they are to experience depression. (Nature Communications, Dec. 2022)
- Microbial diversity is closely related to severity of depression. (Translational Psychiatry, April 2023)
- Microbiome of young adults with depression: Less diverse; Fewer anti-inflammatory bacteria; Differences align with symptom severity. (Brain, Behavior, & Immunity, March 2020)
- Lower gut microbial diversity linked to higher suppression of emotions. Inverse link between specific bacteria and positive emotions, like happiness and hopefulness. Direct link between those same species and negative emotions, like depression and hopelessness. (Psychological Medicine, March 2023)

Brain Health, Cognition, & Mental Health

- “The human brain consists of roughly 100 billion neurons, 100 trillion neuronal connections and consumes about 20–25% of the body's energy.” (Frontiers in Nutrition, Feb. 2024)
- The brain is the most easily damaged by a poor diet.
- “Put simply, what you eat directly affects the structure and function of your brain and, ultimately, your mood.” *Dr. Eva Selhub, Harvard Medical School*

- The adult hippocampus (critical for learning, memory & mood) forms new neuronal cells throughout the lifespan. Neurogenesis is fundamental to neuroplasticity, as well as overall brain health (functional & structural). The hippocampus is extremely sensitive to diet. (Frontiers in Nutrition, Feb. 2024)
- Brain-Derived Neurotrophic Factor (BDNF) - Promotes brain cell growth, connectivity, and survival. (Frontiers in Neurology, June 2019)
- Anything affecting your vascular health is going to affect your brain health because it's a very vascularized organ (it's very reliant on healthy blood circulation).
- Blood flow to the brain is primary pathway impacting brain health and risk of dementia. (medRxiv, July 2024)
- Meta-analysis (35 studies) - Carotid intima media thickness is significantly thicker in patients with depression. (Journal of Psychiatric Research, May 2024)

Inflammation in the Body & Brain

- Chronic low-grade inflammation is common as we get older (referred to as 'inflammaging'). It occurs due to significant alterations in gut microbe composition and function occur (decline in beneficial bacteria and an increase in potentially pathogenic microbes). The microbial changes are worsened by age-related changes in immune function and gut barrier integrity.
- Pro-inflammatory diets are associated with brain aging: vascular brain injury and smaller brain volume, including hippocampus, which is involved in emotional regulation. (Alzheimer's & Dementia, May 2022)
- Meta-analysis (12 studies) - A higher "Dietary Inflammatory Index" is linked to a higher risk of cognitive decline, including Alzheimer's Disease. (Frontiers in Nutrition, April 2023)
- An inflammatory dietary pattern is linked depression. (Brain, Behavior, & Immunity, Feb. 2014)
- Inflammation & immune-related pathways identified as leading biological pathways linked to adolescent depression - seen in those with depression compared to those without, both at high and low risk of developing. (Translational Psychiatry, June 2024)
- Suicide & Inflammation - Genes and pathways linked to inflammation were significantly upregulated and pathways linked to neuronal development (pathways influencing proper brain performance & functioning) were suppressed. (Molecular Psychiatry, Nov. 2023)
- Suicide & Inflammation - Genes and pathways linked to inflammation were significantly upregulated and pathways linked to neuronal development (pathways influencing proper brain performance & functioning) were suppressed. (Molecular Psychiatry, Nov. 2023)
- A pro-inflammatory diet is linked to a significantly higher risk of anxiety disorders, including total anxiety disorders, panic disorders, & mixed anxiety and depression disorders (especially among women and smokers). (Nutrients, Dec. 2023)
- Pathogenic bacteria initiate periodontal disease. Inflammation and oxidative stress play a huge role in the severity of tissue destruction. Host modulation therapy: fortify the host immune response - no smoking, healthy body weight, antioxidant-rich/anti-inflammatory diet. (Archives of Oral Biology, Sept. 2019)
- A pro-inflammatory diet contributes significantly to periodontal inflammation. (Journal of Periodontology, Dec. 2023)
- Hamburg City Health Study - Researchers report significant inverse link between anti-inflammatory diet score & periodontitis. Most dentists recommend limiting sugar intake, but rarely discuss which foods are proinflammatory and anti-inflammatory. (Nutrients, July 2023)

- Review of RCTs (20 studies) - Effects of anti-inflammatory diets on 14 different inflammation markers in adults. A Mediterranean diet is linked to statistically significant and clinically meaningful differences in inflammatory markers. (Nutrition Reviews, Jan. 2023)
- Switching from a Western to Mediterranean diet reduced gingivitis significantly in people with gingivitis. (Journal of Clinical Periodontology, Dec. 2021)
- When patients with type 2 diabetes were switched to the Nordic diet for two weeks, the reduction in gingival bleeding was as substantial as might be expected from one session of professional tooth cleaning. (International Journal of Molecular Sciences, July 2018)
- Based on NHANES data (over 6,800 participants), adherence to an anti-inflammatory diet is associated with significantly fewer missing teeth. (Clinical Nutrition, Aug. 2018)
- Anti-Inflammatory Foods: colourful fruits and vegetables; beans/legumes; high fibre, whole grains; herbs and spices; healthy fats (olive oil and vegetable oils, salmon, nuts and seeds, avocado); healthful, unsweetened beverages (green/black tea and coffee).
- Pro-Inflammatory Foods (limit or avoid): sugar-sweetened drinks; refined grains; sweets and desserts (cookies, ice cream, cake); red and processed meats; foods high in saturated fats, such as fatty red meats and butter; ultra-processed foods (nutrient-poor, calorie-rich); any calories in excess of energy needs.

Three Essential Food Choices for Optimal Gut & Brain Health

- Three essential dietary choices for good gut and brain health: fibre-rich plant foods, a diverse diet (wide variety of colourful, plant foods), and a regular intake of fermented foods.
- “A low-fibre diet decimates gut bacteria.” (Cell Host & Microbe, Dec. 2017)
- Microbes starved of fibre munch on the natural layer of mucus that lines the gut. (Cell, Nov. 2016)
- Load up on a wide range of fibre sources - whole grains, whole fruits & vegetables, nuts & seeds, and legumes/beans. Current guidelines - women should aim for at least 25g of fibre daily and men 38g. For optimal gut health 50g of fibre daily or more may be ideal.
- Prebiotic foods contain types of fibre that promote growth of beneficial microbes. Examples: bananas, apples, berries, kiwi, dark leafy greens, asparagus, avocado, broccoli, artichokes, oats, barley, garlic, onions, leeks, artichokes, and legumes.
- Fibre & Periodontal Disease (meta-analysis, 6 studies, including 5 RCTs) - A fibre-rich diet intervention significantly reduces: Clinical Attachment Loss/Level, Bleeding On Probing, Periodontal Inflamed Surface Area, Plaque Index, Gingival Index (Nutrients, Sept. 2023)
- The more diverse your diet, the more diverse your gut microbes. Eat a wide variety of different fruits, vegetables, legumes, nuts & seeds, whole grains, and herbs & spices. (Gut Microbiota for Health, Oct. 2020)
- American Gut Project (over 10,000 human microbial samples) – To optimize gut microbial diversity, aim for at least 30 different plant foods each week. Choose a variety of foods from the following food categories: fruits, vegetables, legumes, nuts & seeds, whole grains, herbs & spices, coffee/tea, cocoa. (mSystems, May/June 2018)
- Fermented foods include foods like yogurt, kefir, kimchi, sauerkraut, miso, tempeh, natto, and kombucha.
- Stanford researchers found that a 10-week diet high in fermented foods significantly boosts microbiome diversity and decreases inflammation. (Cell, July 2021)

- NHANES Study (46,091 adults) - The consumption of foods with live microbes is linked to lower: blood pressure, blood sugar, body weight, waist circumference, C-reactive protein (inflammation), triglyceride levels. (Journal of Nutrition, April 2023)
- NHANES, 34,133 adults, 10-year follow-up - Higher dietary live microbe intake linked to a longer life (lower mortality risk) & slower biological aging. (Journals of Gerontology, Aug. 2024)
- NHANES (11,529 participants) – Increasing dietary live microbe intake (fermented foods) is associated with a lower risk of frailty. (Journal of Nutrition, Health & Aging, March 2024)
- Fermented food intake can significantly impact health of the intestinal gut barrier; health of the blood brain barrier; immune response (inflammation), as well as overall communication between the gut & brain. (Neuroscience & Biobehavioral Reviews, Jan. 2024)
- Which fermented foods are best for brain health? "I expected only a few fermented foods would show up, but out of 200 fermented foods, almost all of them showed the ability to exert some sort of potential to improve gut and brain health." *Ramya Balasubramanian, Researcher, APC Microbiome Ireland*
- Study (26,118 adults, age 19-64, Korea) - Probiotic food intake from fermented dairy products and vegetables is inversely associated with depressive symptoms in the general population. (Nutrition, Feb. 2019)
- NHANES (8,574 participants) - Daily intake of medium to high levels of live dietary microbes linked to significantly lower risk of periodontitis. (Oral Diseases, Jan. 2024)

Probiotics & Health

- Know the name of the strain. Every probiotic is unique with a 3-part name – genus, species, and strain.
- Meta-analysis (42 studies, RCTs) - Probiotics, compared with antidepressants and placebo, may be efficacious as an adjunct or standalone therapy for treating depression. (Nutrition Reviews, Jan. 2024)
- Research Review (7 studies) - “Probiotic supplementation yielded only modest effects on depressive symptoms”. (Nutrients, March 2023)
- Research review on probiotics and dental health (24 clinical trials) - Able to reduce harmful bacteria (65% reduction in *Streptococcus mutans*). Equally effective or better than chlorhexidine in reducing oral pathogens, gingival index, and plaque index scores. (Current Pharmaceutical Biotechnology, April 2023)
- Meta-analysis on probiotics and periodontal disease (19 studies) - Used as an adjunct to scaling and root planning, probiotics can result in statistically significant improvements in: plaque index, periodontal probing depth, clinical attachment level, gingival index, bleeding on probing, deep probing depth levels of subgingival microbes. (Beneficial Microbes, March 2023)
- Probiotics versus Antibiotics for Periodontal Disease (research review – 10 studies) - Probiotics showed a significant reduction in probing pocket depth and clinical attachment loss. Antibiotics were more effective in reducing plaque and gingival index. Probiotics can be used as alternative to antibiotics, however, a combination is more effective. (Oral Diseases, Nov 2023)
- There is currently no standard on what an effective dose is for probiotics for oral health. Adhesion of probiotics is limited due to salivary washout - it is vital that a panel of experts determine a “minimal adherent probiotic dose”. (Frontiers in Microbiology, July 2023)

- Clinical guide to probiotic products available in Canada (www.probioticchart.ca). Designed to translate scientific evidence available for probiotic products to practical, clinically relevant information. Can help you select the appropriate product, dose, and formulation for a specific indication (genus, species and strain). Examples of current recommended products for mood disorders include Yakult Probiotic Drink and CalmBiotic. Examples of current recommended products for oral health include products from BioGaia and CulturedCare.

Fruits & Vegetables

- Research review (95 studies): An inverse relationship exists between fruit and vegetable intake and the risk of heart disease, stroke, cancer, and all-cause mortality. (Int J Epidemiol., June 2017)
- Meta-analysis (14 studies): Each additional serving of fruit or vegetable linked to a 14% lower risk of frailty. (Ageing Research Reviews, Nov. 2021)
- Meta-analysis (16 studies): Dose-response relationship between fruits & vegetables and prevalence of cognitive disorders. (Frontiers in Nutrition, June 2022)
- Increased fruit and vegetable consumption linked to increased happiness, life satisfaction, and well-being. Aim for at least 8 servings daily. (American J of Public Health, Aug. 2016)
- UK Household Longitudinal Study, 45,000 participants, 8-year study - The relationship between fruits & vegetables and better mental health is robust (dose-response). Even modest increases in intake can have substantial positive effects on well-being. (Social Science & Medicine, Jan. 2019)
- Norfolk Children & Young People Health & Well-being Survey (7570 secondary school, 1253 primary school children, 50 schools) - Students who ate at least five servings of fruits & vegetables daily were almost four times more likely to score high in mental health & well-being. (BMJ Nutrition, Prevention & Health, Sept. 2021)
- National FinHealth Study (5,043 adults, age 18+) - Researchers found a strong and consistent relationship between reduced fruit & vegetable intake and either inadequate or excessive sleep durations. (Frontiers in Nutrition, May 2024)
- Eat primarily whole fruits and vegetables, rather than juice. Increasing intake of fruit juice is linked to type 2 diabetes and gout. (EFSA Journal, Feb. 2022)

Dark Leafy Greens

- Contain more nutrition per calorie than any other food, including health-protective nutrients like magnesium, potassium, vitamin K, vitamin E, folate and carotenoids.
- Higher adherence to the MIND Diet (diet designed to prevent dementia and loss of brain function as you age) is linked to a significantly lower risk of dementia. Eating dark leafy greens daily is a core component of the diet. (JAMA Psychiatry, May 2023)
- Rush Memory & Aging Project, 581 autopsied participants - The MIND and Mediterranean diets are associated with less postmortem Alzheimer's disease pathology, primarily β -amyloid load. Among dietary components, higher green leafy vegetable intake was associated with less Alzheimer's disease pathology. (Neurology, May 2023)
- Aim for at least 1 cup of dark leafy greens each day.
- In 37 patients suffering from gingival inflammation, consuming a nitrate-rich diet (green smoothie consumed for two weeks) alters the composition of the oral microbiome and decreases gingival inflammation in periodontal recall patients. (Journal of Periodontology, Nov. 2021)
- Aim for at least 1 cup of dark leafy greens each day.

Cruciferous Vegetables (examples: arugula, broccoli, brussels sprouts, cabbage, cauliflower, kale)

- These vegetables contain powerful anti-cancer compounds. They turn off genes that promote cancer growth and turn on genes that suppress cancer growth. (American Institute for Cancer Research, September 2019)
- Cruciferous vegetables are uniquely, and significantly, linked to less thickening of the neck arteries. (American Heart Assoc. April 2018)
- Plant compounds (sulphoraphane) in cruciferous vegetables, like broccoli, slow down skin aging - less inflammation, less free radical damage, better collagen deposition. (The Journal of Nutritional Biochemistry, Dec. 2021)
- Eat cruciferous vegetables, like broccoli and kale, at least three to five times weekly.

Berries (antioxidant all-stars)

- As your intake of antioxidant-rich foods goes up, your risk of depression & anxiety goes down. (Annals of General Psychiatry, March 2019).
- Animal research - Blueberry-rich diet reversed age-related cognitive declines. (Geriatrics & Gerontology, Oct. 2012)
- The size of the stroke was 50% less in rats treated with diets supplemented with blueberries before the stroke." Paul Bickford, PhD, University of South Florida
- Boost your brain with berries (just over 1 cup daily for 12 weeks) was found to improve executive function, strengthen short-term memory, and speed up reaction times. (American Journal of Clinical Nutrition, March 2023)
- Wild blueberry drink linked to significantly lower risk of adolescent depression. (British J of Nutrition, March 2020)
- Post-traumatic stress disorder (PTSD) results in a prolonged stress response (increased oxidative stress and inflammation) in certain parts of the brain. Rats fed blueberries following the trauma had markedly reduced inflammation and higher serotonin levels, suggesting a better recovery. (PLOS One, Sept. 2016)
- Higher adherence to Mediterranean diet promotes growth of specific gut microbes that appear to be PTSD protective. (Nature Mental Health, Oct. 2023)
- Eat one cup of berries daily (fresh or frozen). Organic berries are higher in antioxidants.

Herbs & Spices

- "Wouldn't it be wonderful if we started thinking of our spice rack as a medicine cabinet?" *Dean Sherzai, MD, PhD, Alzheimer's Prevention Program, Loma Linda University*
- "If you set up a good herb and spice cabinet and season your food liberally, you could double or even triple the medicinal value of your meal." Diane Hartle, University of Georgia
- The power of herbs & spices: antioxidants, anti-inflammatory, anti-bacterial & anti-viral, increased use can reduce sodium/sugar intake.
- Regularly consuming higher quantities of herbs and spices results in a lower abundance of pathogenic bacteria in the gut. (Nutrients, March 2024)
- Turmeric (curcumin) appears to have significant health and medicinal benefits. It shows promise for cancer, heart disease, inflammatory disease, metabolic disease, neurological disease, and skin disease. (ACS Pharmacology & Translational Science, March 2023)
- Systematic Review (10 studies, RCT's) - Curcumin improves symptoms of depression & anxiety - anti-inflammatory, increases BDNF, reduces cortisol. (Australian & New Zealand Journal of Psychiatry, March 2021)

- Research Review (20 studies) - “Although curcumin demonstrates anti-anxiety, anti-depressive and anti-stress properties, studies on humans are limited... Further research is highly recommended to determine the most functional formula, dose, duration, and possible side effects of curcumin on mental disorders in humans.” (Life (Basel), April 2024)
- “Concentrated and highly bioavailable forms of turmeric and curcumin are now commercially available. Because of these formulations, there has been an upsurge in published cases of turmeric-based liver damage.” (Hepatology Communications, April 2024)
- Onions & garlic are also excellent for gut health – they are a significant source of inulin, a prebiotic (feeds the good bacteria in your gut).

Whole Grains

- The bran and germ, which are discarded when making refined grains such as white bread, contain 80% or more of the health protective plant compounds.
- PURE study (21 countries, over 10-years, 137,130 participants): A higher intake of refined grains is associated with a significantly higher risk of total mortality, high blood pressure, stroke, and heart disease. (BMJ, Feb. 2021)
- “Our study findings suggest that a substantial amount of the cancer burden in the U.S. is attributable to low whole grain consumption and high processed meat consumption.” (Dr. F. Zhang, Cancer & Nutrition Researcher, Tufts University)
- Starchy foods are often ignored when dentists counsel patients about oral health and dental caries. “Starchy foods (particularly those more rapidly digested in the oral cavity) have a similar or greater potential than sugary foods to drop plaque pH and may therefore pose an increased risk of dental caries.” (Nutrients, Aug. 2021)
- Enjoy intact whole grains more often, including oat groats, steel-cut oats, brown rice, quinoa, wheat berries, millet, and barley.
- Read labels (ingredient list): enriched wheat flour is “white flour”. Multigrain means the product contains more than one grain but doesn’t mean any of the grains are “whole” grains.
- Popcorn is a much better choice than snacks like pretzels, potato chips, or cheezies. It is a 100% unprocessed, whole grain and a significant source of antioxidants (hull).

Nuts

- Research Review (89 studies): Consuming a handful of nuts daily (28 grams) is linked to a significantly lower risk of: coronary heart disease incidence & mortality, atrial fibrillation, stroke mortality, cancer deaths, all-cause mortality, respiratory diseases, infectious diseases, diabetes. (Advances in Nutrition, Aug. 2022)
- Based on 34 studies, pistachios, walnuts, and almonds are best for lowering triglycerides and LDL cholesterol compared with other nut-enriched diets. (American J of Clin. Nutrition, Nov. 2019)
- Regular nut consumption improves cognition (including accuracy & reaction time) and gut health. (The Journal of Nutrition, Dec. 2022)
- NHANES, 26,656 participants - Depression scores were significantly lower among nut consumers, particularly walnut consumers, as compared to non-nut consumers. (Nutrients, Jan. 2019)
- University students consumed ½ cup of walnuts daily - had a positive impact on stress levels, depression, and sleep quality. (Nutrients, Nov. 2022)
- Consuming peanut products, starting in infancy (around 6 months) & continuing to age 5, helps prevent peanut allergies. (New England Journal of Medicine, May 2024)

- Eat a small handful of nuts and/or seeds daily. Enjoy them in their least processed form (nut butters don't protect health to the same extent). Enjoy a wide variety of nuts and seeds.

Beans

- Nutrient Rich Foods Index (University of Washington): beans are one of the highest-scoring foods nutritionally. Beans contain 12 to 15 grams of fibre per cup, which is exceptional.
- Black beans, red kidney beans, lentils, and pinto beans are high in antioxidants.
- Beans contain slow-release carbs (blood sugar increases slowly when consumed).
- Eating one serving of beans daily (3/4 cup) is linked to significant weight loss, even when no special effort is made to avoid other types of foods. (Am. J of Clinical Nutrition, March 2016)
- Adding one cup of beans daily to the diet increases gut microbial diversity (including beneficial gut microbes) and decreases pathogenic microbes (ones that threaten gut barrier integrity & promote colon cancer). These changes reverse within one month of stopping bean consumption. (eBioMedicine, Dec. 2023)
- Taking an antibiotic generally results in a decrease in microbial richness or diversity and a decrease in SCFA production. Consuming beans daily while taking an antibiotic appears to limit these microbial changes. (Cell Reports Medicine, May 2021)
- Drug-Resistant Bacteria Deaths Projected to Rise 70% by 2050. "Antimicrobial-resistant bacterial infections have been a significant global health threat for decades and that this threat is growing." (The Lancet, Sept. 2024)
- Blue Zones - communities with surprisingly high percentages of centenarians. They eat mostly plants, especially beans (average 1 cup daily).
- Enjoy beans daily or at least every other day (¾ cup to 1 cup serving).
- Beans & gas – flatulence is good for health. Specific gut microbes use hydrogen (one of the gases bacteria in our GI tract produce as we digest food) to produce hormones that impact health. This includes a hormone (allopregnanolone) that may reduce the risk of postpartum depression. Low levels of this hormone are also linked to other mood & psychiatric disorders. (Cell, June 2024)

Fish

- Meta-analysis (17 studies), 40,861 participants with heart disease - Dose-response relationship between omega-3 fats (grams per day) and all-cause mortality. (Food & Function, Jan. 2024)
- Association of dietary patterns with heart disease mortality from Adventist Health Study 2. Pesco-vegetarians (plant-based plus fish) had the lowest risk of dying from heart disease. (Journal of the American College of Cardiology, Sept. 2020)
- Omega-3 fats (EPA in particular) in plaque tissue is associated with decreased plaque inflammation and increased stability. (Pharmacology & Therapeutics, Dec. 2022)
- Oily fish consumption is inversely associated with pain incidence and worsening over 5 years. Higher intakes are linked to less pain worsening. (Clinical Nutrition, Sept. 2022)
- "Countries where the population eats a lot of fish have a lower rate of a whole host of psychiatric problems. Low seafood consumption is associated with greater risk for depression, bipolar disorder, homicide, and suicide." *Julia Rucklidge, PhD, University of Canterbury*
- Omega-3 fats are a primary structural component of the human brain. They are concentrated right where brain cells communicate with each other, and all signals pass back and forth. They have strong anti-inflammatory properties.

- Meta-analysis (67 studies): Supplementation with omega-3 fats can lead to large and clinically important improvements in depression severity (greatest reductions seen at 1 to 1.5 g/day) and an increase in remission rates. (British Journal of Nutrition, Sept. 2023)
- 60 adults with major depressive disorder, 4-to-8-week intervention with 3 standard antidepressants - Lower blood levels of omega-3s linked to less positive response to antidepressants. (Depression & Anxiety, March 2022)
- Meta-analysis, 3,918 participants, 28 studies, RCTs - Conclusion: There is now sufficient evidence to begin to implement omega-3 supplementation to reduce aggression in children and adults. (Aggression & Violent Behavior, Sept/Oct. 2024)
- Inflammaging - aging is accompanied by changes in gut microbe composition resulting in a low-level inflammation throughout the body that becomes constant. Promotes decline or deterioration of brain cell health. (Molecular Metabolism, Aug. 2023)
- Omega-3 fats help protect the aging brain, including memory loss, by curbing inflammation. (Frontiers in Cellular Neuroscience, Aug. 2023)
- Aging decreases transport of omega-3 fat (DHA) across the blood-brain barrier. (PLOS One, Feb. 2023)
- Cognition & Fish Intake (NHANES - 3,123 participants, ≥60 y). “The most striking result from this study is how strongly fish consumption is associated with better performance on immediate recall, delayed recall, & executive function in older adults.” (American Journal of Clinical Nutrition, Dec. 2023)
- Meta-analysis (12 studies) - Supplementation with omega-3s results in significant improvements in cognitive function in older people with mild cognitive impairment. (Journal of Alzheimer’s Disease, April 2024)
- 102 participants, age 75+ with lower blood levels of omega-3s (brain scan, blood test, 1.65g fish oil supplement): Fish oil supplementation benefits those with a genetic predisposition to Alzheimer's disease (slows neuronal integrity breakdown). (JAMA Network Open, Aug. 2024)
- Omega-3 supplementation (3 grams/day) can alleviate exercise-induced muscle damage and promote post-exercise recovery. (European Journal of Nutrition, Dec. 2022)
- There is a large body of evidence that clearly shows the actions of omega-3 fats (EPA and DHA) in periodontitis. Omega-3 fats: reduce inflammation, reduce bone loss, increase clinical attachment gain. (Nutrients, Feb. 2023)
- Higher oily-rich fish consumption linked to less severe periodontitis, including less gingival inflammation & periodontal pockets. (J of Clin. Periodontology, Feb. 2022)
- Canadian Health Measures Survey (over 4,000 adults). Omega-3 Index: proportion of EPA + DHA as a percentage of total fatty acids in red blood cell membranes (about 8% to 12% is optimal). Less than 3% of the Canadian population have levels in the optimal (>8%) range. (American Journal of Clinical Nutrition, April 2021)
- Review (58 studies) of the Omega-3 Index: A value ≥ 8% is associated with a lower risk of chronic disease, especially cardiovascular disease. The amount of fish oil required to improve the index is 1,000 to 1,500 mg/day EPA plus DHA for at least 12 weeks. (Frontiers In Nutrition, Jan. 2023)
- Eat 2 to 3 servings of higher fat fish each week (Salmon, Herring, Mackerel, Rainbow Trout, Sardines). If you don’t eat fish regularly consider taking a fish oil supplement.
- To determine the omega-3 content of a fish oil supplement, take the mg of EPA and DHA listed on the label and add them together.

Eggs

- Eggs are nutrient-dense, low calorie, low in saturated fat, rich in lutein and zeaxanthin, rich in choline.
- Limit egg yolk intake to one whole egg daily for healthy people or up to two for seniors with normal cholesterol levels. Shrimp and other shellfish can be part of a healthy diet focused on other lean or plant-based protein sources. Vegetarians can include more dairy and eggs in their diets. People with high cholesterol, particularly those with diabetes or at risk for heart failure, should still be cautious about cholesterol-rich foods. (AHA Science Advisory, Dec. 2019)
- Meta-analysis (11 studies) -High consumption of dietary cholesterol increases risk of Type 2 diabetes (dose-response), especially in Western countries. (Nutrition, Metabolism & Cardiovascular Diseases, Jan. 2023)

Milk Products

- Review (41 meta-analyses of 45 health outcomes): An increment of 200 ml (approx. 1 cup) milk intake per day was associated with a lower risk of: cardiovascular disease, stroke, hypertension, colorectal cancer, metabolic syndrome, obesity, osteoporosis. Milk may increase risk of prostate cancer, Parkinson's disease, and acne. (Nutrition & Metabolism, Jan. 2021)
- Dietary Recommendations for Prevention & Treatment of Osteoporosis. Recommend Mediterranean-type diet and the daily consumption of 2 to 3 dairy products, especially fermented (lack of data for plant-based beverages). (Joint Bone Spine, May 2023)
- Fermented dairy foods appear to be the most health protective. (Journal of the National Medical Association, Feb. 2024)
- Comparison of 233 plant-based milk alternatives - Compared to cow's milk, only 12% of the milk alternative products contained comparable or greater amounts of all three nutrients studied: calcium, vitamin D, and protein. (American Society for Nutrition, July 2023)
- Fats & Oils - A scoping review for Nordic Nutrition Recommendations 2023: "Butter increases LDL-cholesterol when compared to virtually all other fats and oils." (Food & Nutrition Research, Feb. 2024)
- Out of 477 plant-based alternative products, only four milk-alternative products were iodine fortified. (European Journal of Nutrition, March 2024)
- Always shake plant-based milks before using, as nutrients like protein and calcium can settle to the bottom. (Frontiers in Nutrition, Aug. 2022)
- Plant-Based, Milk Alternatives & Dental Health - Most plant-based products contain more cariogenic carbohydrates, lack phosphopeptides, have fewer minerals, and less buffering capacity. (Nutrients, March 2023)
- Cow's milk vs soy milk, 2-week study, RCT - Soy milk demineralized enamel whereas cow's milk resulted in remineralization. (Journal of Dentistry, Sept. 2019)

Water

- Atherosclerosis Risk in Communities Study - Poor hydration accelerates biological aging, chronic disease development, and premature death. (eBioMedicine, Jan. 2023)
- Chronic low fluid intake increases the risk of urinary tract infection, kidney stones, chronic kidney disease, and bladder cancer. (National Kidney Foundation)
- Even small differences in hydration status (less than 1% of body weight) can impact memory, response time, ability to focus attention, energy levels, and mood, including anxiety & depression. (Am J Clin Nutrition, Sept. 2016)

- NHANES, 5,882 participants (age 45+) - Increasing intake of plain water lowers periodontitis risk in middle aged & elderly population. (BMC Oral Health, Jan. 2024)
- Recommended Daily Water Intake (from food and drinks): Adult males – at least 2000 mL (10 cups). Adult females – at least 1600 mL (6.5 cups). (British Dietetic Association, Jan. 2023)
- Avoid water or other drinks sold in plastic bottles. They can contain 10 to 100 times more bits of plastic than previously estimated - nanoparticles so tiny they can't be seen under a microscope. (PNAS, Jan. 2024)
- National Institutes of Health looked at livers, kidneys, & brains from bodies autopsied in 2016 and 2024. The brain samples contained about 10 to 20 times more plastic fragments than other organs. (Nature Portfolio, May 2024)

Coffee

- “It’s way past time that we stopped viewing coffee as something we all need to cut back on. It’s a completely reasonable addition to a healthy diet, with more potential benefits seen in research than almost any other beverage we’re consuming. It’s time we started treating it as such.” *Aaron E. Carroll, MD, Indiana University School of Medicine*
- Harvard Nurses’ Health Study & Health Professionals Follow-Up Study (15,486 men & women with type 2 diabetes, 18.5-year follow-up): Coffee is inversely associated with all-cause mortality. (BMJ, March 2022)
- NHANES, 13 384 participants (2 cups coffee/day average) -Moderate coffee drinking may offer substantial benefits in reducing biological aging. (Food & Function, May 2024)
- Habitual coffee (3 cups daily) or caffeine intake (200 to 300 mg daily) helps protect against heart disease, stroke and type 2 diabetes. (Journal of Clinical Endocrinology & Metabolism, Sept. 2024)
- “At last, liver physicians have found a lifestyle habit that is good for your liver! Drinking coffee can protect you from developing liver disease and in addition reduces the risk of progressive disease for those already affected.” *Prof. G. Alexander, British Assoc. for Study of the Liver*
- 1719 patients with stage I–III colon cancer - Research shows a strong inverse association between coffee consumption and colon cancer recurrence. (Int. Journal of Cancer, Feb. 2024)
- EPIC4PD Study, 184,024 participants, 6 European countries - Higher intake of coffee linked to almost 40% lower risk of Parkinson’s Disease. (Neurology, March 2024)
- UK Biobank Study, 487,594 participants, age 38–73 (12-year follow-up): Consuming 1 to 2 cups of coffee (not decaf) or 3 to 4 cups of tea daily is linked to a significantly lower risk of osteoporosis. Lowest risk seen in those who drink both daily. (Bone, May 2024)
- Meta-analysis (29 studies, 422,586 participants) - Coffee & caffeine may protect against development of depression. (Frontiers in Nutrition, Feb. 2023)
- Two studies (Health & Retirement Study & UK Biobank Study) link coffee and/or tea drinking to a significantly lower risk of cognitive decline & dementia. (Alzheimer’s Association International Conference, July 2024)
- Research Review (24 studies) - Consuming caffeine prior to sleep: reduces total sleep time, increases time it takes to fall asleep, reduces amount of time spent in deep sleep, increases how much time you spend awake after falling asleep initially. To avoid reductions in total sleep time, consume coffee (1 cup) at least 8.8 hours prior to bedtime. Example - if your bedtime is 10 pm, have coffee prior to 1 pm. (Sleep Medicine Reviews, Feb. 2023)

Tea

- Tea has been called the “World’s Healthiest Beverage” and is good for heart disease, stroke, cancer, dementia, depression, diabetes, bone health, eye health, dental health, and immunity.
- Tea is a longevity beverage that centenarians sip casually all day long.
- Moderate daily tea consumption (especially when consistent) slows biological aging. Three cups of tea daily linked to greatest anti-aging benefits. (The Lancet, Regional Health, Nov. 2023)
- Meta-analysis (8 studies) - High green tea consumption (3 or more cups/day) is inversely associated with depression symptoms. (Journal of Nutritional Science & Vitaminology, 2022)
- Herbal tea (Chamomile/Saffron) may significantly improve depressive symptoms through multiple pathways, including increased BDNF in the brain and lower inflammation. (Heliyon, Oct. 2022)
- Meta-analysis (7 studies, 410,951 participants) - Drinking green or black tea is linked to a significantly lower risk of dementia, including Alzheimer’s disease & vascular dementia. (PeerJ, July 2023)
- Green and black tea compared to soft drinks and orange juice over 20 weeks: The erosive effect of tea was similar to water, which has no erosion potential. Given the systemic and dental benefits of tea and the low potential for erosion, green and black tea should be highly encouraged for daily beverage consumption. (General Dentistry, July/Aug. 2008)
- Increased consumption of green tea shows a strong positive association with oral health-related quality of life in both men and women, especially at an intake of ≥ 3 cups/day of green tea. (European Journal of Clinical Nutrition, April 2019)
- Green tea promotes oral health by: Reducing inflammation of the tongue, cheek, & throat; promoting growth of health-promoting bacteria (*Lactobacillus* & *Bacillus*) and inhibiting growth of pathogens (*Achromobacter*); reversing microbial disorders in oral cavity. (Journal of Food Science, October 2023)
- Long-term green or black tea consumers are significantly more likely to maintain functional dentition (≥ 20 teeth). (BMC Public Health, Feb. 2024)
- Rinsing with green tea more effectiveness in decreasing *Streptococcus mutans* compared to black tea. (Macedonian Journal of Medical Sciences, Nov. 2019)
- Based on a review of 5 studies, green tea-based mouthwashes can be considered as an alternative to chlorhexidine mouthwashes in sustaining oral hygiene (plaque index and/or gingival index), especially because of the added advantages provided by herbal preparations. (Indian Journal of Dental Research, March/April 2018)
- Mouthwash study (green tea vs green tea plus ginger vs chlorhexidine) - Green tea plus ginger resulted in the most significant reduction in plaque & gingival index score and can be used as an alternative to Chlorhexidine. (Journal of Indian Society of Periodontology, July/Aug. 2021)
- Liz’s spiced green tea: cinnamon sticks, whole cloves, thinly sliced, fresh ginger.
- Fluoride Content of Various Teas - Tea plants hyperaccumulate fluoride from the soil. Black tea has most. White tea has least. (Scientific Reports, July 2021)
- STUDY: Fluoride Content of Different Types of Tea (black, green, matcha). Most teas contain a higher fluoride concentration than optimally fluoridated water (0.7 mg/L). All tested tea samples contained fluoride in amounts ranging from 0.521 to 6.082 mg/L. Matcha green tea powder had the highest concentration of fluoride. (General Dentistry, Jan. 2021)
- Meta-analysis (23 studies) - drinking hot (high temperature) tea is linked to an 80% higher esophageal cancer risk. (Frontiers in Nutrition, April 2022)

- IARC Monographs (2016): Drinking very hot beverages (at above 65 °C) is “probably carcinogenic to humans”. Sip temperature, as well as sip volume (first sip often not the biggest sip) linked to higher risk of esophageal cancer. (Cancer Epidemiology, Oct. 2024)
- Plastic teabags release significant amounts of microplastics. Choose brands that contain no plastic or use loose leaf tea with an infuser. (Environmental Science & Technology, Sept. 2019)
- Enjoy 3 to 6 cups of green tea daily. Drink regular, not decaffeinated green tea - decaffeinated has 50% fewer beneficial plant compounds. Don’t drink it too hot (wait 4 minutes). Enjoy herbal teas in the afternoon and evening to limit caffeine intake later in the day.

Vitamin Supplements

- Nutrients in high doses can act like drugs, have pharmacological side effects, and be toxic.
- “No single nutrient can successfully treat the complexity of brain and mental disorders.” *Julia Rucklidge, PhD, University of Canterbury*
- The body needs a full blend of nutrients for the brain to function optimally.
- “The meta-analysis of three separate cognition studies provides strong and consistent evidence that taking a daily multivitamin, containing more than 20 essential micronutrients, helps prevent memory loss and slows down cognitive aging.” (American Journal of Clinical Nutrition, Jan. 2024)
- Multivitamin makes sense for: most females; vegans & vegetarians; everyone age 50+.
- Vitamin D - the sunshine vitamin. Recommended daily intake: 600 IU (over age 70: 800 IU).
- High incidence of vitamin D deficiency in those who engage in office Jobs (8 hours indoors daily). (Ecology of Food & Nutrition, Jan. 2024)
- A deficiency of vitamin D can increase the risk of fractures in older adults, cancer, autoimmune diseases (especially rheumatoid arthritis), cardiovascular events, diabetes. (Consensus Statement on Vitamin D, April 2024)
- Exposure to sunlight, or vitamin D supplements, boosts diversity of gut microbiome and good gut bacteria. (Frontiers in Microbiology, Oct. 2019)
- Umbrella Meta-analysis (65 RCTs, 31 cohort) - Vitamin D supplementation helps alleviate depression. There is an inverse relationship between higher blood levels of vitamin D and overall depression. (Pharmacological Research, Jan. 2023)
- Vitamin D linked to an almost 50% lower risk of attempted suicide and intentional self-harm (higher daily dosages associated with lowest risk). (PLOS One, Feb. 2023)
- Vitamin D supplementation linked to 40% lower risk of dementia (effect significantly greater in females). (Alzheimer's Association, March 2023)
- Vitamin D has a profound impact on immunity (turns antimicrobial genes on) and inflammation (turns pro-inflammatory genes off). Deficiency leads to inflammation and ultimately, alveolar bone loss. (Journal of Periodontal Research, Aug. 2019)

Leaving Room For Chocolate

- Dark chocolate contains significantly more health-protective flavanols than milk chocolate. You are also much less likely to overindulge in dark chocolate.
- Do not buy “dutched” cocoa. It contains 40% to 90% less flavanols. If it has been processed this way, you will see “potassium carbonate” or “sodium carbonate” on the ingredient list.
- Dark chocolate can be a significant source of heavy metals, including lead and cadmium. Consumers Reports recently tested 28 bars and indicated which brands are most and least likely to contain dangerous levels. The full results of their study can be found online. (Consumer Reports, Dec. 2022)

Foods to Limit or Avoid

Red Meat and Processed Meats

- October 2015: The World Health Organization classified processed meats as a carcinogen and red meat as a possible carcinogen. These meats are linked to a higher risk of colon cancer.
- World Cancer Research Fund (Feb. 2023) - Our Cancer Prevention Recommendation for processed meat is “eat little if any.” Examples of a processed meat include sausages, hot dogs, bacon, ham, pâté, canned meat (like corned beef & Spam), and sliced luncheon meats (like salami, ham, chicken, turkey).
- Research review - The consumption of even low levels of processed red meat can increase the risk of mortality and chronic disease outcomes, including cardiovascular diseases and colorectal cancer. (Food & Agriculture Organization of the United Nations, April 2023)
- 31 cohorts, 1,966,444 adults - The consumption of meat, particularly processed meat and unprocessed red meat, increases the risk of type 2 diabetes across populations. (The Lancet Diabetes & Endocrinology, Sept. 2024)
- Food and mental health... “We saw in our data a very clear pattern around too little or too much meat being problematic. A tiny amount – three or four palm-sized servings a week – was associated with about half the probability of having a depressive or anxiety disorder.” *Felice Jacka, PhD, Director of Food & Mood Centre*
- Meta-analysis (13 studies), over 49,000 participants - Vegetarians are more likely to suffer from depression than non-vegetarians. (J of Affective Disorders, Nov. 2021)
- Over 14,000 adults (age 35–74) - Individuals who excluded meat from their diet were over twice as likely to suffer from depression. (J of Affective Disorders, Jan. 2023)
- Lifetime incidence of psychiatric diagnoses (anxiety & depression): non-vegetarians had lowest incidence, vegetarians had highest incidence, and semi-vegetarians were in the middle. (Progress In Cardiovascular Disease, Sept/Oct. 2022)
- Low quality plant-based diets (high in ultra-processed foods, refined grains, sugary snacks, and drinks) are associated with a higher risk of depression. High quality plant-based diets are associated with a lower risk of depression in vegans and vegetarians. (BMJ Nutrition, Prevention & Health, Nov. 2021)
- UK Biobank Study - Consuming processed meat significantly increased the risk of dementia, including Alzheimer’s disease, while small amounts of unprocessed red meat was linked to a lower risk. (American Journal of Clinical Nutrition, July 2021)
- If you eat meat, limit your weekly intake to about three small servings (deck of cards size) of lean, unprocessed meat. If you follow a vegetarian diet, it must be well balanced, including lots of beans/legumes. Marinate meat before grilling (herbs/spices, garlic, extra virgin olive oil) to reduce the formation of carcinogens.
- Meta-analysis (36 studies) - Protein powder... Does protein supplementation benefit community-dwelling older adults? Protein supplementation does not lead to increases in lean body mass, muscle cross-sectional area, muscle strength, or physical performance. It does not increase the benefits of resistance exercise. Most study participants already getting sufficient protein in diet. (American Journal of Clinical Nutrition, Nov. 2018)

Alcohol

- Comprehensive, systematic reviews of the evidence conclude that no level of alcohol is safe to drink. There are no known protective health effects from consuming alcohol, even at low levels. Drinking less alcohol is better for your health, but none is best. (World Health Organization/2023)
- Canada's Guidance on Alcohol & Health – The science is evolving and recommendations about alcohol use need to change. No amount or kind of alcohol is good for your health. Drinking alcohol, even a small amount is damaging to everyone, regardless of age, sex, gender, ethnicity, tolerance for alcohol or lifestyle. You will likely avoid alcohol-related consequences for yourself and others if you limit your intake to 1 to 2 standard drinks per week. (Canadian Centre on Substance Use & Addiction, Jan. 2023)
- The World Health Organization has classified alcohol as a “Class 1” carcinogen since 1988. Alcohol is one of the top three causes of cancer deaths worldwide.
- Policy Position, World Cancer Research Fund International, Sept 2024: Consuming alcohol increases the risk of 7 types of cancer. All types of alcohol increase risk. For cancer prevention, it is best not to consume alcohol.
- “Alcohol has two possible effects on sleep, it can make it worse or much worse.” *Dr. Wendy Burn, Consultant Psychiatrist*
- Meta-analysis (23 studies) - Consuming alcohol increases the risk of high blood pressure (linear relationship), especially above an alcohol intake of 12 g or more than one drink daily. (Hypertension, June 2024)
- “Increasing rates of harmful alcohol use over the past 2 decades have led to skyrocketing rates of alcohol-associated liver disease.” *Nneka N. Ufere, MD, Transplant Hepatologist*
- UK Biobank Study (25,000 people - brain scans) - “Our findings suggest that there is no safe level of alcohol consumption for brain health. Current low risk guidelines do not take account of the brain impact of drinking but should now be reviewed.” (medRxiv, May 2021)
- “Ethanol, present in alcoholic beverages, has more damaging effects on the human brain than perhaps any other chemical that comes from outside the body.” Alcohol easily crosses the blood-brain barrier and is poisonous to brain cells. (Alcohol & Society Research Report, Feb. 2024)
- Alcohol consumption, especially heavy drinking, may negatively impact the oral microbiome - depletion of beneficial bacteria and increased colonization of pathogenic bacteria. (Microbiome, April 2018)
- Based on a review of 18 studies, higher alcohol use (about 3 or more drinks daily) is linked to a 60% higher risk of periodontal disease. (Journal of Clinical Periodontology, July 2016)
- Binge drinking is especially harmful to health - typically five or more drinks in two hours for men, and four drinks for women.
- Youth binge drinking alters the gut microbiome. The changes negatively impact the ability to recognize emotions and increase the urge to consume alcohol. (Lancet eBioMedicine, Feb. 2023)
- Adolescent binge drinking, even if discontinued, increases the risk for anxiety later in life due to changes in the brain, especially in the amygdala, which is involved in emotional regulation. (Biological Psychiatry, Jan. 2019)
- If you choose to drink alcohol, consume it in smaller quantities (no more than 1 drink daily), over a longer period of time, and with food. The body's ability to tolerate alcohol decreases as we get older. If alcohol abuse, heart disease, or cancer runs in your family, be extra cautious. Women become dependent on alcohol quicker & develop health-related problems sooner than men.

Ultra-Processed Foods

- Unhealthy diets now pose a greater risk to health, well-being, and risk of death than any other risk factor in the world.” (The Lancet, May 2019)
- “As a general rule of thumb, the more ingredients a food has, and the more you struggle pronouncing these ingredients, the more likely it is an ultra-processed food.” *Dr. Mario Kratz, PhD, Nourished by Science*
- Ultra-processed food consumption linked to obesity, poor liver health, metabolic syndrome, depression, heart disease, increased risk of COVID-19 infection, dementia, kidney disease, inflammatory bowel disease, cancer, and frailty. (Ultra-Processed Foods Evidence Review, 2022)
- Today’s children are shorter, fatter, & sicker. Failure to reverse the alarming trajectory will result in a generation burdened throughout their lives by diet-related illnesses & the mental health impact of living with disease – followed by an early death. (Food Foundation Report, June 2024)
- Main goals of food industry are to generate profit, maximize product sales, and drive consumption. (World Health Organization, June 2024)
- “People say to me, ‘It’s ridiculous to compare cookies to heroin...the power of the products is the speed at which they hit the brain. Tobacco smoke can take 10 seconds to make you want to smoke more. Sugar can excite the brain in less than one second.” *Micheal Moss (author of Salt, Sugar, Fat)*
- The ultra-processed food industry has spent the most on lobbying. (Milbank Quarterly, Jan. 2024)
- Over 90% of food products advertised to children and teens on Facebook, YouTube, and Instagram are unhealthy. (Pediatric Obesity, March 2023)
- Tim Spector, a prominent researcher from King’s College London, had his university age son eat nothing but McDonald’s for ten days (either a Big Mac or chicken nuggets, plus fries and Coke) to determine impact the gut microbiome. The number of gut-friendly, bifidobacteria decreased by 50% and species diversity decreased by about 40%.
- Dr. Chris van Tulleken (author of book “Ultra-processed People”): Consumed 80% ultra-processed food diet for one month. He experienced rapid weight gain, inflammation, raging thirst, poor sleep, constipation, and rewiring of brain.
- There is a linear relationship between ultra-processed foods intake and weight gain. Excessive body fat increases production of many pro-inflammatory compounds, which can also increase the risk of depression. (Public Health Nutrition, July 2023)
- Colon cancer rates in the U.S. between 1999 and 2020 increased by: 500% age 10 to 14; 333% age 15 to 19; 185% age 20 to 24. (Digestive Disease Week, May 2024)
- Ultra-processed food intake is linked to a significantly higher risk of chronic insomnia. (Journal of the Academy of Nutrition & Dietetics, Feb. 2024)
- A diet high in ultra-processed foods reduces restorative, deep sleep (less slow-wave activity). (Journal of Obesity, May 2023)
- Highly-processed products contain the most microplastics per gram. (Environmental Pollution, Feb. 2024)
- 26 countries, 292,786 participants (age 18 to 75+) - Mental health decreases sharply with more frequent consumption of ultra-processed foods. (Sapien Labs Rapid Report, Oct. 2023)
- High intakes of ultra-processed foods are linked to an 80% higher risk of depression. (Public Health Nutrition, July 2022)
- Meta-analysis (17 studies) - Children & adolescents with the highest consumption of ultra-processed foods are significantly more likely to experience depression, stress, anxiety, & poor sleep. (Nutritional Neuroscience, Sept. 2023)

- Reducing ultra-processed food consumption independently benefits those with depression. Combining a Mediterranean-type diet with a lower intake of ultra-processed foods lowers depression risk the most. (International Society for Nutritional Psychiatry Research, March 2023)
- Research Review (5 studies, 617,502 adults) - Ultra-processed food intake is linked to a significantly higher risk of cognitive decline & Alzheimer's. (Frontiers in Nutrition, Jan. 2024)
- Severity of periodontitis is associated with the processing level of consumed food. (Nutrients, Sept. 2022)

Sodium

- High salt intake leads to high blood pressure, which raises the risk of vision loss, memory loss, stroke, heart failure, heart attack, kidney damage, erectile dysfunction, and peripheral artery disease. (Centre for Science in the Public Interest, Nutrition Action, Oct. 2020)
- Over 70% of sodium consumed comes from processed foods and restaurants.
- Recommended daily limit for sodium is 1500 mg (upper limit 2300 mg). One teaspoon of salt contains about 2,300 mg of sodium. (National Academies of Sciences, March 2019)
- Using a salt substitute (reduced sodium/added potassium) to replace all regular salt in the home can reduce blood pressure substantially in those with high blood pressure. (American Journal of Clinical Nutrition, March 2021)
- Potassium-enriched salt should be recommended to all patients with high blood pressure. Exception - those with advanced kidney disease or those taking a potassium supplement or potassium-sparing diuretic. (Hypertension, Jan. 2024)
- A salt substitute also helps prevent the development of high blood pressure. Older adults were 40% less likely to develop hypertension when using a salt substitute for 2 years. (Journal of the American College of Cardiology, Feb. 2024)
- Some forms of salt have undeserved "health halos". Sea salt & Himalayan salt are still high in sodium and almost never iodized.
- Iodized table salt is the most reliable source of iodine in the diet. National diet surveys (NHANES) suggest iodine consumption has been decreasing over the last 20 years (urinary levels suggest nearly 40% of Americans may be low on iodine, putting them at risk of an enlarged thyroid & hypothyroidism). Salt added commercially is not iodized (it's the source of most of our salt). (Cardiovascular Health & Well-being DPG Symposium, April 2024)

Sugar & Health

- Research Review (73 meta-analyses, 8601 studies): A diet high in added sugar is linked to 45 poor health outcomes, including: asthma, cancer (pancreatic, liver), dental caries, depression, diabetes, fatty liver, gout, high blood pressure, heart disease, heart attack, & stroke, shorter lifespan. Reduce intake of added sugars to below 6 teaspoons/day and limit sugar sweetened beverages to less than one serving/week (BMJ, Feb. 2023)
- Divide grams of "sugars" on food labels by 4 to determine number of teaspoons in product.
- "Sugar is a major dietary culprit in the development of cardiovascular disease." (Frontiers in Nutrition, July 2024)
- Higher added sugar intake causes our cells to age prematurely. (JAMA Network Open, July 2024)
- Review of over 300 studies (sugar consumption, stress & emotions) - Overwhelming evidence shows over-consumption of sugar changes brain cell functioning and plasticity: negatively alters ability to regulate our emotions; Increases impulsivity, anxiety, and depression. (Neuroscience & Biobehavioral Reviews, Aug. 2019)

- NHANES (18,439 adults, age ≥ 20 years) - A 100 g/day increase in sugar intake (about 6 tsp) is linked to a 28% higher risk of depression. As sugar intake rises, so does the risk of depression. (BMC Psychiatry, Feb. 2024)
- Rush Memory & Aging Project (837 participants) - Researchers found an inverse relationship between sugar intake and both cognition and memory. Highest sugar intakes linked to more than double the risk of Alzheimer's Disease. (Journal of Alzheimer's Disease, Oct. 2023)
- Sugar and dental health - The most important single factor, driving the oral microbiome from a healthy symbiotic balance with the host to a state of dysbiotic imbalance... is excessive sugar intake. Each additional 5 grams of sugars (about 1 tsp) intake has been associated with an increase in the probability of developing caries.
- 21 patients with untreated periodontitis (avoided sugar for 4 weeks). Free-sugar avoidance (sweets, juice, processed white flour) after periodontal therapy had additional beneficial effects on periodontal health, including significant reduction in periodontal bleeding. Patients were allowed to replace sugar with whole fruit, which also led to increased levels of micronutrients such as vitamin C. (Journal of Periodontology, Aug. 2024)
- WHO Guidance on Starch based on a review of 156 studies: Rapidly digested starch intake (more processed), but not total starch intake promotes increased risk of caries. Health professionals should promote consumption of slowly digested starches, such as that found in whole grains, fruits, and vegetables and advocate limiting rapidly digested starches only, especially when combined with free sugars. (Journal of Dental Research, Jan. 2019)

Sugary Drinks & Health

- Sugary drinks are especially harmful to health, including weight gain, fatty liver, heart disease, type 2 diabetes, and cancer. They also increase the risk of tooth decay, tooth loss, gum disease, and dental erosion.
- UK Biobank Study (188,426 participants, age 39 to 72) - Free sugars, especially from beverages, are linked to significantly higher risk of depression, but intrinsic sugars are not. (European Journal of Nutrition, Oct. 2022)
- Higher sugar-sweetened beverage consumption (≥1 serving/day) linked to lower oral microbiota richness and diversity, along with a selective increase in aciduric bacteria (Neisseria and Streptococcus). (International Journal of Food Sciences & Nutrition, Feb. 2022)
- Based on a meta-analysis of 38 studies, there is a robust dose-response relationship (for both caries & erosion) between the consumption of sugar-sweetened beverages and dental caries. (European Journal of Public Health, Feb. 2021)
- NHANES, 4,906 children (age 2 to 19) - Beverages were the most important source of added sugars associated with increased caries (risk was diminished among children with home water fluoride of 0.7 ppm or greater). (JDR Clinical & Translational Research, April 2022)
- 92 participants with gingivitis (normally follow Western diet) - Dietary changes (avoid sugar, white flour, sugary drinks; focus on whole foods) reduce gingival inflammation & bleeding on probing. (Nutrients, April 2024)
- A significant positive relationship exists between sugar in coffee and tea and the number of root caries in community-dwelling elderly. (Community Dental Health, Aug. 2020)
- "Over the last few decades, there was a drastic decline in the prevalence of dental caries worldwide which has been accompanied by a remarkable increase in the incidence of non-carious lesions such as dental erosion."

- Research review (22 studies) - Dental erosion is prevalent among over 1/3 of preschool children, especially in those with more frequent intake of fruit juices soft drinks. (Healthcare, March 2022)
- GOAL: Prevention & early detection (severe states can lead to aggressive and costly treatments). Early clinical signs of dental erosion: loss of enamel texture, a silky glossy appearance, sometimes a dulling of the surface gloss (referred to as the "whipped clay effect), cupping, restorations 'standing proud'. A diet analysis is a useful diagnostic aid (the following may increase risk of erosion): soft drinks, sports drinks, energy drinks, fruit juices, chewable vitamin C tablets, sweet/sour candies, vinegar-based dressings, white wine. (J. of Esthetic & Rest. Dent., Jan. 2021)
- Acids (phosphoric, citric, malic) are added to beverages for taste and increased shelf-life. (J Am Dent Assoc., April 2016)
- Erosive potential of 379 Beverages (juices, sodas, flavored waters, teas, and energy drinks) were evaluated in the United States. Results: 54% were erosive; 39% were extremely erosive; Only 7% were minimally erosive. (J Am Dent Assoc., April 2016)
- Calcium fortification can significantly reduce the erosive potential of fruit juice. (Scientific World Journal, June 2022)
- Soft drinks sweetened with sugar, aspartame, erythritol or stevia all resulted in significant dental erosion. (Journal of Clinical Pediatric Dentistry, May/June 2019)
- Non-sugared drinks (diet and zero-calorie) are often more erosive than sugared beverages. (General Dentistry, July-Aug. 2015)
- Millennial drinks & dental erosion. Researchers compared the erosive potential of the following beverages: energy & sports drinks, flavoured sparkling water, kombucha, unsweetened iced tea, vegetable/fruit juice blend, & soft drink. An energy drink & kombucha resulted in significantly more enamel softening than other beverages tested. All drinks were acidic with pH below 4.5. (General Dentistry, July/Aug. 2023)
- Sparkling water is made by pumping carbon dioxide into water, which ultimately turns into carbonic acid, and causes the pH to decrease. Many flavoured, sparkling waters have added citric acid, which may cause a further decrease in pH.
- Sparkling water makers have become increasingly popular. Higher carbonation levels generally result in higher enamel erosion. Test strips (pH) can be purchased on Amazon.

Sugar Alternatives & Health

- Low/no-calorie sweeteners can adversely affect gut microbiota at doses relevant to human use and do pose safety concerns at currently approved levels. More research is required. (Food & Chemical Toxicology, July 2019)
- Sugar alternatives: Even with FDA approval... "They're all potentially worrisome & all understudied." *Dr. Dariush Mozaffarian, Professor of Nutrition Science, Tufts University*
- Xylitol may enhance platelet reactivity and promote blood clot formation. Higher intakes are linked to a greater risk of major adverse cardiovascular events. (Eur. Heart Journal, June 2024)
- Stevia – possible benefits: May increase microbiome diversity, lowers blood sugar & blood pressure, antioxidant, anti-inflammatory, reduces liver & kidney damage (Microorganisms, April 2022)
- Research Review (26 studies) - Stevia may improve blood glucose control, especially in those with higher body weight, diabetes, & high blood pressure. More randomized trials required. (Diabetes & Metabolic Syndrome: Clinical Research & Reviews, July 2024)

Wishing you and your family a long, healthy & happy life!