The Fire Within:  
The Consequences of Chronic Inflammation

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If the American public embraced a healthier lifestyle:

- no smoking
- no or moderate alcohol consumption
- limited or no exposure to toxic chemicals
- healthy nutrition
- balance of exercise and rest
- stress management
- and healthy social networks

93% of diabetes, 81% of heart attacks, 50% of strokes, and 36% of all cancers could be prevented.

Two Unifying Themes

When we look at what appears to be driving much of our chronic diseases, we see:

Chronic Inflammation
and
Insulin Resistance

Factors That Drive Inflammation and Insulin Resistance

• Pattern of central obesity
• Western-dietary pattern, high fructose
• Sedentary lifestyle, lack of exercise
• Prolonged psychosocial stress
• Alterations in gut flora and intestinal permeability
• Environmental exposures (smoke, toxins)

• Coronary artery disease (CAD) is the leading cause of death in the United States.
• CAD was once considered primarily a lipid accumulation mediated disease.
• It has now been shown to involve an ongoing inflammatory response.
• We no longer believe that the primary driver of heart disease is dietary cholesterol and saturated fat.
Saturated Fat Debate

- Three large meta analyses (21 studies, 12 studies, and 76 studies) have all failed to show any significant evidence that saturated fat increases the risk for heart disease.
- It also has failed to find any significant evidence that increasing polyunsaturated fats and decreasing saturated fats lowers your heart risk.
- Choose a healthy variety of fats in the diet........


Periodontitis and Heart Disease

- Periodontitis recognized as an inflammatory disease of bacterial origin by American Academy of Periodontology.
- Plausibility of periodontal bacteria influencing vascular inflammation strengthened when Porphyromonas gingivalis isolated from human atheromatous plaques.

Oral Health & Systemic Disease

- In recent years, periodontal diseases have been associated with systemic diseases such as rheumatoid arthritis, cardiovascular disease, diabetes, chronic respiratory diseases, and adverse pregnancy outcomes including pre-term low-birth weight and pre-eclampsia.
- Improving periodontal health before or during pregnancy may prevent or reduce the occurrences of these adverse pregnancy outcomes and, therefore, reduce the maternal and perinatal morbidity and mortality.

Periodontitis and Cancer

- Almost 60,000 Americans develop head and neck cancer annually and 12,000 die from the disease.
- Chronic periodontitis may be independently associated with HNSCC through direct toxic effects of bacteria and their products, and/or through indirect effects of inflammation.
- It may also facilitate the acquisition and persistence of oral HPV infection, a recently recognized risk factor for HNSCC.
Osteoporosis

- Growing evidence osteoporosis may be driven, in part, by chronic low grade inflammation.
- Pro-inflammatory cytokines (IL-1, IL-6, TNF-alpha) accelerate bone loss via activation of osteoclasts, inhibit collagen production in osteoblasts and enhance breakdown of the extracellular matrix.
- Large study of older women found almost a 50% increased risk of hip fracture in those with highest levels of inflammatory markers.


Inflammation and Cancer

- Activation of NF-κB is vital for our body's ability to defend itself against infection and is a central mediator of inflammation.
- Many things activate NF-κB and when it is persistently “turned on” it induces genes that are responsible for increasing cell survival, proliferation, migration and invasion.
- It also turns down growth regulators (e.g., p53) that suppress tumor growth.


Insulin Resistance Can:

- Cause:
  - Sugar cravings
  - Fatigue after eating
  - Aches and pains
  - Increased hunger
  - Difficulty losing weight
  - Cause hormonal imbalances
    - PCOS
    - High estrogen and low thyroid
    - Increased fat storage
    - Abdominal obesity
Obesity and Insulin Growth Factors

- Obesity associated with multiple factors that increase risk for heart disease, diabetes and certain cancers such as inflammation, insulin resistance, high blood sugar and insulin-growth factors (IGF).
- Elevated insulin increases tumor growth and aggressiveness.
- IGF-1 and IGF-2 have been identified as tumor promoters in multiple studies.


Knowing the Tumor Type is Important

- The Women's Healthy Eating and Living (WHEL) trial found carbohydrate restriction associated with a striking five-fold reduction in breast cancer recurrence in 50% of subjects, specifically those whose tumors expressed the IGF-1 receptor.
- Unfortunately, IGF-1 testing of tumors is not yet a routine clinical practice.

• Waist measurements indicating increased risk:
  • 31.5 inches or more for women
  • 37 inches or more for men
• High risk
  • 35 inches or more for women
  • 40 inches or more for men

"The food you eat can be either the safest & most powerful form of medicine or the slowest form of poison."
Dietary Inflammatory Index

- Inflammation in the body is often driven by eating an anti- or pro-inflammatory dietary pattern.
- An anti-inflammatory diet reduces inflammation and improves health.
- The Dietary Inflammatory Index is based on measuring inflammation in the body in response to specific foods.
- You can take the test by downloading the app for Dietary Inflammatory Index.

Inflammatory Food Ratings

<table>
<thead>
<tr>
<th>IF RATING</th>
<th>FOOD</th>
<th>SERVING SIZE</th>
<th>SERVING SIZE (GRAMS)</th>
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<tbody>
<tr>
<td>0 to 100</td>
<td>MILK, WHOLE</td>
<td>1 CUP</td>
<td>246</td>
</tr>
<tr>
<td>-101 to 200</td>
<td>ONIONS, COOKED</td>
<td>½ CUP</td>
<td>105</td>
</tr>
<tr>
<td>-201 or lower</td>
<td>SPINACH</td>
<td>1 CUP</td>
<td>158</td>
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<tr>
<td>-201 or lower</td>
<td>TURMERIC</td>
<td>½ TSP</td>
<td>1.5</td>
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<tr>
<td>-19</td>
<td>CHICKEN BREAST, RSTD</td>
<td>3 OUNCES</td>
<td>85</td>
</tr>
<tr>
<td>-20</td>
<td>CHEESE, CHEDDAR</td>
<td>1 OUNCE</td>
<td>28.35</td>
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<tr>
<td>-46</td>
<td>OLIVE OIL</td>
<td>1 TBSP</td>
<td>14</td>
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<tr>
<td>-64</td>
<td>ALMOND BUTTER</td>
<td>¼ CUP</td>
<td>64</td>
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<tr>
<td>-74</td>
<td>AGAVE NECTAR</td>
<td>1 TBSP</td>
<td>23</td>
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<tr>
<td>-193</td>
<td>RICE, WHITE</td>
<td>1 CUP</td>
<td>158</td>
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<tr>
<td>-20</td>
<td>SALMON, SOHO BAKED</td>
<td>3 OUNCES</td>
<td>85</td>
</tr>
<tr>
<td>-100</td>
<td>CHEESE, CHEDDAR</td>
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<td>28.35</td>
</tr>
<tr>
<td>-74</td>
<td>AGAVE NECTAR</td>
<td>1 TBSP</td>
<td>23</td>
</tr>
</tbody>
</table>

Mediterranean Diet Pattern: Anti-Inflammatory

- Sweets and Meats
- Poultry and Eggs
- Cheese and Yogurt
- Fish and Seafood
- Be Physically Active
“Compared with patients consuming the control diet, patients consuming the intervention diet had significantly reduced serum concentrations of hs-CRP, IL-6, IL-7, and IL-18, as well as decreased insulin resistance.”

“A Mediterranean-style diet might be effective in reducing the prevalence of the metabolic syndrome and its associated cardiovascular risk.”

Esposito et al., JAMA 2004; 292:1440-1446

Mediterranean Dietary Pattern

• The American Heart Association
• American College of Cardiology
• European Society of Cardiology
• National Heart Foundation of Australia ALL recommend the Mediterranean diet to reduce cardiovascular risk.

Mediterranean Dietary Pattern and Memory

• The Mediterranean and DASH diets have both been associated with lower dementia risk. Researchers evaluated the inflammatory potential of these diets in relation to mild cognitive impairment/dementia risk using the DII during an average follow up of 9.7 years during Women's Health Initiative Memory Study.
• Higher DII scores were significantly associated with greater cognitive decline and earlier onset of cognitive impairment.


Mediterranean Dietary Pattern

• 13 meta-analyses of observational studies and 16 meta-analyses of randomized controlled trials investigating the association between the adherence to the Mediterranean diet and 37 different health outcomes, for a total population of over than 12,800,000 subjects, were reviewed.
• Robust evidence (P-value<0.001) and large simple sizes showed that greater adherence to the Mediterranean diet was associated with reduced risk of overall mortality, cardiovascular diseases, myocardial infarction, overall cancer incidence, diabetes, and neurodegenerative diseases.

Mediterranean Diet and Cancer

- Study of more than 2000 women confirmed that a “Western” diet was associated with an increased risk for breast cancer, while the Med Diet lowered the risk of all breast cancer subtypes, particularly triple-negative tumors.
- Review found strong evidence of a beneficial role of the Mediterranean diet on oral and pharyngeal cancer.


Omega 3 Fatty Acids from Plants and Animals

- Dark green vegetables, walnuts, freshly ground flax seeds and other plant foods.
- Cold water fish, fish oil, fresh seaweed, clean animal foods like free range chicken, eggs, and grass fed beef.

Cardiovascular Health

On the basis of 19 studies of free-living populations globally, biomarker concentrations of seafood and plant-derived ω-3 fatty acids are associated with a modestly lower incidence of fatal CHD.

PrediMed study found that dietary ALA, supplied mainly by walnuts and olive oil, relates inversely to all-cause mortality, whereas protection from cardiac mortality was limited to fish-derived long-chain n-3 polyunsaturated fatty acids.


American Heart Association: Fish Oil

- “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.”
- There was insufficient evidence to evaluate the role of fish oil supplements in primary prevention of CVD.

Resolution Biology

- Inflammation always considered a passive process.
- Newer 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.

Omega 3 is Critical During Pregnancy

- Critical for neurological and early visual development, particularly in 3rd trimester.
- Reduces risk of allergies and asthma
- Reduces risk of preterm labor and birth
- Increases birth weight
- FDA recommends 2-3 servings of low mercury fatty fish per week during pregnancy.

Omega 3 Fatty Acids – Bone/Muscle

- In animal studies, fish oil attenuates bone loss associated with estrogen loss; EPA enhances calcium absorption, reduces calcium excretion and increases calcium deposition in bone.
- Omega-3 fatty acids stimulate muscle protein synthesis in older adults and may be useful for the prevention and treatment of sarcopenia.

Omega 3 and Asthma: Impressive

- Reduced intake of omega-3 fatty acids may be a contributing factor to the increasing prevalence of wheezing disorders.
- Reviewers found that supplementation with omega-3 fatty acids in the third trimester of pregnancy reduced the absolute risk of persistent wheeze or asthma and infections of the lower respiratory tract in offspring by approximately 33%.
Canadians and Omega 3: Not So Good

- The Omega-3 Index indicates the percentage of EPA+DHA in red blood cell fatty acids.
- Canadian government found that the mean Omega-3 Index level of Canadians aged 20-79 was 4.5%.
- Levels higher for women, older adults, Asians and other non-white Canadians, omega-3 supplement users, and fish consumers; levels lower for smokers and people who were obese.
- Fewer than 3% of adults had levels associated with low CHD risk; 43% had levels associated with high risk.


No Fish Story

- Omega-3 Index test is now 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, cardiologist and past President of the AHA and first woman Director of the NIH said, “Before long, your personal Omega-3 Index just could be the new cholesterol—the number you want to brag about.”

Omega 3 and Prostate Cancer?

- SELECT trial raised concerns about potential link between omega 3s and increased prostate cancer/aggressive cancer.
- European Food Safety (EFSA) concluded, “there is no evidence for a role of EPA and/or DHA intake in the development of prostate cancer.”
- Also, “supplemental intake of EPA and DHA combined at doses up to 5 g/d does not give rise to safety concerns for adults.”


Fish Oil: What Type is Best?

- Supplementation is an alternative to eating fish; however, all supplements are not equal.
- Randomized, crossover study of 35 healthy individuals compared four popular brands/types of omega 3 fatty acids:
  - Concentrated triglyceride (rTG)
  - Ethyl ester (EE)
  - Phospholipid krill oil (PL)
  - Triglyceride salmon oil (TG)

Dosing According to Manufacturer’s Recommendations

<table>
<thead>
<tr>
<th>Brand</th>
<th>Product Description</th>
<th>EPA &amp; DHA per capsule</th>
<th>Total value</th>
<th>Label max capsule</th>
<th>Daily dosage of EPA + DHA</th>
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<tbody>
<tr>
<td>Nordic Naturals ProOmega&lt;sup&gt;®&lt;/sup&gt;</td>
<td>325 mg EPA</td>
<td>326.8 mg EPA</td>
<td>2</td>
<td>450 mg</td>
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<tr>
<td>Triglyceride</td>
<td>225 mg DHA</td>
<td>226.6 mg DHA</td>
<td>DHA: 450 mg</td>
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<tr>
<td>Merinae MeriEPA&lt;sup&gt;®&lt;/sup&gt;</td>
<td>756 mg EPA</td>
<td>774.2 mg EPA</td>
<td>1</td>
<td>756 mg</td>
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<tr>
<td>Platinum Liquid</td>
<td>226 mg DHA</td>
<td>226.7 mg DHA</td>
<td>DHA: 226 mg</td>
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<tr>
<td>Source Naturals AntiFat&lt;sup&gt;®&lt;/sup&gt;</td>
<td>75 mg EPA</td>
<td>78.0 mg EPA</td>
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<td>150 mg</td>
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<tr>
<td>Krill Oil Phospholipid</td>
<td>45 mg DHA, 46.7 mg EPA</td>
<td>DHA: 96 mg</td>
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<td>New Chapter</td>
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<tr>
<td>Wintergreen&lt;sup&gt;®&lt;/sup&gt; Salmon</td>
<td>90 mg EPA</td>
<td>90.4 mg EPA</td>
<td>2</td>
<td>180 mg</td>
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<tr>
<td>Olive Triglyceride</td>
<td>110 mg DHA</td>
<td>109.5 mg DHA</td>
<td>DHA: 230 mg</td>
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</tbody>
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Seafood Calculator

www.ewg.org/research/ewg-s-consumer-guide-seafood/seafood-calculator
Nutrient Quality of Modern Crops

- Agricultural methods have increasingly stripped amounts of nutrients from the soil. Nutrient deficient soil yields nutrient deficient food.
- We may be seeing a genetic dilution with high-yield varieties with more carbohydrate but fewer nutrients. Increasing use of pesticides may also decrease plant secondary metabolites.
- Studies in wheat show 50% decline in protein, and in produce, we have seen a 22-29% decline in 6 minerals over the past 100 years; broccoli has roughly 1/3 the calcium it did in 1950.

Nutrient Deficiencies US

- More than:
  - 90 million Americans are deficient in vitamin D using the Endocrine Society guidelines (deficiency is vitamin D levels <20 ng/ml or 50 nmol/L)
  - 30 million are deficient in vitamin B6
  - 18 million people have B-12 deficiency
  - 16 million have vitamin C deficiency
  - 8 million women have very low iron levels;
    - Latinas 12% and black women 16%
  - 7-10% children ages 1-5 are iron deficient
  - Women 25-39 have borderline iodine insufficiency

Magnesium

- Low magnesium intakes and 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.
- FDA requires warning that proton pump inhibitors can cause dangerously low magnesium levels.

FDA Safety Advisory

- FDA issued MedWatch warning and label change for PPIs due to low magnesium levels associated with long-term use.
- “Those taking medications, generally more than one year, may end up with low magnesium, which can put them at risk for seizures, irregular heartbeats, and muscle spasms.”
- Review of nine studies (n=115,455) found that the odds of developing hypomagnesia increased by 75% if taking PPIs.
- FDA advises magnesium levels be checked before and periodically during treatment.
- Supplement with 300-400 mg per day magnesium citrate.
Vitamin B6 (Pyridoxal-5-Phosphate)

- Critically involved in production of serotonin, dopamine, melatonin, hemoglobin, protein metabolism, energy production, and for the conversion of ALA to DHA (omega 3).
- Deficiency: depression; impaired cognition, attention, memory, and sleep. Increased risk for heart disease, stroke and colorectal cancer.
- Common OTC analgesics and oral contraceptives lower B6 levels.

Inflammation Drives B6 Deficiency

- Tuft’s researchers found as inflammation in the body rises, B6 levels fall and even marginally low PLP levels (20–30 nmol/L) are associated with increased risk of CAD and stroke.
- Women 2 x more likely to be deficient than men (OCPS deplete), and deficiency in blacks (15.7%) is higher than for whites (10.7%).
- The DV is 2 mg per day but you likely need 4-6 mg per day. Best taken in complex with riboflavin (needed to convert B6 to PLP in liver) and zinc (needed for cells to take up and use PLP).

To Get 1.5mg of B6 in Food

- 2.5 bananas
- 12 Tbsp. roasted sunflower seeds
- 8 ounces chicken breast
- 8 ounces sockeye salmon
- ~5 ounces cooked tuna
- ~5 ounces beef liver
- 3.5 cups raw diced avocado
- 3 cups sweet potatoes
- 15 cups of milk OR
- 20 Tbsp. peanut butter

Refined Sugar - The Other White Drug
One 12 ounce soda per day contains 10 grams of sugar
That equals \textbf{31 pounds of sugar per year}
Non-alcoholic Fatty Liver Disease

- Small study found significant reductions in systolic blood pressure, body fat, liver enzymes (P = .04) and insulin resistance in children with NAFLD at 5 and 6 months (P < .05) on a low fructose, low GL diet.
- Four week study found low fructose diet in Hispanic adolescents increased insulin sensitivity and lowered hs-CRP.

Mager DR, et al. JPEN J Parenter Enteral Nutr 2013; Aug 23

Choline & Fatty Liver Disease

- Increased synthesis of fat from carbohydrate, increased circulation of fat released from adipose tissue, and decreased secretion of fat from the liver = fatty liver.
- Choline deficient diets have long been used to study the mechanisms of fatty liver disease and its progression.
- Choline is needed to make VLDL particles, which carry triglycerides away from the liver into the bloodstream. If deficient, triglycerides remain in liver = fatty liver.

Corbin KD. Curr Opin Gastroenterol 2012; 28(2):159-65

Glycemic Load and Mood?

- 82 healthy weight and healthy overweight/obese, adults enrolled in randomized, crossover controlled feeding study.
- Compared to a low GL diet, consumption of high GL diet resulted in:
  - 38% higher score for depressive symptoms (P = 0.002)
  - 55% higher score for total mood disorder (P = 0.05)
  - 26% higher score for fatigue/inertia (P = 0.04), compared to low GL diet.

WHO Recommends Limiting Sugar Consumption To 25g/d

Sugars added to foods, as well as those found naturally in honey, syrups, fruit juices and fruit concentrates. Not in fresh produce.

Resources

- The New Glucose Revolution by Jennie Brand-Miller, PhD
- The Glycemic Load Diet by Rob Thompson MD
- The Glycemic Load Diet Cookbook by R. Thompson
- The Easy GL Diet Handbook by Fedon Lindberg MD
- The 150 Healthiest 15-Minutes Recipes on Earth by Jonny Bowden, PhD

All disease begins in the gut.
Hippocrates
Intestinal Permeability and Systemic Inflammation

• Insulin resistance is associated with alterations in gut permeability.
• Fructose-induced NAFLD is also associated with changes in microbiota composition that alters gut permeability by reducing expression of tight junction proteins. This causes endotoxin translocation.
• The liver is exposed to lipopolysaccharide (LPS-endotoxin from membrane of gram negative bacteria in intestinal lumen), which causes chronic inflammation and oxidative damage.
• Chronic exposure to LPS may contribute to weight gain and type 2 DM.


Pre and Probiotics

• Regulates/modulates immune functions, reduce risk intestinal infection.
• Improves intestinal barrier function, reduces metabolic endotoxemia
• Induces hypo-responsiveness to food antigens
• Improves glucose control and reduces inflammatory cytokines.
• Find evidence based strains and dose: www.usprobioticguide.com
  www.scienceofprobiotics.ca
Turmeric (Curcuma longa and others)

- Rhizomes provide bright yellow-orange culinary spice and dye.
- Yellow pigments = curcuminoids, one example is curcumin.
- Long history of medicinal use for respiratory, skin, digestive and inflammatory conditions in India.
- More than 65 clinical trials have shed light on its potential role in CVD, diabetes, cancer, fatty liver, arthritis, neuro/psych disorders.

Turmeric for Arthritis?

- Laboratory, translational and clinical trials, in general, support use of turmeric/curcumin for osteoarthritis.
- 13 randomized clinical studies show turmeric/curcumin at sufficient dosing and in optimal preparations can reduce pain and improve the functionality of patients with knee OA.

Depression and Pain

- Multiple studies suggest a link between inflammation, depression and pain.
- Danish study (>73,000 adults) showed that those with the highest levels of CRP were twice as likely to have psychological distress and depression than those with normal levels.
Turmeric for Depression?

- A mini meta-analysis of 6 studies found curcumin reduced depression symptoms, particularly in middle-aged patients when given at higher doses for longer periods of time.
- Authors concluded, “there is supporting evidence that curcumin administration reduces depressive symptoms in patients with major depression.”
- Is this an impact on microbiome? Is it due to systemic reduction in inflammation? More research needed.


Absorption and Safety Issues

- Nanoencapsulation, addition of phosphatidylcholine, or inclusion of the black pepper alkaloid, piperine have all been shown to enhance tissue distribution and bioavailability.
- Note: Piperine causes inhibition of CYP3A4 and at doses of 20 mg can cause clinically relevant drug interactions especially for drugs with narrow therapeutic indices.
- Dose generally 1200-1500 mg per day of turmeric extract standardized to 95% curcumin, taken in divided doses.


Ginger (Zingiber officinale)

- Ginger has long been known to have a beneficial effect on lipids, elevated blood sugar, oxidative stress and inflammation. Studies also suggest that ginger can be beneficial in those with arthritis.
- Ginger at doses of 1-2 grams of dried rhizome per day has not been associated with adverse effects. Doses higher than 4 grams per day can have a negative impact on blood clotting.

Green Tea (Camellia sinensis)

- White, green, oolong and black teas contain polyphenols and flavonoids, particularly catechins.
- Dominant catechin in green tea is epigallocatechin gallate (EGCG), which exerts potent anti-inflammatory and antioxidant activity.

Green Tea in Cancer

- Potent inhibitor of NF-κβ and inducer of P53.
- Inhibits every step of carcinogenesis. Stimulates DNA repair and inhibits two proteins that promote tumor cell growth and migration—vascular endothelial growth factor (VEGF) and hepatocyte growth factor (HGF).


Green Tea and Prostate Cancer

- Note: Do NOT take EGCG at doses of 500 mg or more without FOOD.
- RDBPCT 60 men with high-grade prostate intraepithelial neoplasia given 600 mg of EGCG or placebo for 1 year.
  - 3% in EGCG group converted to prostate cancer versus 30% in placebo group.
- UK study: 199 men (~74 years age) localized prostate cancer, randomized to oral capsule containing pomegranate, green tea, broccoli, turmeric; or identical placebo for 6 months.
  - Median rise in PSA in supplement group was 14.7% as opposed to 78.5% in the placebo group (P=0.0008).


Coffee Consumption

- A review of 18 cohorts (n=2,272,642) and 2905 cases, and 8 case-control studies found that 2 cups of caffeinated coffee and, to a lesser extent, decaffeinated coffee per day are associated with a 35% reduced risk of hepatocellular carcinoma, including in those with pre-existing liver disease.

BENEFITS OF PHYSICAL ACTIVITY

- Maintain healthy body weight and muscle tone.
- Reduces risk of heart disease.
- Lowers risk of diabetes by enhancing skeletal uptake of blood sugar.
- American Cancer Society, exercise may reduce risk of cancer by reducing insulin and insulin-like growth factors levels, associated with increased cell/tumor growth.
- Review of 73 studies found 25% average risk reduction for breast cancer amongst physically active women.
- Aim for 30-45 minutes of moderate (or more) physical activity most days of the week.

Meta-analysis: 92 studies (4,310 participants) for effect of physical activity on depression; 306 studies (10,755 participants) on anxiety concluded: physical activity reduces depression and anxiety.


A Nation On The Edge?
High cortisol levels are linked to high blood pressure, high cholesterol, high blood sugar, insulin resistance, insomnia, weight gain, headaches, mood swings, and increased risk of infections.

*Scientists believe that prolonged elevation of stress hormones may shorten our lifespan by 15 years.*

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**Being Chronically Stressed is Harmful to Health**

- Stress hormones released directly into the gut mucosa from sympathetic nerve endings of the enteric nervous system cause mast cells to degranulate, releasing tryptase, histamine and other mediators.
- These compounds activate lymphocytes, stimulate epithelial chloride secretion and *increase barrier permeability.*
- Subsequent *movement of the bacteria in* the intestine into the underlying mucosa *triggers further immune and inflammatory events.*

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**Loneliness, Social Isolation & Your Health**

- 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 obesity.

Oh what to do, what to doo???

Resiliency

• We are all born with innate resiliency, with the capacity to develop the traits seen in resilient survivors:
  • Social competence
  • Empathy, Caring, Communication skills, Humor
  • Autonomy
    • Sense of identity, Self-efficacy, Adaptive distancing from negative messages and conditions
  • A sense of purpose and belief in a bright future
    • Goal direction, Optimism, Spiritual connectedness

Meditation Mindfulness

• Long-time meditators have greater activation of areas responsible for sustaining attention, processing empathy, integrating emotion and cognition, and perceiving the mental and emotional state of others.
• Review of 47 trials found meditation improves:
  • Anxiety
  • Depression
  • Pain

There are voices which we hear in solitude …

but they grow faint and inaudible as we enter into the world.”

Ralph Waldo Emerson

To speak gratitude is courteous and pleasant, to enact gratitude is generous and noble, but to live gratitude is to touch Heaven.

Johannes A. Guerner, quoted in Words of Gratitude
Just Breathe.....

Patient: Doctor, I don’t feel well and I’m not sure why.

Doctor: I want you to meditate for 20 minutes, twice a day, exercise for at least 30 minutes a day, avoid processed foods, eat plenty of organic fruit and veg, spend some time in nature and less indoors, stop worrying about things you can’t control and ditch your T.V. Come back in 3 weeks.