The Anti-Inflammatory Diet: Cooling the “Fires” Within

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Chronic Inflammation

Cardiovascular Disease
- Atherosclerosis
- Heart Failure
- Stroke
- Hypertension

Autoimmune Disorders
- IBD
- Crohn’s Disease
- Colitis
- Lupus
- Multiple Sclerosis
- Type 1 Diabetes

Metabolic Disorders
- Type 2 Diabetes
- Fatty Liver Disease
- Renal Failure

Bone & Joint Disease
- Osteoarthritis
- Rheumatoid Arthritis
- Osteoporosis

All Cancer Stages
- Infection
- Progression
- Metastasis

Neurological Diseases
- Depression
- Alzheimer’s
- Parkinson’s
- Multiple Sclerosis

Diabetic Complications
- Neuropathy
- Retinopathy
- Hypertension
- Atherosclerosis
- Heart Disease

Pulmonary Disease
- Asthma
- COPD
- Hay Fever
- Bronchitis
Most people associate inflammation with conditions such as arthritis and IBS, but we are increasingly coming to understand that it is also connected to diabetes, obesity, heart disease, Alzheimer’s, cancer and even depression and mood disorders. Americans are living more and more disconnected from their natural food sources, and our diets are increasingly made up of processed foods, excess sugars and bad fats, and genetically modified foods.

This is a recipe for chronic inflammation. An anti-inflammatory diet can quiet symptoms, and turn back the tide on many health issues, with the added benefits of increased energy and, in many cases, weight loss.
What is Inflammation?

- Part of a healthy immune system response
- Low-level, *chronic inflammation* is an excessive, *inappropriate* inflammatory response
- Can be measured with lab test: *C-reactive protein*
- C-reactive protein (CRP) is a substance produced by the liver *in response to inflammation*.
- High CRP levels may put people at increased risk for *coronary artery disease*, which can cause a heart attack

The Anti-Inflammatory Diet

- One of the *most powerful tools* to combat inflammation comes *not from the pharmacy, but from the grocery store*
- Many studies have shown that components of foods and beverages can have *anti-inflammatory effects*
Cooking Methods/Inflammation

- Also, HOW we cook our food may be as important as WHAT we cook as far as health and nourishment are concerned.
- Food cooked at high heat in our modern, fast-paced, processed-food culture, creates potentially cancer-causing chemicals called heterocyclic amines (HCAs) and polycyclic aromatic hydrocarbons (PAHs).

AGEs, HCAs

- Heterocyclic amines (HCAs) are created when meat, poultry and fish are cooked at high temperatures –seafood has less, plant foods little to none.
- Foods cooked at high temperature also contain greater levels of advanced glycation end products (AGEs) that cause more tissue damage and inflammation than foods cooked at lower temperatures.
- AGEs irritate cells in the body, damaging tissues and increasing risk of complications from diseases like diabetes and heart disease.
**HCAs**

- Grilling, barbecuing, broiling and pan-frying are more likely to produce HCAs than baking or roasting – due to high temp
- Propane gas grill can reach 640 degrees F while a typical roasting temp is 350 degrees
- Liquid cooking – boiling, steaming, poaching, stewing generates **no HCAs** because temp never tops boiling point of water.
- Microwave – little HCAs

**PAHs**

- Polycyclic aromatic hydrocarbons occur whenever fat drips on a flame, heating element or hot coals
- PAHs waft up in the smoke and can land on food
- Can also form directly on food when it’s cooked to a crisp
PAHs

- Studies have shown that exposure to HCAs and PAHs can cause cancer in animals
- Many epidemiologic studies of humans have found that high consumption of well-done, fried, or barbecued meats was associated with increased risks of colorectal, pancreatic, and prostate cancer.

Tips to Reduce PAHs, HCAs

- Grill vegetables instead of meat!
- Marinate before grilling – significantly reduces the amount of HCAs
- Trim the fat, remove the skin – less fat drips into flames
- Partially pre-cook meats, fish, poultry in oven or microwave before grilling
- Keep meat portions small – less time on grill
**Tips to Reduce PAHs, HCAs**

- **Cover grill** with punctured aluminum foil to avoid letting meat juices drip onto flame.
- Keep **water spray bottle** on hand to tame flames.
- **Flip frequently.**
- **Remove all charred or burnt** portions before eating.

**What About Cooking Oils?**

- Different oils have different uses, and each performs best within a certain **range of temperatures.**
- Every oil has a **smoke point**, the temperature at which it begins to smoke.
- Oil should never be allowed to smoke as it compromises nutritional value and releases carcinogenic free radicals – **promotes inflammation!**
Olive Oil

- As an unrefined oil, extra virgin olive oil should not be exposed to heat higher than 325°F, its smoke point
- Most of its characteristic flavor dissipates under sustained heat
- Extra virgin olive oil is more suitable for use as a condiment than in most cooking applications.

Smoke points of oils

- Avocado 510 degrees F
- Almond 495
- Sesame 445
- Canola 425
- Walnut 400
- Olive 325
- Flax 225

Foods that PROMOTE inflammatory disease

- Foods with **high saturated fat** content, such as animal products and most full-fat dairy products
- Foods with **high omega-6** fatty acid content and low omega-3 fatty acids such as partially hydrogenated oils, margarine, oils from corn, cottonseed, safflower, sesame and sunflower
- Foods with **high glycemic load**, such as bagels, instant rice, white pasta, sugar

Foods that promote inflammatory disease

- For some people - food with **high allergy** potential, such as dairy products, wheat and eggs
- These inflammatory foods can increase production of **inflammatory mediators**
- Foods with high allergy potential may also increase **intestinal permeability**, triggering immune response and potential increase in inflammatory disease
Anti-Inflammatory Foods

- Foods with **high omega-3 fatty acids**, such as cold water fish: salmon, sardines, herring, tuna; flaxseeds, walnuts
- Foods with **high levels of antioxidants**, such as vegetables, citrus fruits, cherries, garlic, onion and tea, cocoa
- **Spices**, in particular, ginger, garlic, rosemary, turmeric, oregano, cayenne, clove and nutmeg
- **Low glycemic index/load foods**
- **Mediterranean Diet** – high in omega 3 fats, F/V, nuts and seeds and whole grains

Recipe: Blueberry Almond Turtles

- Almonds
- Blueberries
- Bittersweet
  Dark chocolate
Nuts

- Frequent consumption of nuts, has been shown in multiple studies to be inversely related to inflammatory markers in the body.
- A study published in *The American Journal of Clinical Nutrition* in 2011 found that over a 15-year period, men and women who consumed the most nuts had a 51% lower risk of dying from an inflammatory disease compared with those who ate the fewest nuts.
- Study published in the journal *Circulation* found that subjects with lower levels of vitamin B6 – found in most nuts – had higher levels of inflammatory markers.

Blueberries

- Numerous studies show that blueberries can:
  - Improve heart health
  - Reduce cancer risk
  - Fight UTIs
  - Improve brain health
  - Are loaded with antioxidants
  - Excellent anti-inflammatory food
Cocoa

- Study in the American Journal of Clinical Nutrition found that 40 g of cocoa powder (about 5 Tbsp) per day for a period of 4 weeks reduced inflammatory mediators involved in development of atherosclerosis in subjects at high risk of CVD
- Helps to lower HTN

Recipe: Blueberry Almond Turtles

- Almonds
- Blueberries
- Bittersweet Dark chocolate
Recipe: Overnight Oatmeal

- Steel cut oats
- Unsweetened almond milk
- Unsweetened apple juice
- Apple
- Brown sugar
- Cinnamon
- Raisins
- Walnuts
- Omega 3 fatty acids from Omega Swirl

Whole Grains

- Every day, more and more studies show the benefits of whole grains
- SLOW carbs, not NO carbs!
- Studies show that regular whole grain consumption reduces the risk of both cardiovascular disease and diabetes
Whole Grains

- Scientists at the National Institutes of Health, followed 259 healthy women for 2 years, to see if whole grain consumption lowered levels of C-reactive protein.
- They found that women who ate even small amounts of whole grains – up to 1 serving a day – had, on average, 11.5% lower concentration of hs-CRP (measures inflammation) in their blood.
- Women eating a full serving or more of whole grain had, on average, 12.3% lower CRP levels.

Omega 3s Fatty Acids

- Omega Swirl
Omega 3 Fatty Acids

- Omega-3 fatty acids are found in fish, such as salmon, tuna, and halibut, other seafoods including algae and krill, flaxseeds and nut oils.
- Also known as polyunsaturated fatty acids (PUFAs), omega-3 fatty acids play a crucial role in brain function.
- May reduce the risk of heart disease.
- Helps lower high blood pressure.
- The American Heart Association (AHA) recommends eating fish (particularly fatty fish such as mackerel, lake trout, herring, sardines, albacore tuna, and salmon) at least 2-3 times a week.

Omega 3 Fatty Acids

- Hundreds of studies suggest that omega-3s may provide benefits to a wide range of diseases: cancer, asthma, depression, cardiovascular disease, ADHD, and autoimmune diseases, such as rheumatoid arthritis.
- All these diseases have a common genesis in inflammation.
- Typical dosage is 1,000 – 4,000 mg/day depending on health status and medications.
Balanced Omega 6/Omega 3

- EPA and DHA from fish oils are **more biologically potent** than alpha-linolenic acid (ALA) from flaxseeds and walnuts
- A **balanced intake** of omega-6 and omega-3 fatty acids is anti-inflammatory
- Overconsumption of omega-6 fats in relation to omega-3 fats leads to inflammation (common)
- Most appropriate ratio of omega-6 to omega-3 fatty acids is approximately 2:1.

Polyunsaturated Fat

- Omega 6 to Omega 3 should be in a 2:1 ratio
- Typical American diet: more like 20:1 ratio
- We overeat Omega 6 fats and don’t get enough Omega 3 fats
- Opposing but complimentary functions in the body
  - Omega 6 – pro-inflammatory
  - Omega 3 – anti-inflammatory
Omega 6

- Widely spread in foods
- Vegetable oils (safflower, sunflower, sesame, corn)
- Salad dressings made with above oils
- Margarines
- Crackers, bread, chips, popcorn, etc
- Increase inflammation in the body
- Reduce intake of Omega 6 fats

Omega 3 Fats

- Increase HDL “good” cholesterol
- Reduce blood clot formation
- Suppresses inflammation in the body
- Decreases triglyceride levels in blood
- Decreases risk/incidence of sudden death and MI
- Inhibits growth of plaque
- Promote arterial relaxation, lowers BP
- Reduce susceptibility to arrhythmias
Sources of Omega 3 fats

- Increase intake of Omega 3 fats
- Choose fatty fish (salmon, sardines, herring, trout)
- Flaxseed and flaxseed oil
- Edamame
- Omega-3 eggs
- Dark leafy greens, wheat germ
- Walnuts and walnut oil, pumpkin seeds

Fish Oil Supplements

- Two omega-3 fatty acids – eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) found to help lower triglycerides, reduce blood clotting and decrease inflammation
- AHA: healthy people should get about 1,000 mg per day of EPA and DHA
- High Blood pressure: 2,000 mg per day
- High triglycerides: 2-4 grams per day (under care of health care provider)
- Fish oil supplements – quality matters
- Omacor/Lovaza/Vascepa – prescription fish oils
Fish Oil Supplements

- Over the counter brands:
  - Nordic Naturals
  - Carlson

Cinnamon

- Cinnamon has a long history both as a spice and as a medicine.
- Seasoning a high carb food with cinnamon can help lessen its impact on your blood sugar levels.
- Cinnamon slows the rate at which the stomach empties after meals, reducing the rise in blood sugar after eating (Ceylon cinnamon is best)
- Adding cinnamon to the rice pudding lowered the gastric emptying rate from 37% to 34.5% and significantly lessened the rise in blood sugar levels after eating. Am J Clin Nutr. 2007 Jun;85(6):1552-6.
Recipe: Overnight Oatmeal

- Steel cut oats
- Unsweetened almond milk
- Unsweetened apple juice
- Apple
- Brown sugar
- Cinnamon
- Raisins
- Walnuts
- Omega 3 fatty acids from Omega Swirl

Recipe: Pumpkin Black Bean Soup

- Black beans
- Tomatoes
- Chicken broth
- Onion and garlic
- Pumpkin
- Black bean burgers
- Tea seed oil
Black beans

- The "protein-plus-fiber" combination in black beans and other legumes is key to their outstanding support for blood sugar balance and blood sugar regulation.
- Numerous studies show decreased risk of type 2 diabetes following increased intake of fiber from plant foods (and especially legumes).

Black beans

- Much of the research on bean intake and decreased risk of cardiovascular disease focus on the outstanding soluble fiber content of beans.
- One cup of black beans provides over 4 grams of soluble fiber, and this is precisely the type of fiber that researchers have found especially helpful in lower blood cholesterol levels.
- Decreased risk of coronary heart disease (CHD) and myocardial infarct (MI, or heart attack) have both been associated with increased intake of soluble fiber from food, especially beans.
Anti-Inflammatory Fruit/Vegetables

- A high fruit and vegetable intake has been shown to be associated with a low level of inflammation.
- Fruit and vegetable intake has been shown to be inversely related to oxidative stress and inflammation in type 2 diabetics.
- Consuming a diet high in fruits and vegetables is associated with lower risks for numerous chronic diseases, including cancer and cardiovascular disease.
- Tomatoes, onions, garlic, pumpkin

Pumpkin

- A 2010 article published in "Nutrition Research Reviews" notes that pumpkin reduces inflammation.
- Alpha- and beta-carotene antioxidants are a class of carotenoids that convert into usable vitamin A within the body.
- Beta-carotene is anti-inflammatory.
- Alpha-carotene hinders tumor growth, slows aging and protects against cataracts.
- Additionally, carotenoids reduce the risk of cardiovascular disease and boost immunity.
Recipe: Pumpkin Black Bean Soup

- Black beans
- Tomatoes
- Chicken broth
- Onion and garlic
- Pumpkin
- Black bean burgers
- Tea seed oil

Recipe: Spicy Cherry Salsa

- Cherries and cherry juice
- Cider vinegar
- Garlic
- Agave
- Ginger, allspice, cayenne, cardamom, cinnamon
Cherries

- Scientific studies show that cherries are packed with unique anthocyanins and other compounds that naturally mediate the inflammatory process
- These compounds deliver comparable anti-inflammatory activity to ibuprofen (Advil®) and naproxen (Aleve®)—but without the significant side effects!
- The compounds found in cherries modulate numerous pathways to protect against other conditions associated with inflammation—including cancer, cardiovascular disease, metabolic syndrome, and Alzheimer’s disease.

Cherries

- Tart cherry constituents can switch critical genes off and on
- Tart cherries were ranked 14th among the top 50 foods for highest antioxidant content per serving—surpassing such well-known antioxidant sources as red wine and dark chocolate, according to the *American Journal of Clinical Nutrition*
Guard Against Degenerative Disease and Inflammation with Tart Cherries

- Physical exercise can induce muscle damage that generates inflammation and with it, burning, stiffness, and pain. The effect worsens with age.
- Standard treatment with nonsteroidal anti-inflammatory drugs such as Ibuprofen (Advil®) involves potentially deadly adverse effects, such as stroke.
- Evidence shows that the complex anthocyanins and phenols in tart cherries provides superior protection against muscle injury—by safely inhibiting the pain and inflammatory effects.

Tart Cherries

- The potent components in tart cherries have been demonstrated to deliver high-level protection against inflammatory and degenerative diseases, including cardiovascular disease, metabolic syndrome, and neurodegenerative diseases such as Alzheimer's.
Tart Cherries

- A study conducted by scientists at Boston University found that intake of cherry extract reduced the risk of gout attacks in those who suffered recurrent gout attacks by 45%.
- Additionally, the researchers discovered that when cherry intake was combined with allopurinol use, the risk for gout attacks was reduced by 75% versus no intervention.
- What’s more, these results persisted even across subgroups stratified for sex, obesity status, purine intake, and alcohol use.
- Tart cherries appear to be a natural—and safe—way to inhibit the key gout pathway.

Sweet Cherries

- An impressive study released in 2013 reported that after 28 days of consumption, sweet cherries were found to selectively and significantly reduce a number of biomarkers associated with inflammatory diseases.
- Among other decreased inflammation indicators, blood levels of C-reactive protein were reduced by over 20%.
Garlic

- Garlic has been used as a medicinal plant since ancient times
- Researchers have shown that garlic may promote an anti-inflammatory environment by cytokine modulation that leads to overall inhibition of NF-(kappa)B activity
- NF-(kappa)B is a central transcription factor in adaptive immunity and a central regulator of pro-inflammatory gene expression

Ginger

- Ginger contains very potent anti-inflammatory compounds called gingerols.
- These substances are believed to explain why so many people with osteoarthritis or rheumatoid arthritis experience reductions in their pain levels and improvements in their mobility when they consume ginger regularly.
- In two clinical studies involving patients who responded to conventional drugs and those who didn't, physicians found that 75% of arthritis patients and 100% of patients with muscular discomfort experienced relief of pain and/or swelling.
Spices: Ginger

- Ginger belongs to the same botanical family as turmeric and cardamon
- Has been used as an anti-inflammatory agent for centuries
- Researchers have found that ginger inhibits prostaglandin biosynthesis – similar to NSAIDs

Spices: Ginger

- Ginger extract also inhibits the induction of several genes involved in the inflammatory response
- *In a study of 261 people with osteoarthritis (OA) of the knee, those who received a ginger extract twice daily experienced less pain and required fewer pain-killing medications compared to those who received placebo.*
- For analgesic purposes, 2 to 4 grams fresh ginger juice or extract taken daily is recommended
Zyflamend

- Food- and herb-based supplement that combines ten of the very top anti-inflammatory concentrates
- One of the top herbal supplements sold in the world
- Rosemary, Turmeric, Ginger, Holy Basil, Green Tea, Hu Zhang, Chinese Goldthread, Barberry, Oregano, Baikal Skullcap

Cayenne

- Arthritis is generally thought to be an inflammatory disorder resulting in destruction of the tissues lining the joints.
- Cayenne pepper has been used topically to increase blood supply and provide a warming sensation to affected joints.
- Taken internally as a supplement, cayenne may also help to reduce joint inflammation through its antioxidant activity.
- Applied as a topical cream, gel or patch, capsaicin works by depleting the amount of a neurotransmitter called substance P that sends pain messages to the brain.
Capsaicin

- Many studies have shown that capsaicin effectively reduces pain from osteoarthritis, rheumatoid arthritis, and fibromyalgia.
- In a 2010 German study, joint pain decreased nearly 50% after three weeks' use of 0.05 percent capsaicin cream.

Recipe: Spicy Cherry Salsa

- Cherries and cherry juice
- Cider vinegar
- Garlic
- Agave
- Ginger, allspice, cayenne, cardamom, cinnamon
Recipe: Apricot Chicken Tagine

- Canola oil
- Chicken
- Onion, garlic, ginger
- Turmeric
- Nutmeg
- Cinnamon
- Saffron
- Vegetable broth
- Apricots
- Garbanzo beans
- Tomatoes
- Cashews
- Cilantro

Spices: Turmeric

- Curcumin is a naturally occurring chemical compound that is found in the spice turmeric
- Turmeric is a mustard-yellow spice from Asia.
- Main ingredient in curry
- Laboratory and animal research has demonstrated anti-inflammatory, antioxidant, and anti-cancer properties of turmeric and its constituent curcumin.
Spices: Turmeric

- Researchers tested turmeric extracts in animal models and found evidence of anti-arthritic and anti-Alzheimer’s disease efficacy
- They found that curcuminoid extract inhibits a transcription factor, NF-KB, from being activated in the joint
- Typical dose used therapeutically 400 mg twice a day

Turmeric

- One of the most comprehensive summaries of turmeric benefits studies to date was published by the respected ethnobotanist James A. Duke, Phd., in the October, 2007 issue of *Alternative & Complementary Therapies*, and summarized in the July, 2008, issue of the *American Botanical Council* publication *HerbClip*.
- Reviewing some 700 studies, Duke concluded that turmeric appears to outperform many pharmaceuticals in its effects against several chronic, debilitating diseases, and does so with virtually no adverse side effects.
Turmeric

- Alzheimer’s disease: Duke found more than 50 studies on turmeric’s effects in addressing Alzheimer's disease.
- The reports indicate that extracts of turmeric contain a number of natural agents that block the formation of beta-amyloid, the substance responsible for the plaques that slowly obstruct cerebral function in Alzheimer's disease.
- Dosages of 400 to 600 mg, taken three times daily have been used in studies

Turmeric

- Arthritis: Turmeric contains more than two dozen anti-inflammatory compounds, including six different COX-2-inhibitors (the COX-2 enzyme promotes pain, swelling and inflammation; inhibitors selectively block that enzyme).
- By itself, writes Duke, curcumin - the component in turmeric most often cited for its healthful effects - is a multifaceted anti-inflammatory agent, and studies of the efficacy of curcumin have demonstrated positive changes in arthritic symptoms.
Salicylic Acid

- Salicylic acid is the active component of willow-bark, long used as a folk remedy for pain
- **Aspirin** is a synthetic derivative of willow bark
- Foods high in salicylic acid: **berries, grapes, broccoli, spinach, chili peppers, cinnamon, ginger, rosemary, nutmeg, sage, basil, strawberries**

Mediterranean Diet

- Studies have found that the Mediterranean diet can produce beneficial changes on markers of inflammation, including reduction in **C-reactive protein** and **pro-inflammatory cytokines**, as well as reduced platelet aggregation and improved endothelial function
Mediterranean Diet

- High cardiovascular risk participants from the PREDIMED trial eating a Mediterranean diet, rich in olive oil and nuts, showed improved lipid profiles, decreased insulin resistance and **reduced concentrations of inflammatory molecules** compared with those allocated to a low-fat diet.

Tagine

- **Definition:** A tagine is like a casserole dish used in north African cooking, most commonly in Morocco.
- It consists of two pieces - a plate like bottom and a conical shaped lid. The bottom doubles as a serving dish.
- Can purchase in cooking stores or online.
Recipe: Apricot Chicken Tagine

- Canola oil
- Chicken
- Onion, garlic, ginger
- Turmeric
- Nutmeg
- Cinnamon
- Saffron
- Vegetable broth
- Apricots
- Garbanzo beans
- Tomatoes
- Cashews
- Cilantro

Anti-Inflammatory Diet

- 90% plant-based foods (or more)
- Fresh produce at every meal – Fruits and veggies
- No processed foods (made in a factory)
- No fried foods, no cheap oils
- Good fats: extra virgin olive, walnuts, and omega 3 fats in fatty fish like salmon, sardines, herring and tuna
- Lots of avocados, fresh tomatoes, cucumbers, herbs and spices, etc.
- Low glycemic foods like berries, and legumes
- Green tea and water as your beverages
Cook well, live long . . .

Richard Collins, MD and
Susan Buckley, RDN, CDE