The Anti-Inflammatory Lifestyle

Inflammation is one of the body's natural ways of protecting itself. It involves many chemical reactions that help to fight off infections, increase blood flow to places that need healing, and generate pain as a signal that something is wrong with the body. Unfortunately, as with any process in the body, it is possible to have too much of a good thing.

Inflammation is often compared to fire. In controlled amounts, there is no question that fire keeps us warm, healthy, and protected, but when there is too much fire, or if fire gets out of control, it can be destructive. But a fire does not need to be big to cause damage. It is now understood that low-grade chronic or on-going inflammation that is below the level of pain, can contribute to many chronic health problems and can itself become a disease. This low-grade inflammation can keep the body's tissues from properly repairing and also begin to destroy healthy cells in arteries, organs, joints, and other parts of the body.

A number of medical conditions are linked to too much inflammation. Some of these include:

- Alzheimer's disease
- Asthma
- Cancer
- Chronic obstructive lung diseases (emphysema and bronchitis)
- Chronic pain
- Type 2 diabetes
- Heart disease
- Inflammatory bowel disease (Crohn's or ulcerative colitis)
- Stroke
- Diseases where the immune system attacks the body, such as rheumatoid arthritis, lupus, or scleroderma

How to Know If You Have Too Much Inflammation

Anyone can benefit from eating and living in an anti-inflammatory way, but you can work with your doctor to understand if you have too much inflammation. Measuring the level of C-reactive protein (hs-CRP) in the blood is the most common test. Ask your doctor if you have concerns.

How to Prevent or Reduce Unnecessary Inflammation

Often, people take medications to decrease inflammation. Drugs like ibuprofen and aspirin can change the body's chemical reactions, but they are not without side effects. Research has shown that **lifestyle choices** can decrease inflammation too; our choices can influence how much inflammation we have in our bodies. **Adopting a healthy diet as well as other healthy lifestyle behaviors** can have a dramatic effect on inflammation levels.

The Anti-Inflammatory Lifestyle Includes

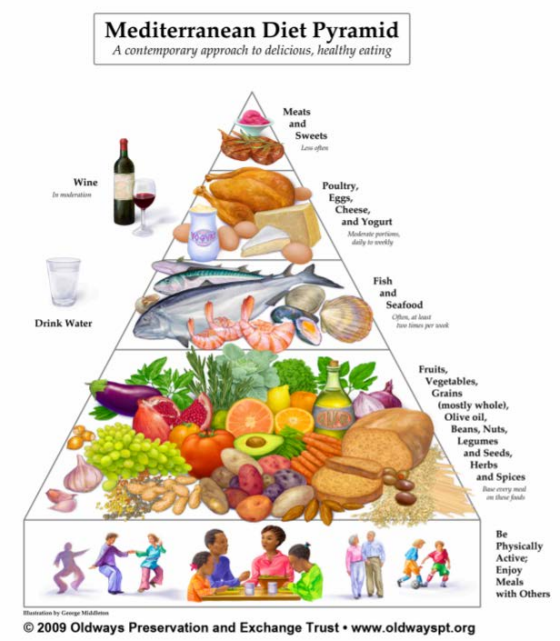
- Eating anti-inflammatory foods
- Not smoking
- Limiting alcohol intake
- Adequate exercise and being active
- Getting enough good quality sleep
- Managing stress well
- Managing weight

Eating to Reduce Inflammation

How we eat can affect inflammation, and certain diets are more likely to decrease pain and other symptoms of disease. It is estimated that 60% of chronic diseases, including many of the health problems listed above could be prevented by a healthy diet.[2] Not only can eating the right foods reduce the occurrence of inflammation in the first place, but it can also help to reduce and resolve inflammation that is already occurring.

Anti-Inflammatory Way of Eating

Eating to reduce inflammation is not one-size-fits-all. Different people will do it in different ways. One of the most researched examples of an anti-inflammatory way of eating is the traditional **Mediterranean diet,** which is a dietary pattern inspired by some countries of the Mediterranean basin. People that more closely eat a Mediterranean-like diet have consistently lower levels of inflammation compared to other less healthy ways of eating.[3,4] The **Mediterranean diet** has been extensively studied and is protective against many chronic health conditions including cardiovascular disease, type 2 diabetes mellitus, Parkinson's and Alzheimer's disease, and some cancers.[5,6] The Mediterranean diet is just one example of a traditional diet and happens to be the most researched traditional diet pattern in the world. Many traditional diets are healthier than trendy modern diets because they are centered around eating whole, unprocessed foods, shared with friends and family. The specifics of the Mediterranean Diet may vary from study to study, but these are always common elements.



In general, the **Mediterranean Diet** is a plant-based pattern (though not exclusively), rich in fresh fruits and vegetables, whole grain cereals, and legumes. It emphasizes nuts, seeds, and olive oil as sources of fat and includes moderate consumption of fish and shellfish, white meat, eggs, and fermented dairy products (cheese and yogurt), and relatively small amounts of sweets and red and processed meat. It is likely that the diet as a whole rather than individual components, leads to good results. The various components act together to reduce inflammation and produce favorable effects in the body.

Some key aspects of the Mediterranean diet include[6,7]

- Relatively high fat intake (30-50% of total daily calories)
  - Mostly from monounsaturated fatty acids (mainly from olive oil)
  - Saturated fats make up less than 8% of calories
  - Even if you aren't sure how to keep track of how much of each fat you are eating, you can trust that following a Mediterranean diet will give you a reasonable amount of the different types.
- High omega-3 fatty acid intake from fish (2 or more servings/week) and plant sources.
- A low omega-6:omega-3 ratio of 2-3:1 versus the 14:1 ratio typical of the US and European diet.
- High fruit and vegetable consumption
- High fiber consumption (32 g/day)

- Low in simple and quickly digested carbohydrates (I.e., low glycemic load. See Managing Dietary Carbohydrates for Better Health for more information**.**

The Mediterranean Diet is just one example of a traditional diet pattern. Traditional diet patterns in general are healthy, anti-inflammatory patterns because they include no processed foods.

The Anti-Inflammatory Diet (See also Figure 1 on last page)

Eat More Anti-Inflammatory Foods

- **Eat a Colorful Well-Balanced Diet with Lots of Vegetables and Fruit**
  Diets rich in fruits and vegetables supply important antioxidants and phytochemicals that are powerful anti-inflammatory nutrients. **Brightly colored fruits and vegetables, specifically green, orange, yellow, red, and purple contain many beneficial plant compounds, called phytochemicals**. Many of these compounds have antioxidant properties that can help to reduce inflammation. Studies show that a diet high in fruits and vegetables is helpful.

Fruits and Vegetables
The more servings eaten, the better. **At least 4 ½ cup-equivalents per day of a variety of vegetables and fruits including dark green, orange, yellow, red and purple, and legumes (beans and peas), is a good goal.** For light, "airy" vegetables, like lettuce and raw spinach, one cup counts as ½ cup-equivalent. For denser vegetables like peas, green beans, or chopped sweet peppers, ½ cup of counts as a ½ cup-equivalent. Emphasize vegetables over fruit. Purple and red berries are particularly rich in anti-inflammatory compounds as well as cruciferous vegetables like broccoli, kale, cabbage, and cauliflower.

- **Increase Omega-3 Fatty Acids**
  Foods containing long-chain omega-3 fatty acids such as cold water fish (salmon, sardines, and tuna), are especially good for decreasing inflammation. Aim for **2-3 servings per week (a serving is 3.5 ounces) of fatty fish like salmon, mackerel, herring, lake trout, sardines, and albacore tuna**.

  - ❖ The omega-3 fatty acids abundant in fatty fish, eicosapentanoic acid (EPA) and docosahexanoic acid (DHA), are more potent anti-inflammatory agents than alpha-linolenic acid (ALA), typically found in plants. ALA does convert into EPA and then to DHA, but less than 1% of the original amount of ALA is converted to the physiologically active EPA and DHA.[8] For this reason flax oil, rich in ALA, is not as effective as EPA and DHA for inflammation.

- Fish oil contains preformed EPA and DHA (around 18% and 12%, respectively) and is a good source of these essential fatty acids. Plant sources of omega-3s typically contain ALA, though there are now vegan supplements derived from algae that contain both EPA and DHA.

- **Consider supplementing your diet with a high-quality fish oil**. 1 gm of fish oil has about 0.5-1 gm of combined omega-3s, so target 3-4 gms of fish oil daily, or 5-4 gms to treat inflammatory conditions.

- **Increase Olive Oil**

When cooking, extra-virgin olive oil is an excellent choice as it has been shown to lower blood pressure, LDL cholesterol, and markers of inflammation.[9,10] Pay attention to the oils in commercial salad dressings and opt for olive oil if possible. Olive oil contains primarily mono-unsaturated fatty acids (not omega-3 or -6s) and comes in several "grades"; "pure" is the most processed, "virgin" has moderate processing, and, and extra-virgin olive oil (EVOO) is minimally processed and is prized for its content of many potent beneficial phytochemicals. "Pure" and "virgin" are good for cooking with. It is best to not cook with EVOO because heating it to a moderate temperature will reduce the phytochemical content by about 15%-25%[11], however, the benefits of the mono-unsaturated fatty acids remain. EVOO can be added after cooking or used to make salad dressings. Canola oil is a good option as a primarily mono-unsaturated oil, but it does not contain many of the beneficial phytochemicals found in olive oil and there is less research to support its anti-inflammatory effects.[12] Other oils moderately high in monounsaturated fatty acids include peanut, rice bran, and sesame oils, however these also contain moderate amounts of omega-6s.

- **Coconut Oil**

There is increasing interest in using coconut oil in cooking. Whether coconut oil is "heart healthy" is currently under debate. Coconut oil appears to increase HDL-cholesterol (the "good" cholesterol) more than LDL-cholesterol (the "bad" cholesterol), resulting in a more favorable cholesterol profile when compared to butter.[13] Additionally, in the context of traditional diets where coconut oil is consumed regularly, it appears to not cause harm.[14] This suggests that **it is important to consider the rest of the diet, not just the oil itself**. In the context of an unhealthy Western diet, it is suggested that coconut oil could increase cardiovascular risk.[14] In regards to inflammation, preliminary research in animal suggests that extra-virgin coconut oil may have anti-inflammatory properties,[15,16] however research in humans is still lacking.

- **Include Tea and Several Spices**

  Spices such as ginger and turmeric contain many important anti-inflammatory compounds (see Figure 1), increase these in your diet by drinking teas (green is a powerful anti-inflammatory tea), and using these spices in your cooking.

Avoid Inflammatory Foods

- **Omit Trans-Fat Containing Foods**
  Trans-fatty acids promote inflammation. Sometimes referred to as "hydrogenated oils", foods that may contain trans-fats include margarine, deep-fried foods, and processed foods designed to have a long shelf-life such as crackers and packaged foods.

- **Limit Refined Seed Vegetable Oils**
  Limit seed oils (Soybean, corn, sunflower, safflower, grapeseed, cottonseed, and wheat germ oils) and processed foods, which are high in omega-6 fatty acids, and choose sources of mono-unsaturated fatty acids, like olive and canola oils, while increasing intake of omega-3-rich foods (like cold water fatty fish). The seed oils above are not inherently unhealthy in limited amounts. It's just that the western diet contains a lot of them.

  The background story on omega-6 fatty acids
  Omega-6 fatty acids are abundant in the typical western diet. They are found in high concentration in the common seed oils listed above and thus in many processed and packaged foods (crackers, chips, fast foods). The effect of omega-6 fatty acids on inflammation and chronic health conditions remains unclear. Early research suggested that too much of these dietary fatty acids were linked to pro-inflammatory pathways in the body. However, more recent research suggests that omega-6 fatty acids may not directly increase inflammation, and can actually act in an anti-inflammatory way depending on other factors.[17,18] What ***is*** clear, however, is that **omega-3 fatty acids**, like those from cold water fish have **anti-inflammatory and thus positive health effects**.

  What should you eat?
  Evidence suggests that human beings evolved on a diet with a ratio of omega-6 to omega-3 essential fatty acids of about 1:1. Current western diets have a ratio of about 10-25:1.[19] So ancient humans ate a LOT less omega-6 compared to omega-3 fatty acids than the modern American. Because seed oils are so commonly used in most processed foods, **the best way to reduce your omega-6 intake is to limit processed foods in your diet.**

  Both omega-3 and -6 fatty acids are essential nutrients, so you need SOME omega-6s in your diet, but you should limit them. So focus on **increasing dietary omega-3s (see above) and limiting dietary omega-6s, while still keeping both essential fats in the diet**. See Figure 1.

- **Reduce Saturated Fat Intake**
  Recent evidence continues to confirm that high dietary saturated fat intake in the context of an unhealthy western diet is associated with a small, but increased risk of cardiovascular disease[20] and a small, but increased level of inflammation, especially in overweight and obese individuals.[21] However, it is important when reducing saturated fat, to **emphasize poly- and mono-unsaturated fats and especially omega-3 fatty acids** rather than carbohydrates. Also, the context of the whole diet is important and consumption of the anti-inflammatory foods listed above contributes to a positive synergistic effect.

- **Moderate Dairy Intake**
  Full-fat and non-fermented dairy may have a small effect on increasing inflammation, but overall, dairy does not seem to increase inflammation.[21] Furthermore, fermented dairy like yogurt and Kiefer have a neutral or even positive effect on both cardiovascular risk and inflammation.[22] Therefor consumption of dairy, and especially yogurt in moderate amounts may be an acceptable part of an anti-inflammatory way of eating. Be sure to limit sugar intake by choosing plain, unsweetened varieties.

Reduce
Butter
Cream
Full-fat dairy
Red meat
Processed meats

- **Regulate Red Meat Intake**
  People that eat the most total red meat remain at greatest risk for diabetes, cardiovascular disease, and numerous cancers.[23] However, recent evidence suggests that processed red meats, like hot dogs, sausage, and lunch meats may be the biggest culprit.[24-30] Red meat is a good source of protein, iron, and other micronutrients, but poultry, eggs, and dairy as well as plant proteins (legumes), and grains can serve as good substitutes. If you consume red meat, select grass-fed unprocessed sources that may have more favorable fatty-acid profiles, choose lean cuts, and trim visible fat. The World Cancer Research Fund suggests eating no more than 12 to 18 ounces, cooked weight, of red meat per week (three 6oz servings or six 3oz servings); 3oz is about the size of a deck of cards. Avoid processed meats such as ham, salami, hot dogs, and sausages.

- **Avoid Charring Food**
  Charring is linked to inflammation.[31]

Reduce Blood Sugar

- **Limit Refined Carbohydrates**
  Foods high in refined carbohydrates such as white flour, white rice, white bread, and refined sugar, are easily broken down by the body into simple sugars, which are rapidly absorbed and can cause **large spikes in the hormone insulin which promotes inflammation**. Best to limit or avoid these foods.

- **Eat Low-Glycemic Load (GL)**
  Eat low GL foods and meal patterns (See Managing Dietary Carbohydrates for Better Health). These foods include complex carbohydrates (such as unprocessed whole grains, starchy vegetables, and fruits), protein, fats, and foods rich in fiber that help to keep blood sugar stable and reduce the inflammatory effects of insulin. By consuming complex carbohydrates in combination with foods that are high in fiber and healthy oils, carbohydrate break-down is slowed and the overall glycemic load is reduced.

Eat More Fiber

- **Diets high in fiber help to decrease inflammation**.[32,33]
  Fiber helps to slow the digestion of carbohydrates, helping to regulate blood sugar levels and also keeping you full longer. Mechanisms by which fiber reduces inflammation are not entirely understood, but fiber encourages recycling of fats in the body and also encourages “good” bacteria in the intestines that positively affect inflammatory pathways. Also, whole foods rich in fiber contain other important phytochemicals that have anti-inflammatory effects.

- **A good fiber goal is 30 or more grams a day.** Get in the habit of reading nutrition labels for packaged foods to help find product options with more fiber. However, getting fiber from whole foods is best. Keeping track of total fiber intake can be cumbersome, but if you eat a healthy diet pattern like the Mediterranean diet, you'll *probably* be getting plenty of fiber. See the box below for some good ways to boost your fiber intake.

Fiber Tips

- **Shift your carbohydrate sources to whole-food carbohydrate sources like starchy vegetables, legumes, whole grains, and fruits while also keeping your glycemic load low**. One-half cup of starchy vegetables (beets, corn, green peas, parsnips, winter squash, sweet potatoes, and pumpkin) provides from 2-4 grams of fiber. One medium apple delivers 4 to 5 grams of fiber and a medium orange provides about 3.5 grams of fiber. Be mindful of serving sizes, ½ cup is the size of a computer mouse. Carbohydrates should make up about ¼ of your meal plate.
- **Beans are a powerhouse of fiber. Eating at least one serving (1/2 cup) of legumes (beans and peas) every day will go far in meeting your fiber goal**. A ½ cup of cooked lentils, garbanzo, or black beans provides 6 to 9 grams of fiber. All beans are a good source of fiber, include a variety in your diet and get creative, adding them to soups, and using pureed beans as dips and spreads (think hummus!). Start slow to avoid excessive gas and bloating; your system will eventually adapt.
- **Choose whole grains over refined grains**. Whole grains are minimally processed, leaving the whole grain intact. Whole grains include oats, brown rice, quinoa, millet, barley, amaranth, bulgur wheat, and buckwheat. One-half cup provides from 2-4 grams of fiber
- **Include veggies in every meal and eat them first**. One study showed that when people ate salad before the main meal, they consumed 23% more vegetables than those served salad at mealtime, increasing their fiber intake and reducing their calorie intake.[1]

Additional Considerations

- **Ensure Adequate Magnesium (Mg) Intake**
  Mg deficiency is linked to increased inflammation.[34,35] Mg is under-consumed in the US due to poor diet, and it is estimated that 60% of Americans do not get enough.[34] Dark leafy vegetables are a rich source of Mg as well as legumes, nuts, seeds, and whole grains. The recommended dietary allowance (RDA) for Mg is 320 and 420 mg/d for women and men over age 31, respectively. Intake beyond this amount does not seem to provide further benefit. One cup of spinach or Swiss chard contains about 150 mg; ¼ C of pumpkin seeds contains 190 mg; 1 C of black beans, ¾ C quinoa, and ¼ C cashews or sunflower seeds contain about 120 mg.

- **Be Patient**
  The Anti-Inflammatory way of eating can take a while to be effective. Try it for at least six weeks or longer. Eventually, it should become a habitual way of eating to keep you healthy long-term.

The Anti-Inflammatory Lifestyle

Be Active

Exercise has been shown to reduce inflammation and people who get regular physical activity have lower levels of inflammation.[36] General recommendations for activity include:[37]

- A goal of a minimum of 150 minutes (30 minutes 5 days per week) moderate intensity aerobic physical activity such as brisk walking or tennis **or** 75 minutes (1 hour and 15 minutes per week) of vigorous-intensity aerobic physical activity.
- Moderate or high-intensity muscle-strengthening activities (such as weight lifting or using resistance bands) on 2 or more days per week.

Get Enough Quality Sleep

Sleep is one of the most important things people need to keep their minds and bodies healthy. The Centers for Disease Control estimates that as much as 35% of US adults do not get the recommended 7 hours of sleep per night.[38] People that do not get enough sleep or have frequent disrupted or poor quality sleep are more likely to have greater inflammation and also health problems like type 2 diabetes and weight gain.[39] Sleep helps tissues in the body heal, grow, and repair and also helps the body make the right levels of important hormones.

- Aim for **7-9 hours of restful sleep per night**.
- See Improving and Maintaining Healthy Sleep Habits for healthy sleep tips.

Manage Stress

"Stress" comes in many forms such as physical (threat of danger), mental (job or financial stress), and emotional (social rejection, isolation, or relationship stress). Stress is a natural part of life and can change over the course of life. If stress gets overwhelming or if there are moderate on-going stresses that are not relieved, the body can lose its ability to healthfully respond, causing increased inflammation which can harm our health.[40]

The ability to manage stress can be developed. All of the strategies already mentioned — eating a healthy diet, being active, and getting enough sleep — help support the body's ability to manage life's stresses. There are additional strategies that may be helpful, including mind-body approaches like mindfulness-based stress reduction (MBSR), progressive muscle relaxation (PMR), biofeedback, breathing exercises, yoga, and tai chi. See Integrative Approaches to Anxiety: Easing the Fear and also several handouts under the ***Mind & Emotions section*** of the IH Clinician and Patient Education page.

Manage Weight

Many factors contribute the balance of inflammation in the body. Some research suggests that maintaining a healthy weight may be important for keeping inflammation under control. People who are overweight or obese, or who have extra weight in the abdominal area have increased risk for more inflammation. Fat cells (known as adipocytes), especially ones located in the belly area, produce and secrete compounds that can contribute to inflammation. **Fortunately, even modest weight loss of 10% of body weight** can help to reduce inflammation.[41] Aim for following a healthy diet like the Mediterranean diet or the Anti-Inflammatory way of eating. See also, A Healthy Approach To Weight.

In Summary

Each of these lifestyle factors can help with managing inflammation. You don't need to do everything all at once. Bite off a manageable bit and make just one change at a time. This will help to enhance your capacity to make and maintain changes. Working to find balance in your life, addressing stress in healthy ways, being a part of a community, spending time outdoors, exercising, sleeping well, and, most importantly, spending time with people you love are equally as important as the foods you eat. You need to feed yourself as a whole – mind, body, heart, and spirit.

Note: The recommendations here are general suggestions for a dietary pattern that may help to reduce inflammation. Individuals may have unique sensitivities to foods that may contribute to inflammation. Please see The Elimination Diet handout to learn how to identify foods that may be causing specific symptoms**.**

The information in this handout is for general education. Please work with your health care practitioner to use this information in the best way possible to promote your health.

NOTES

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Figure 1: A Quick Guide to the Anti-Inflammatory Lifestyle

A Quick Guide to The Anti-Inflammatory Lifestyle

Be active daily

Eat a colorful and well-balanced diet

Manage stress

Get 7-9 of restful sleep per night

Manage weight

Spend time doing thing you love and with people you love.

INCREASE

Fruits & Vegetables

Aim for 4-5+ cups/day

Cherries, peppers, carrots, sweet potato, pineapple, squash, peaches, dark leafy greens, broccoli, cabbage, green beans, Brussels sprouts, blueberries, blackberries, grapes, eggplant, olives, plums, purple cabbage.

Omega-3's

Aim for 2-3 servings/week

Fatty fish (salmon, tuna, mackerel), fish oil (2-4 gms daily good quality oil), whole grains, walnuts, green vegetables, *eat more omega-3's than omega-6's.*

Monounsaturated Fats

Oils (olive is best, canola, peanut, rice-bran, sesame), avocados.

Fiber

Legumes (beans, peas, lentils, etc.), whole grains (brown rice, oatmeal, bran cereal), nuts, popcorn, vegetables, and fruits.

Protein

Plant-based (beans, grains, nuts, seeds), grass-fed or wild meat and fish.

Herbs & Spices

Paprika, rosemary, ginger, turmeric, sage, cumin, cloves, Jamaican allspice, cinnamon, marjoram, tarragon, green and black tea.

Desserts/Snacks

Limit sweets. Dark chocolate, (70% of cocoa or more): less than 100 g/week

Consider: Magnesium supplement (320 mg/d women; 420 mg/d men)

DECREASE

Trans-fats

Partially hydrogenated oils, baked goods (cakes, pie crusts, frozen pizza, cookies), fried foods (donuts, fries)

Refined Vegetable Oils from seeds

Soybean, corn, sunflower, safflower, grapeseed, cottonseed, wheat germ

Sugars and Simple Carbohydrates

Eat a low glycemic load diet

White breads, English muffins, bagels, white pasta, instant and white rice, rice, corn, sweetened cereals, sweets like candy, baked goods, and other desserts, fruit juice

Processed meats

Lunch/deli meats, hot dogs, bacon, sausage

Saturated Fats

Choose lean cuts of meat and trim visible fat (lamb, pork, fatty beef, chicken with skin). Consider grass-fed, organic sources. Limit butter and full-fat dairy like cream. Emphasize fermented dairy like yogurt and Kiefer.

Foods that may trigger intolerance in some people

Dairy, wheat, eggs, artificial flavor and colors (Aspartame, FD&C dyes)

(See Elimination Diet handout)

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