The Anti-Inflammatory Diet Clinical Tool

This document has been written for clinicians. The content was developed by the Integrative Medicine Program, Department of Family Medicine, University of Wisconsin-Madison School of Medicine and Public Health in cooperation with Pacific Institute for Research and Evaluation, under contract to the Office of Patient Centered Care and Cultural Transformation, Veterans Health Administration.

Information is organized according to the diagram above, the Components of Proactive Health and Well-Being. While conventional treatments may be covered to some degree, the focus is on other areas of Whole Health that are less likely to be covered elsewhere and may be less familiar to most readers. There is no intention to dismiss what conventional care has to offer. Rather, you are encouraged to learn more about other approaches and how they may be used to complement conventional care. The ultimate decision to use a given approach should be based on many factors, including patient preferences, clinician comfort level, efficacy data, safety, and accessibility. No one approach is right for everyone; personalizing care is of fundamental importance.
WHOLE HEALTH: CHANGE THE CONVERSATION
The Anti-Inflammatory Diet
Clinical Tool

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. A natural comparison for inflammation is 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 a fire gets out of control, the results can be catastrophic. When inflammation becomes systemic or chronic, it becomes a disease itself.

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. Things we have control over such as our stress levels, smoking, drinking alcohol, how much we exercise and sleep, and how we eat all influence how much inflammation we have in our bodies. Making healthy choices can prevent inflammation and promote health.

Linking Diet to Inflammation

How do foods cause inflammation? This is a complicated question, though there are a few theories.

Eicosanoids
When our bodies break down omega-6 fatty acids and omega-3 fatty acids, one of the end products is eicosanoids, which do a number of different things in the body. Eicosanoids are molecules in our cells that signal reactions in the body and exert control over many bodily systems, mainly related to inflammation or immunity. They also act as messengers in the central nervous system. Depending on the balance of the polyunsaturated fat intake of a person’s diet (omega-3’s versus omega-6’s), they will signal the production of anti-inflammatory prostaglandins or pro-inflammatory prostaglandins. In general, omega-6’s are pro-inflammatory and omega-3’s are anti-inflammatory. See Figure 1 for a list of foods that are likely to increase or decrease inflammation.

Omega-6’s are found in most vegetable oils, land animal meats, and foods with preservatives for longer shelf lives. Our ancestors probably ate omega-6’s to omega-3’s in a ratio of between 2:1 and 4:1, but in the standard American diet, it is probably closer to 15:1 to 20:1.¹ When our bodies break down omega-6’s and omega-3’s, one of the end products is eicosanoids, which do a number of different things in our bodies. One eicosanoid, arachidonic acid (AA), is the building block for all pro-inflammatory eicosanoids and is found in excess in diets with an overload of omega-6’s. Metabolites of AA, even-numbered prostaglandins and leukotrienes, increase the risk of clots and platelet aggregation.
Figure 1. Foods that increase and decrease inflammation.²

**The microbiome of the gut**
Another proposed mechanism for inflammation is the alteration in gut bacterial flora impacted by food choices. The foods we eat can either promote the growth of healthy bacteria living in our gut, which improves overall health, or it can foster the growth of bacteria that is less health-enhancing. This is part of the theory behind fecal transplants for people who no longer have the healthy bacteria living in their colon. This is an arena of much study in the microbiome research community, and hard-and-fast rules on which bacteria is best for the gut are still under discussion.³

**Free radicals**
Free radicals are compounds that readily donate electrons to various chemical reactions. In our bodies they can help to fight infection, but in excess they can lead to tissue damage and significant inflammation. Although the safety and benefits of antioxidant supplements have been questioned, a healthy diet with antioxidant rich foods can potentially protect against free-radical-induced damage.
Clinical Research

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

- **Alzheimer’s disease.** High-carbohydrate diets may correlate with increased Alzheimer’s risk. Fish, monounsaturated fats, cereal, and wine consumption seem to protect against cognitive decline.

- **Asthma.** There is a dose-dependent relationship between eating fast food (hamburgers) and asthma. Fish oil can be helpful for exercise-induced asthma, reducing airway narrowing and medication use.

- **Cancer.** It is estimated that 30%-35% of cancers can be related to poor diet. Increased consumption of fruits and vegetables and the antioxidants therein have been shown prevent cancers in vitro and in vivo.

- **Chronic obstructive lung diseases (emphysema and bronchitis).** Omega-3 fats lower inflammatory cytokines and improve dyspnea and increase oxygen levels in the blood.

- **Chronic back pain/fibromyalgia.** A small study showed that vegan diets improved fibromyalgia pain. It is likely that an anti-inflammatory diet could decrease levels of phospholipase-A2. This enzyme is at least 20 times (possibly up to 10,000 times) more active in lumbar tissue. It may generate more pro-inflammatory eicosanoids.

- **Type 2 diabetes.** Individuals who have diets ultimately leading to insulin resistance and type 2 diabetes also have higher levels of overall inflammation.

- **Heart disease.** A study including more than 10,000 people found that in those consuming a Mediterranean diet, cardiac risk was reduced by half.

- **Inflammatory bowel disease (Crohn’s or ulcerative colitis).** A supplement rich in fish oil, fructo-oligosaccharides, vitamin C, vitamin E, and selenium improved clinical response and decreased steroid needs.

- **Autoimmune diseases.** These are conditions where the immune system attacks the body, such as rheumatoid arthritis, lupus, or scleroderma. Fish oil and vegetarian diets decrease the number of tender and swollen joints.

Eating to Reduce Inflammation

How we eat can affect inflammation, and specific diets are more likely to decrease pain and other symptoms of disease. It is estimated that 60% of chronic disease could be prevented by a healthy diet. People who eat foods that are consistent with an anti-inflammatory diet are less likely to have the health problems listed above. Some important guidelines for people who want to eat an anti-inflammatory diet follow:

**Avoid unhealthy fats**

Trans fats, saturated fats, and fats that are high in omega-6’s cause inflammation. These fats are found in many animal products, fast foods, and any foods designed to have a long shelf life. Monounsaturated fats (like olive oil) are better choices. Omega-3 fats, like fish oil
and flax oil, are polyunsaturated fatty acids (PUFAs) that are especially good for decreasing inflammation.

One important thing to know about omega-3 PUFAs is that eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) are much more potent anti-inflammatory agents than their precursor alpha linolenic acid (ALA). 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 DHA and EPA.\(^\text{18}\) For this reason, flax oil (which is 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). Typically, plant sources of omega-3’s usually contain ALA, though there are now vegan supplements derived from algae that contain DHA.

When cooking, extra virgin olive oil is an excellent choice as it has been shown to lower systolic blood pressure, fasting glucose, c-reactive protein (CRP), and LDL levels.\(^\text{19,20}\) It is also resistant to trans fatty acid conversion with heat. There is currently increasing interest in using coconut oil in cooking as well. As a medium-chain fatty acid, it does not behave like most long-chain saturated fatty acids. It does not cause increased cholesterol and fat accumulation, but there still has not been much definitive research published on coconut oil.

**Eat fruits and vegetables**
Many studies indicate that a diet high in fruits and vegetables is good for decreasing inflammation. The more servings one eats, the better. Eight to 10 servings per day is a good goal. Unfortunately, most Americans get about 1.5 servings of vegetables and 1 serving of fruits daily, and that's usually from French fries or iceberg lettuce.\(^\text{21,22}\) Blueberries and cherries are particularly good choices to reduce inflammatory cytokines.

Levels of flavonoids, compounds found in colored fruits and vegetables, are often a proxy measure for high nutritional quality. For instance, the darker the color of the salad leaf, the greater the nutritional benefits. (Think iceberg lettuce versus spinach and arugula.) Steer people away from juice, as it often has added sugar and leads patients to miss out on the beneficial fiber than comes with eating the whole fruit. Aim to eat at least five servings of fruit and five servings of vegetables daily.

**Eat fiber**
Diets high in fiber are shown to help to decrease inflammation. A good goal is about 30 grams/day, ideally from a diet rich in whole grains, fruits, and vegetables. Grain consumption has been found to have an inverse relationship with CRP, with greater protection seen at a total fiber level above 22 grams/day.\(^\text{23}\) The single greatest factor that determines the inflammatory potential of a carbohydrate is its glycemic load. Highly processed carbohydrates typically have a higher glycemic load, leading to higher post-prandial glucose and insulin levels, which leads to free radical formation. For more information on the glycemic load and glycemic index, see the [Glycemic Index](#) clinical tool.

**Choose your protein carefully**
Plant-based proteins such as legumes, grains, nuts, and soy-based proteins are healthy alternatives to animal protein. If you choose to eat meat, aim to eat grass-fed rather than
corn-fed beef or wild sources of red meat, as these are less inflammatory choices. Trim the fat off of your meat when cooking it, and try to not char the meat when preparing it to lessen the inflammatory impact.\textsuperscript{24,25}

Fish are a wonderful source of protein with many health benefits. Given water pollution levels, avoid the largest fish, which are likely to have the highest levels of methyl mercury (shark, swordfish, golden bass, and mackerel). In general, do not eat carnivorous fish that eat the smaller fish that have ingested heavy metals. Some of the safest fish are tilapia, wild salmon, and anchovies.

**Include anti-inflammatory drinks, spices, and sweets**
A glass of red wine daily has been shown to lower inflammatory markers. Three to 6 glasses of green tea daily has been shown in early studies to be linked to cancer prevention. Water is the perfect drink, as it has no additives or calories and is very affordable. We are the only species that ever drinks something other than water to slake our thirst. For more information on the benefits of what we drink, see the [What We Drink](#) clinical tool.

The cooking spices turmeric, oregano, ginger, rosemary, clove, cumin, and cayenne also have anti-inflammatory properties. Dark chocolate (more than 70% cocoa mass) also modulates inflammation biomarkers. A 1.5 ounce serving a day is reasonable.

**Other Suggestions: Food Rules and Diet Pyramids**

*Food Rules* is a book written by Michael Pollan.\textsuperscript{26} Michael Pollan is a journalist who has written a number of books on food and lifestyle. The following list includes just a few of the “food rules” that Michael Pollan recommends, but they are a good beginning primer on how to eat.

- Don’t eat anything your great-grandmother wouldn’t recognize as food.
- Only eat things that will eventually rot.
- Avoid food products that have some form of sugar among the top 3 ingredients.
- Eat your colors.
- Drink the spinach water (or use it for broth).
- Don’t eat breakfast cereals that change the color of the milk.
- Stop eating before you are full.
- Do all your eating at the table (and your desk is not a table).
- The fewer the feet, the better the meat.
- Spend as much time enjoying your meal as you did cooking it.
- Treat treats as treats.
- Break the rules once in a while.

Finally, the anti-inflammatory diet is just one part of an anti-inflammatory lifestyle. 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 your soul as well as your body.
For one quick and easy-to-use example of an anti-inflammatory diet, see Dr. Weil’s Anti-Inflammatory Pyramid in Figure 2.

Figure 2. Dr. Weil’s anti-inflammatory food pyramid.27
Whole Health: Change the Conversation Website

Interested in learning more about Whole Health?
Browse our website for information on personal and professional care.

http://projects.hsl.wisc.edu/SERVICE/index.php

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References

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