

PREVENTING AND MANAGING INFLAMMATION THROUGH NUTRITION



Chances are that, at one time in your life, you've experienced the effects that inflammation can have on the body.

Inflammation has a bad reputation but it can actually be a healthy response to challenges your body faces, such as infection, illness or injury. Acute inflammation, for example, is a normal, protective response to injury.

However, inflammation can become your enemy if it's causing your body to overreact to stressors, creating a chronic, continuing natural inflammation response. Your lifestyle habits, including diet, nutrition, and exercise, can all affect the way your body addresses these challenges.

The idea of using an "anti-inflammatory" medication, such as a non-steroidal anti-inflammatory medication (NSAID) to address inflammation, has begun to lose favor, because if inflammation is artificially interrupted or blocked, healing is also blocked.

By contrast, nutrients like essential fatty acids are not necessarily anti- or pro-inflammatory; instead, they modulate inflammation on a case-by-case basis, up- or down-regulating the production of pro-inflammatory mediators. This balances inflammatory processes so that healing can occur without undue damage to surrounding tissues.

PREVENTING AND MANAGING INFLAMMATION THROUGH NUTRITION

Essential Fatty Acids and the Inflammation Balancing Act

Omega-3 and omega-6 fatty acids have been front and center in nutrition news for many years now because of their relationship with cardiovascular health. But their role in modulating all types of inflammation in the body makes these fats even more important for healthy diets and lifestyles.

Omega-3s and omega-6s work together to modulate inflammation with a system of checks-and-balances built into place. When the diet provides a good balance of high-quality omega-3 and omega-6 fatty acids, this system works well to perpetuate inflammation when necessary and to quell and resolve the inflammatory cascade when the threat is over.

Most Western diets have an overabundance of omega-6 fatty acids and include insufficient amounts of omega-3s. High omega-6 and low omega-3 intake can throw off the balance, resulting in continuously low levels of chronic inflammation.

Enriching Your Diet with Omega-3s and Omega-6s

The most bioavailable source of omega-3 fatty acids are oils from fatty fish, especially sardines, anchovies, tuna, mackerel, and salmon. A nutrient is “bioavailable” or “bioactive” when it is in a form where it can provide health benefits in the human body. Nut and seed oils are also rich in omega-3 fatty acids, though their conversion to DHA and EPA may not be as efficient as those from fish. Omega-6 fatty acids tend to be more plentiful in many people’s diet, which can also affect how well omega-3 fatty acids convert to EPA and DHA.

Omega-3 fatty acid foods

- Fish and seafood
- Walnuts
- Hemp seed oil and seeds
- Flaxseed oil and flax seeds
- Chia seeds

Omega-6 fatty acids foods

- Liver and organ meats
- Avocado
- Borage oil
- Poultry and red meat
- Flax seed oil and flax seeds
- Black currant seed oil
- Fish and seafood
- Hemp seed oil and hemp seeds
- Evening primrose oils
- Egg yolk
- Pumpkin and sunflower seeds
- Other oils, such as corn, safflower, and soybean oils
- Butter
- Nuts

Botanicals for Inflammation

Herbs can also have a useful role in the management of inflammation and inflammation-generated pain. However, the selection of anti-inflammatory herbs needs to be appropriate to the condition under treatment. Ask your physician which herbs may be right for you.

Adaptogens

“Adaptogens” are a diverse group of herbs that restore overall balance and functioning of the body as a whole through normalizing unbalanced physiological processes: stimulation, relaxation, and improving focus and immune function^{2,3}. These herbs have been shown to clinically reduce self-reported stress, improve mood and energy, and strengthen the immune system. Adaptogens are often particularly helpful in stress-related conditions due to their shielding effects on the brain, immune system, and cardiopulmonary systems. Some, such as ginseng, ashwagandha, and rhodiola, are specifically neuroprotective by blunting the impact of cortisol within the central nervous system by reducing neuroinflammation and even encouraging repair.

Astragalus (Astragalus membranaceus)	Enhances mental and physical performance, learning ability, stress, fatigue, resistance to cancer and diabetes, immune function, chemoprotective, increase oxygen to tissues
Ashwagandha (Indian ginseng, Poison gooseberry, Winter cherry)	Strengthen immunity to colds and infections, improve physical and athletic ability, increase vitality, male fertility and libido, regulate blood sugar, antioxidant, antibiotic, anti-inflammatory, rejuvenating, astringent, anti-anxiety, anti-tumor, diuretic, insomnia, reduce cholesterol, arthritis, tuberculosis, asthma, leukoderma, bronchitis, backache, fibromyalgia, menstrual problems, hiccups, chronic liver disease, balances cortisol, supports HPA axis, boosts thyroid hormones
Bacopa (Bacopa monniera)	Cognitive function, concentration, fatigue, antioxidant, anxiety, epilepsy
Chaga mushroom	Strongest anti-cancer mushroom with an epochal effect in breast, liver, uterine and gastric cancer, hypertension, diabetes, tuberculosis (TB) of the bones, strengthen immune system, anti-inflammatory, anti-ulcer, anti-tumor, DNA Repair, anti-mutagenic
Cordyceps (Cordyceps sinensis)	Immunosuppressive, anti-aging, antioxidant, decreases pro-inflammatory monoamine oxidase and lipid peroxidation activity, liver and lung protection (increase oxygenation), asthma, bronchitis, chemoprotective, anti-cancer, chronic renal failure, atherosclerosis, antiarrhythmic effects
Eleuthero root or Siberian ginseng (Eleutherococcus senticosus)	Invigorate qi (chi or energy) or endurance, strengthen immune system, memory, chemoprotective, DNA repair, anti-inflammatory, normalize body function, particularly kidney, spleen and heart meridians, radiological protection, anti-cholesterolemic, anti-oxidant, angina, headache, insomnia, poor appetite, stress, fatigue, HPA-axis dysfunction
Glycyrrhiza Glabra (Licorice)	Adrenal stress, expectorant, phytoestrogen effects, food sweetener, reduces cholesterol manufacturing, antiviral
Holy basil (Tulsi, Ocimum tenuiflorum or Ocimum sanctum)	Enhance body’s natural response to physical and emotional stress, reduce bloating and gas, antioxidant, support healthy adrenal function, cortisol release and immunity, radiation protection, lipid balance, blood sugar regulation, anti-inflammatory (COX-2 inhibitor), cancer prevention, slow age-related memory impairment, lower cholesterol
L-theanine	Found in green tea, induces relaxation through increased dopamine and serotonin, and improves sleep quality
Mastic (Pistacia lentiscus)	Adrenal stress, expectorant, food sweetener, H.pylori infections, oral health/cancer, phytoestrogen effects
Mucuna pruriens (Cowhage, Velvet bean)	Lower stress as a source of L-DOPA the precursor for dopamine, neuroprotective, Parkinson’s disease, antioxidant, blood sugar, weight loss, metabolic syndrome, male infertility
Muira puama (Ptychopetalum olacoides)	Neuroprotective, stress, libido, depression, mood
Panax ginseng	Mood, cognition, immunity, antifatigue, protection against mental, physical and environmental stress
Phosphatidylserine (PS)	Decrease symptoms of mild depression in mood disorders
Relora Plus	Proprietary blend of plant extracts from Magnolia officianalis, Phellodendron amurense, and B-vitamins that normalizes cortisol levels, stress-related eating, decreases weight gain, and anxiety
Rosa Majalis	Anti-cancer, anti-oxidant, source for Vitamins A,C,E
Reishi or Lingzhi (Ganoderma lucidum)	Mental, physical performance, learning, decrease stress and fatigue), blood pressure stabilizer, antioxidant, analgesic, kidney and nerve tonic, strengthen immune system, anti-inflammatory, anti-viral, anti-tumor, anti-parasitic, liver protectant, blood glucose regulation, chemoprotective
Rhaponticum	Strength or endurance or reduce fatigue, impotence or aphrodisiac
Rhodiola rosea (Golden root, Roseroot, Western roseroot, Aaron’s rod, Arctic root, King’s crown, Lignum Rhodium, Orpin Rose)	Adaptogen, strength or endurance, reduce fatigue, mental and physical performance, decrease recovery time, antioxidant, learning, adrenal stress, depression, improve immunity, sleep patterns, mood stability, and motivation, resistance to cancer, type 2 diabetes, cardio-protective
Schisandra or Magnolia vine	Antioxidant, infection-resistant, increase skin health, liver protectant, stress/fatigue, enhance mental and physical performance, learning, adaptogen, improve resistance to cancer and diabetes, improve immune function, chemoprotective
Shiitake (Lentinus edodes)	Enhances mental and physical performance, increases learning ability, and decreases stress and fatigue, may improve resistance to cancer and diabetes, immune function, antiviral, chemoprotective
Tongkat Ali (Eurycoma longifolia)	Stress and cortisol balance, energy/fatigue, weight loss, erectile dysfunction, testosterone balance, infertility, athletic performance, antioxidant, anti-inflammatory
Valerian (Valeriana officianalis)	Insomnia, anxiety, sedation, stress/sleep disorders

² Guillems and Edwards (2010). Chronic Stress and the HPA Axis: Clinical Assessment and Therapeutic Considerations. Point Institute.
³ Guillems T. The Role of Chronic Stress and the HPA Axis in Chronic Disease Management. 2015. Point Institute.



Essential Fatty Acids and the Inflammation Balancing Act

Omega-3 and omega-6 fatty acids have been front and center in nutrition news for many years now because of their relationship with cardiovascular health. But their role in modulating all types of inflammation in the body makes these fats even more important for healthy diets and lifestyles.

Omega-3s and omega-6s work together to modulate inflammation with a system of checks-and-balances built into place. When the diet provides a good balance of high-quality omega-3 and omega-6 fatty acids, this system works well to perpetuate inflammation when necessary and to quell and resolve the inflammatory cascade when the threat is over.

Most Western diets have an overabundance of omega-6 fatty acids and include insufficient amounts of omega-3s. High omega-6 and low omega-3 intake can throw off the balance, resulting in continuously low levels of chronic inflammation.

Enriching Your Diet with Omega-3s and Omega-6s

The most bioavailable source of omega-3 fatty acids are oils from fatty fish, especially sardines, anchovies, tuna, mackerel, and salmon. A nutrient is “bioavailable” or “bioactive” when it is in a form where it can provide health benefits in the human body. Nut and seed oils are also rich in omega-3 fatty acids, though their conversion to DHA and EPA may not be as efficient as those from fish. Omega-6 fatty acids tend to be more plentiful in many people’s diet, which can also affect how well omega-3 fatty acids convert to EPA and DHA.

Omega-3 fatty acid foods

- Fish and seafood
- Walnuts
- Hemp seed oil and seeds
- Flaxseed oil and flax seeds
- Chia seeds

Omega-6 fatty acids foods

- Liver and organ meats
- Avocado
- Borage oil
- Poultry and red meat
- Flax seed oil and flax seeds
- Black currant seed oil
- Fish and seafood
- Hemp seed oil and hemp seeds
- Evening primrose oils
- Egg yolk
- Pumpkin and sunflower seeds
- Other oils, such as corn, safflower, and soybean oils
- Butter
- Nuts

Supporting the Endocannabinoid System

The term “hemp” describes the fiber and seeds taken from the Cannabis sativa L. plant species. Hemp has long been used in food, fiber, and medicine production ever since it originated from Central Asia. Hemp is rich with essential nutrients and bioactive phytochemical metabolites that nurture the endocannabinoid system, a rather unknown system of the body with a heavy influence on human health and well-being.

Hemp contains beneficial amounts of bioactive phytochemical metabolites and essential polyunsaturated fatty acids (PUFAs), which promote brain and overarching systemic health, aligning physiological balance in the human body. There are two major types of PUFAs:

- Omega-3s (ALA, EPA, DHA)
- Omega-6s (LA, AA)

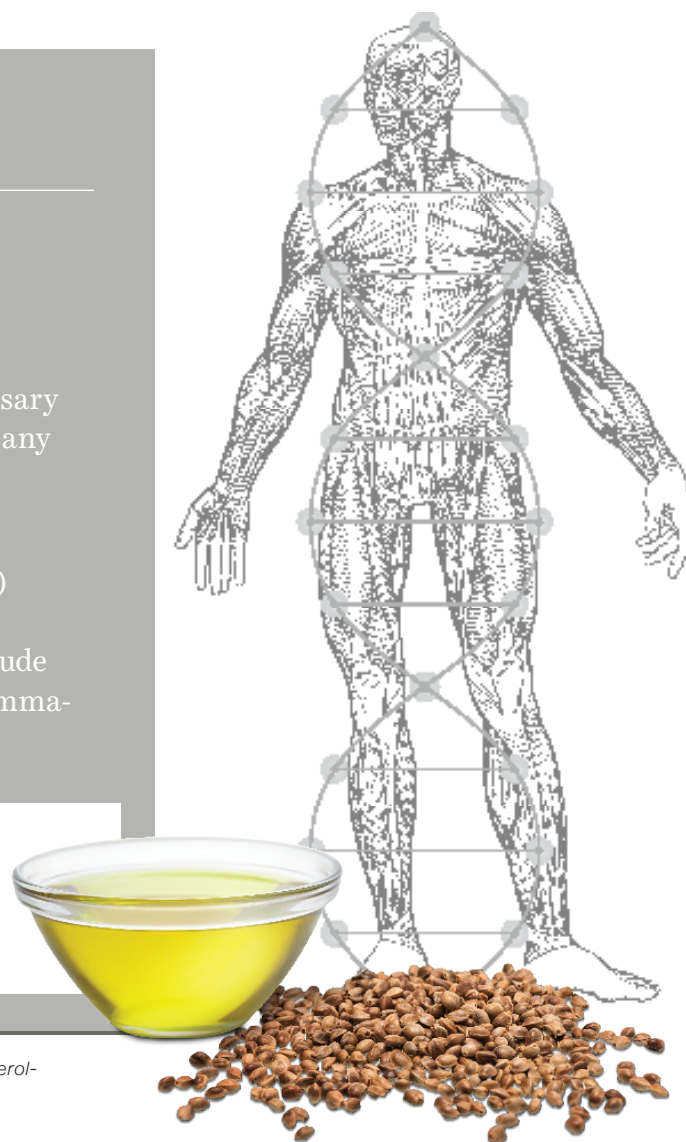
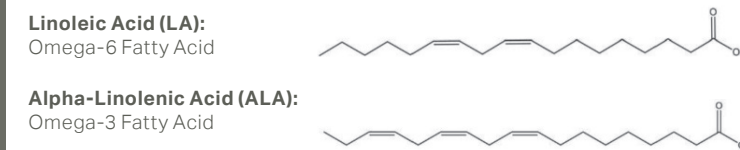
Along with natural antioxidants and fiber obtained via phytonutrients and other parts of a healthy, whole-food diet, hemp can support healthy inflammation.

ESSENTIAL FATTY ACIDS: What are they?

Both omega-3 and omega-6 fatty acids are long-chain polyunsaturated fatty acids, both 18 carbons long with two double bonds.

They are considered “essential” because they are necessary for health and cannot be synthesized by humans (or in any mammals, for that matter) from other fatty acids. Therefore, they must be consumed in the diet.¹

Omega-3 fatty acids include alpha-linolenic acid (ALA) and its metabolites, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Omega-6 fatty acids include linoleic acid (LA) and its most notable metabolites, gamma-linolenic acid (GLA) and arachidonic acid (AA).



¹ Bazinet, RP and Chu, MWA. Omega-6 polyunsaturated fatty acids: Is a broad cholesterol-lowering health claim appropriate? CMAJ. 2014; 186(6): 434–439.

How many times in the last month have you said, “I’m stressed”?

Whether you are young, old, male, or female, stress is likely a common part of your life, and may be affecting your health. According to a 2017 survey from the American Psychological Association, 75% of Americans reported “experiencing at least one stress symptom in the last month.”¹

- Are you experiencing these common stress symptoms?
- Lying awake at night
- Feeling nervous or anxious
- Irritability or anger
- Fatigue

Stress occurs in many different forms. It can be emotional (e.g. fear, frustration, anger, grief), physical (e.g. trauma, over-exertion, illness, dietary stress), environmental (e.g. climate, pollution, toxins), or a combination of the three.² When a person feels stressed, they will likely experience one of the stress symptoms listed above. Meanwhile, there is a complex physiological process going on at the same time inside the body, involving the HPA axis, cortisol production, and underlying inflammation.

What is cortisol?

Cortisol is the main type of glucocorticoid, or stress hormone, in humans. It is responsible for increasing blood glucose levels and modifying fat and protein metabolism in response to stress. As a result, cortisol largely influences cardiovascular function (i.e. blood pressure), inflammation, arousal, and learning and memory.

In a healthy stress response, cortisol levels increase and decrease rapidly as a stressful event begins and ends, but unbalanced cortisol levels initiate a downward cascade of health challenges. In an unhealthy stress response, chronic stress increases baseline cortisol levels, blunting the response to cortisol and making it more difficult to return to pre-stress levels.⁴ A chronic state of stress then increases can produce inflammation in the body and therefore, negative effects such as neuropsychiatric and metabolic disorders. Addressing current life stress is imperative to reducing chronic, underlying inflammation that is associated with a variety of chronic conditions.



HPA Axis and the Stress Response

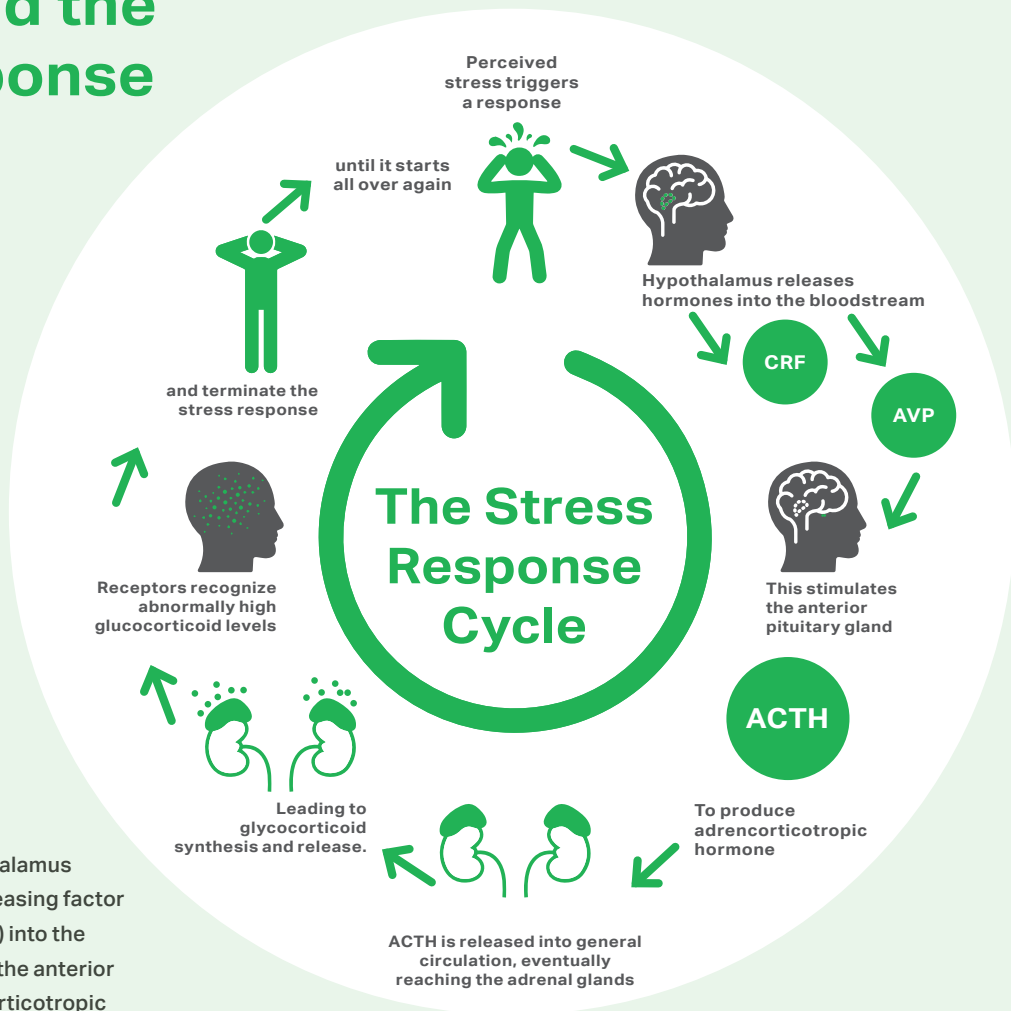
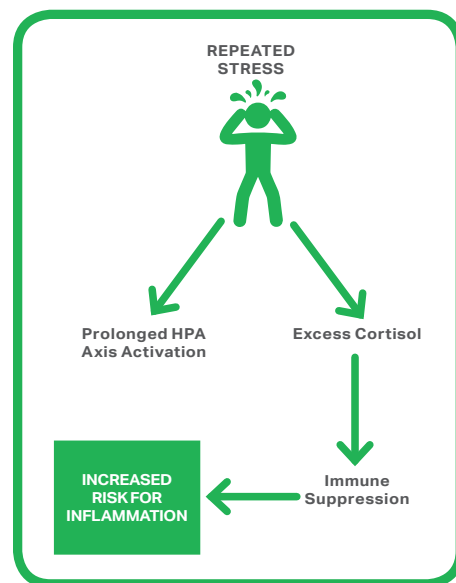


Figure 1: First, neurons in the hypothalamus release hormones corticotropin-releasing factor (CRF) and arginine vasopressin (AVP) into the blood. Then, CRF and AVP stimulate the anterior pituitary gland to produce adrenocorticotropic hormone (ACTH) and release it into general circulation. Finally, ACTH initiates glucocorticoid synthesis and release from the adrenal gland.

What is the hypothalamic–pituitary–adrenal (HPA) axis?

The HPA axis is a hormonal system that plays a role in stress response, modulated through a negative-feedback loop to manage hormone levels and maintain a healthy balance in your body.² When the stress response is working properly, glucocorticoids, upregulate the expression of anti-inflammatory proteins.³ However, repeated stress may lead to prolonged activation of the HPA axis and excess glucocorticoid production. Excess glucocorticoids (i.e. cortisol) may suppress the immune system, leading to an increased risk for inflammation.³



1. Winerman, Lea. (2017). By the numbers: Our stressed-out nation. American Psychological Association, 48(11), 80.
 2. Schneiderman, N., Ironson, G., and Siegel, S.D. (2005) STRESS AND HEALTH: Psychological, Behavioral, and Biological Determinants. *Annu Rev Clin Psychol*, 1, 607-628. doi: 10.1146/annurev.clinpsy.1.102803.144141
 3. Ingawale, D. K., Mandlik, S. K., & Patel, S. S. (2015). An emphasis on molecular mechanisms of anti-inflammatory effects and glucocorticoid resistance. *J Complement Integr Med*, 12(1), 1-13. doi:10.1515/jcim-2014-0051
 4. Stephens, M. A. C., & Wand, G. (2012). Stress and the HPA axis: role of glucocorticoids in alcohol dependence. *Alcohol research: current reviews*, 34(4), 468-483.