



REDUCE INFLAMMATION OPTIMAL BODY BALANCE

Inflammation 101

Everybody knows what acute inflammation feels like – you bang your knee hard into a table leg or getting out of the car and the acute inflammatory process starts: your knee feels hot, gets red, starts to swell and it hurts! This is a natural and protective response by the body to initiate the healing process. Without it, wounds would not heal and healthy tissue would not replace damaged tissue. Inflammation is also responsible for destroying foreign invaders; without inflammation, any germs invading our bodies would quickly overwhelm us. Basically, life would not last very long without a robust inflammatory response.

So how can something that is so beneficial for us in most instances be the cause of so much pain and disease in others? The answer lies in the degree of inflammation we experience over what period of time and if the body is given the necessary building blocks to allow the inflammatory response to benefit us rather than destroy our lives over time.

What most people don't understand is that inflammation is an immune response initiated by the body designed to protect us from germs and injuries. Mosby's Medical Dictionary defines inflammation as "...the protective response of the body tissues to irritation or injury. Inflammation may be acute or chronic; its cardinal signs are redness..., heat..., swelling..., and pain..., often accompanied by a loss of function."





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As we stated before, the signs of acute inflammation are often obvious (i.e., redness, swelling, heat, pain and loss of function). However, it is the 'silent' chronic inflammation that, over time causes us so much distress and disease.

The Players

There are a whole host of players in the inflammatory process, including white blood cells (such as neutrophils, monocytes/macrophages, basophils and eosinophils), cytokines (including interleukin-1 (IL-1), interleukin-6 (IL-6) and tumor necrosis factor-alpha (TNF- α)), tissue-swelling chemicals (like bradykinin, and histamine) and inflammatory chemicals (like the prostaglandins and leukotrienes). All of these chemicals play an important role in the inflammatory response. In addition, as the injury heals or the germs are disposed of other chemicals will turn off the inflammatory response; these are called anti-inflammatory compounds. All works well as long as the balance of inflammatory and anti-inflammatory compounds is maintained.

Said differently (without getting into details - if you are interested in the details, see the references at the end of this chapter for a thorough analysis of the inflammatory process), when there is a tissue injury or immune threat, a response is started in the body that produces a series of chemicals that causes inflammation and pain in an attempt to heal the injury or address the immune threat. This works well as long as there is a healthy balance between pro-inflammatory and anti-inflammatory compounds during this process. Unfortunately, many people experience chronic inflammation and pain because they have not given their bodies the tools it needs to maintain this balance.

Chronic inflammation is widely observed in obesity. As we stated above, there are a number of chemicals produced in the body that initiate or take part in the inflammatory process. Measuring these chemicals through laboratory testing can help determine a person's level of inflammation. Those that are obese or overweight commonly have many elevated markers of inflammation, including:

IL-6 (Interleukin-6)	TNF- α (Tumor necrosis factor-alpha)	Insulin
IL-8 (Interleukin-8)		Blood glucose
IL-18 (Interleukin-18)	CRP (C-reactive protein)	Leptin

These markers of elevated inflammation are also one of the main reasons why obesity is associated with so many health conditions, including high blood pressure, heart disease, stroke, atherosclerosis, diabetes, arthritis and autoimmunity.



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Fat's role in some of these problems has often been attributed to what might be called the physical effects of the excess weight: the wearing burden of weight on bones and joints, the buildup of plaque that reduces blood flow through major arteries, the crowding of fat around critical organs, causing strain on those systems. However, until recently it wasn't known how or why these markers were elevated. Science is beginning to give us the answers.

Fat is Inflammatory

Research is beginning to unravel the 'whys' and 'how's' of obesity. One of the most significant revelations is that researchers have found that fat is not just a passive by-product of overeating; they have shown that body fat actually produces many inflammatory chemicals. This means that fat is not just a reservoir of excess calories waiting to someday be used as fuel when calorie intake runs low. It means that fat itself acts like an 'organ of inflammation', producing many of the chemicals responsible for creating a low-grade systemic (or system-wide) inflammatory state in the body. These same inflammatory chemicals cause or exacerbate many diseases, including those listed above in addition to insulin resistance and obesity itself.

This means that being overweight or obese is actually an inflammatory disorder in and of itself and that the inflammation created by excess body fat is one of the underlying reasons that being overweight or obese predisposes a person to diseases such as diabetes, atherosclerosis, heart disease, depression, Alzheimer's and cancer, to name a few. This remarkable advancement in scientific research provides a very, very compelling reason to lose weight (if you needed another reason): being overweight or obese is killing you – not because it wears you down, but because it wears you out; it is literally stealing away your life from the inside out. And it's killing you slowly, creating a slow, painful progression to an early demise.

All (Body) Fats are Not Created Equal

However, all fat is not created equal. Research has found that visceral fat, which is the fat that surrounds the organs in your abdomen (such as your heart, liver, kidneys, gastrointestinal tract and spleen) and not subcutaneous fat, which is the fat that resides under your skin that is readily visible, is the main source of these inflammatory chemicals.

They determined this by looking at the metabolic results of a common way to quickly shed unsightly (subcutaneous) fat: liposuction. When they looked at people that had large amounts of fat removed via liposuction (which removes only subcutaneous fat) they found that other than weighing less, there were no measurable metabolic benefits in the test subjects. This means that even if a person has liposuction done to remove or eliminate their subcutaneous fat but doesn't



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do what is needed to address their underlying metabolic imbalances, they are still being bombarded with inflammatory compounds created within their own bodies. This means that they have done nothing to reduce their chances of developing any of the inflammatory-based diseases we discussed earlier and are just as likely to develop these diseases as those that don't have liposuction. You may look good (for a while) but you are dying just as quickly.

In a follow up experiment, researchers found that visceral fat in the abdomen secreted large amounts of pro-inflammatory chemicals. These results have propelled our understanding of how being overweight or obese effects our health, but it's just the beginning. Remember, at the beginning of this chapter we said that inflammation is an immune response. So far, we've seen only that visceral fat is the source of many inflammatory mediators, but we didn't know why. This is where it gets really interesting.

The Clean-Up Crew

A little background is in order so that we can properly tell the story of how fat can actually make you fat and cause disease. Fat is actually made up several different types of cells. The ones most people think of when they think of fat are a type of special storage cell called adipose cells. Adipose cells are where excess calories are stored. Each person has only a certain number of these adipose cells. Therefore, adipose cells only increase in size as more and more calories are stored; they do not increase in number. This is an important point to remember, the reason for which will become clear shortly.

As we have already discussed, adipose cells produce chemicals (called cytokines) that produce and regulate inflammation. As adipose cells grow larger, they produce more of these chemicals leading to more inflammation.

In addition to adipose cells, there are other cells that reside in fat tissue called macrophages. Macrophages are immune cells that play a vital role in your overall immune function. They are part of the body's first line of defense and help clean up the debris in the body as cells and foreign invaders die off. Macrophages also produce the same inflammatory chemicals (i.e., the cytokines); in fact, it turns out that most of the inflammatory chemicals produced in fat come not from the adipose cells themselves, but from the macrophages as they mount their immune responses.

Here is the really interesting part; the macrophages create more and more inflammatory chemicals because the adipose cells give them a never ending supply of debris to clean up.

How does this happen? As people become more and more overweight, the adipose cells begin



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to grow larger and larger (recall that people do not produce new adipose cells, the ones they have just increase or decrease in size). Inevitably, as the adipose cells grow larger and larger, some of them become so overburdened that they burst open, leak or just die. This causes the macrophage clean-up crew to come rushing in to dispose of the debris. This causes the concentration of macrophages in fat tissue to increase over time. The more macrophages there are, the more inflammatory chemicals they produce and the more inflammation you experience.

So the act of gaining weight actually promotes inflammation. The more weight a person gains, the larger the adipose cells become. The larger the adipose cells become, the more likely they are to burst or die. As more adipose cells burst or die, more macrophages come in to clean up the debris. More macrophages mean more inflammatory chemicals and more inflammation.

Under normal circumstances, macrophages clean up cellular debris and move on to the next job, so the impact of the resulting inflammation is short lived. With adipose tissue, the damage is ongoing (unless a person's fat cells begin to shrink through prolonged weight loss), so the clean-up work is never done. More and more macrophages are called in to do a never-ending job, creating greater and greater amounts of inflammatory chemicals. This inflammation cannot be contained in the fat tissue, so it spills out into the body and becomes systemic (system-wide). Basically, you hurt. However, the pain you feel isn't the worst of it.

The chronic inflammation created throughout your body as the inflammatory chemicals spill out of your fat cells actually causes many changes in other cells and systems in the body. This is why being overweight or obese correlates so strongly with heart disease, cancer, asthma, arthritis, diabetes and dementia. The fat itself (or as you now know, the cells that are in the fat – adipose tissue and macrophages) is actually creating the inflammatory chemicals that cause or exacerbate these disorders. Let me say that again so it can sink in: being overweight causes inflammatory disorders, including heart disease, asthma, arthritis, diabetes, dementia and cancer.

Add to this the fact that many of the underlying metabolic imbalances – including insulin resistance, sleep deprivation, stress, gut dysbiosis, food hypersensitivities and toxic burden – also increase or cause chronic inflammation, and you have a picture-perfect scenario for chronic pain and tissue destruction throughout the body, not to mention chronic weight gain. Not a pleasant picture.

Once more, you can do whatever you want to try and make yourself look or feel better – things like liposuction, medications, fad diets, surgery – but if do not address your underlying metabolic imbalances, lose the excess body fat and keep it off for the long term you will suffer needlessly and very likely develop one or more of these inflammatory disorders.



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Luckily, research has shown that if you do address your underlying metabolic imbalances and lose not only the subcutaneous fat but also the visceral fat by making the necessary dietary and lifestyle changes, you can reverse this process and substantially reduce not only your weight but also the inflammation in your body and significantly decrease your risk of developing these disorders.

Causes of Chronic Inflammation

As we've pointed out, excess body fat is a key cause of chronic inflammation in the body. There are also several other common causes of inflammation that typically afflict people that are overweight, and it won't surprise you that many of them stem from the underlying metabolic imbalances we have been discussing throughout this course. These include sleep deprivation, excessive or chronic stress, insulin resistance, gut imbalances and toxic burden. However, the largest (non-fat) contributors to systemic inflammation in the body are the things most people put into their mouths every day.

That Standard American Diet (SAD)

Here again, the SAD is a major player. In this instance, the SAD could also stand for the 'Super-inflammatory American Diet' as it is pretty much designed to promote chronic inflammation. Most Americans consume a diet that is very high in processed foods that contain high amounts of trans fatty acids, omega-6 fatty acids and sugars, all of which are extremely inflammation-producing.

Trans fats – the silent killer

Trans fats are produced when vegetable oils are hydrogenated or partially hydrogenated. This means that they take the liquid vegetable oil and bubble hydrogen through it in order to add hydrogen to the chemical structure of the fat (hence the term 'hydrogenated'). This makes the liquid fats become solid or semi-solid at room temperature and gives the fat a longer shelf life. It also imparts a consistency that is more desirable for use in baked goods and processed foods.

The problem is that the hydrogenation process is never complete, and a consequence of this is the formation of what are called 'trans fatty acids' or 'trans fats' (the 'trans' term describes the chemical configuration of the resultant fat). Trans fats are used as a low cost alternative to animal fats in many foods, including fast food, snack food, fried food, and baked goods. This substantially increases the shelf life and decreases the need for refrigeration. Unfortunately, these fats are foreign to the body and have severe health consequences.

Not too long ago, the only trans fats consumed were naturally occurring and there are very few naturally occurring trans fats in nature. If they are present, they are found in only very small amounts. For instance, naturally occurring trans fatty acids in the milk and body fat of cows and sheep are found at levels of 2-5% of total fat. By contrast, foods containing artificial



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trans fats may contain up to 45% trans fat compared to their total fat content. (40) Shortenings (used in many processed baked goods) generally contain 30% trans fats compared to total fats and margarines contain up to 15% trans fat by weight.

This increase in trans fats has very dire health consequences. The reason for this is that the human body cannot properly digest these foreign fats and they cause a great deal of inflammation. Trans fats have been shown to significantly increase the risk of coronary heart disease, Alzheimer's Disease, prostate cancer, breast cancer, diabetes, liver dysfunction, infertility, depression, insulin resistance, and obesity.

In fact, the National Academy of Science (NAS), which advises the United States and Canadian governments on nutritional science for use in public policy and product labeling, has stated that there is no safe level of trans fat consumption. This is supported by a 2006 scientific review published in the New England Journal of Medicine that states "from a nutritional standpoint, the consumption of trans fatty acids results in considerable potential harm but no apparent benefit."

Because of this, many countries have placed strict requirements on the use or consumption of trans fats or eliminated them in food products all together. Even in the United States, where big-business rules much of the food manufacturing and regulatory agencies, several states and organizations have restricted or eliminated the use of trans fats.

Unfortunately, in the US at least, they keep giving food companies loop holes to continue putting these harmful substances in our food while making it appear as if they don't. Don't be fooled by creative labeling stating something has '0 grams of trans fat' or the like; in the United States, if a product contains less than 0.5 grams of trans fat per serving, it can claim '0 grams of trans fat' on the label. Any food that contains hydrogenated or partially hydrogenated oils contains trans fats. Period.

Omega-6 Fatty Acids – The 'other' fatty acid

Omega-6 fatty acids are most commonly found in vegetable oils, especially corn, safflower, soy, peanut, cottonseed, sunflower and canola oils. These oils are rich in an omega-6 fatty acid called linoleic acid. Linoleic acid is converted into another omega-6 fatty acid in the body called arachidonic acid. The problem is that arachidonic acid is the precursor to a number of pro-inflammatory chemicals (our old friends, the cytokines).

Linoleic acid >> Arachidonic Acid >> Pro-Inflammatory Chemicals

In addition, not only does high omega-6 fatty acid intake promote elevated levels of inflammatory chemicals, it also activates other powerful inflammatory molecules, including tumor necrosis factor-alpha (TNF- α), interleukin-6 (IL-6) and nuclear factor kappa beta (NF-kappa β). NF-kappa β in turn has the power to turn on the genes that promote the production of over seven other pro-inflammatory compounds. This means that omega-6 fatty acids pack an incredibly powerful inflammatory punch in a little package by both directly and indirectly increasing the amount of inflammation in the body when they are eaten. Unfortunately, most people eat a lot of them.



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Just like with trans fats, vegetable oils are a recent addition to the human diet. Over the past 40 years, the recent focus on saturated fat and cholesterol prompted the misguided use of linoleic-rich (omega-6-rich) vegetable oils, rather than the use of more healthful oils such as olive oil or coconut oil. This coupled along with the low intake of omega-3 fatty acids has led to a dramatic shift in diet-induced inflammation.

Omega-3 fatty acids to the rescue

The main dietary strategy to counterbalance these inflammation-producing omega-6 fatty acids is to consume omega-3 fatty acids like alpha-linolenic acid, eicosapentanoic acid (EPA) and docosahexanoic acid (DHA). EPA and DHA are better known as 'fish oils' as they are predominately derived from fatty fish.

Omega-3 fatty acids are converted into anti-inflammatory chemicals in the body and help reduce the conversion of linoleic acid to arachidonic acid and reduce the conversion of arachidonic acid into inflammatory cytokines.

Alpha-linolenic acid >> EPA >> Anti-Inflammatory Chemicals

Thus, omega-3 fatty acids reduce inflammation and counter the harmful effects of omega-6 fatty acids.

Before the widespread use of omega-6 rich vegetable oils, it is generally estimated that the dietary omega-6 to omega-3 ratio was around 2-to-1 which kept dietary-induced inflammation in check. However, the omega-6 to omega-3 fatty acid balance for most people today is closer to 20- or 25-to-1. This is due both to the decrease in consumption of fatty fish and omega-3 fatty acids, as well as the increased consumption of omega-6 rich vegetable oils (mainly in processed and fast foods). This severely imbalanced fatty acid intake has profoundly shifted our bodies to a pro-inflammatory state.

Sugar – Sweet Inflammation

Trans-fats and our fatty acid balance are not the only things we put in our mouths that cause a great deal of inflammation. In fact, the dietary culprit responsible for the most inflammation in your body is probably sugar. If you are like most Americans following the SAD you eat a LOT of sugar.

In fact, according to the United States Department of Agriculture (USDA), Americans eat 156 pounds of sugar per person per year. One hundred and fifty six pounds! That is 31 five-pound bags of sugar per person every year! To break that down even further, that's about 44 teaspoons of sugar every day!

Energy drinks, soda and soft drinks account for nearly 36% of this total, or about 16 tsp of sugar per day (about 67 grams sugar/day). Since the average can of soda has about 40 grams of sugar in it, or about 10 teaspoons, every single American drinks, on average of almost two twelve-ounce cans of soda every day. I don't drink any soda, so somebody else is drinking ~4



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cans/day. That's a lot of sugar.

The problem is that sugar is very, very inflammatory, especially to those that are overweight and/or insulin resistant. Since sugar in its many forms is consumed so readily by so many people, it is no wonder people are constantly in pain AND overweight.

Reducing Inflammation

The good news is that because dietary and lifestyle choices are so crucial in determining the body's inflammatory state, changes can be brought about quickly by following an anti-inflammatory diet and making lifestyle choices that reduce inflammation.

Reducing inflammation through food

As we have discussed, the Standard American Diet (SAD) is pretty much designed to increase and exacerbate inflammation in the body. Therefore, incorporating dietary changes that reduce or eliminate inflammation causing foods and increasing foods that bring inflammation down can make dramatic improvements in the overall inflammatory state of the body. Once more, research has shown that those that have lost weight through dietary means show a significant reduction in inflammatory chemicals (including IL-6, CRP and TNF-alpha).

General Guidelines for an Anti-inflammatory Diet

Follow these guidelines and watch your inflammation and your body fat melt away:

Reduce/Avoid as much as possible (these are pro-inflammatory):

- Red meats and peanuts (including peanut butter)
- Caffeine, fried foods, carbonated beverages (like soda and 'energy' drinks) and alcohol
- Sugar, refined carbohydrates, artificial food additives, colors and preservatives
- Oils that contain high levels of trans- and saturated fats. This includes corn oil, cottonseed oil, grape seed oil, peanut oil, safflower oil, sesame oil, soybean oil, sunflower oil, and ALL partially hydrogenated or hydrogenated oils. Use olive, canola or coconut oil instead.
- Any foods that cause allergies, sensitivities and/or intolerances. These foods can be identified through testing or if a reaction occurs upon reintroduction in the diet after the elimination period during an allergy determination diet. Note: if you do not avoid these problematic foods, you may experience renewed and life-long inflammation.
- Dairy products, particularly those from cows, including cheese, sour cream, milk, ice-cream and margarine. Use butter or ghee in limited amounts.

- Gluten and gluten containing grains, including wheat, barley, rye and spelt, and foods made with them. Note: anything that says 'flour', 'enriched flour', 'bleached flour', etc. is made from wheat and should be avoided.

Include the following foods:

- Fruit and vegetables (organic if possible) - eat a lot of them!
- A variety of nuts and seeds, preferably raw, including flaxseeds, sunflower seeds, sesame seeds, walnuts, almonds and cashews.
- Whole, cracked and sprouted grains, including buckwheat, millet, amaranth, quinoa and whole grain rice.
- Healthy herbs and spices, including turmeric, boswellia and ginger, which are all very anti-inflammatory. Other great choices include garlic, chili peppers, basil, cinnamon, rosemary, thyme and oregano.
- Whole grains, legumes and soy products.
- Rice, soy or almond milk as substitutes for cow's milk
- Fermented foods, such as yogurt, sauerkraut, pickles, apple cider vinegar and cider



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An Antiinflammatory Lifestyle

Get some exercise daily

We talk about exercise often in regards to weight loss and most people think that exercise helps just because you burn more calories. However, research has shown a number of other benefits if you move your body regularly. It has been shown that regular vigorous exercise tends to reduce C-reactive protein levels, and that brisk walking after meals will tend to reduce insulin resistance and high blood sugar spikes. This occurs because exercising muscles can remove sugar from the blood without the need for insulin. In this regard, you get a double bang for your exercising buck because reducing insulin resistance will reduce C-reactive protein and fibrinogen as well as burn calories.

How do you do this in everyday life? Book at least 30 minutes 4 times a week for vigorous exercise. This means strength training or aerobic training where it is hard to keep up a decent conversation without breaks. In addition, get out for a quick walk after lunch (and dinner if possible). Get outside if you can, but walking is walking, so take a quick stroll around the building if the weather doesn't cooperate. See your course information about exercise for a lot more great ideas and information about exercise.

Get some sleep

We have talked a lot about the important role that adequate sleep plays not only in weight loss, but in your long-term health and vitality. It has been shown time and time again that getting eight to nine hours of sleep nightly is an important way to reduce inflammation in the body.

Stress Less

Finding ways to reduce stress will lower pro-inflammatory chemicals. There are dozens and dozens of ways to reduce the effect that stress has on your body, but it is up to you to find out which methods work best for you and use them whenever you need them. Two of the easiest to use are our old friend's daily exercise and deep breathing.

Deep breathing can be as easy as taking a deep breath every time something repetitive happens in your day. Let's say you do a lot of emailing during the day; every time you receive or send an email, take a deep breath. If you're on the phone a lot, every time your phone rings or every time you hang up, take a deep breath. If people say your name a lot, every time somebody says your name, take a deep breath. You get the picture. This simple deep breathing technique can make a world of difference in reducing not only the effects of stress on your body, but also your inflammatory load.

You can also do any of the techniques listed in your [Stress materials](#) to help you reduce the pro-inflammatory effects that stress has on your body. The key with stress management is consistency; choose one or two stress reduction techniques and use the everyday (multiple times a day if needed)!



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Eliminate as many toxins from your life as possible

Reduce/eliminate alcohol, caffeine, soda, artificial sweeteners, processed foods and tobacco products; use natural alternatives to household cleaning products, and replace personal care products with more natural alternatives (see the information on [Toxic Burden](#) for ideas).

Testing for Inflammation

Testing for Inflammation

Although there are many mediators of inflammation that are measured in scientific experiments, including such great sounding things as tumor necrosis factor-alpha, prostaglandins, thromboxanes, leukotrienes, interleukin-1, interleukin-6 and nuclear factor kappa-Beta, there are many fewer markers that are typically measured in practice.

In fact, there are really only four: erythrocyte sedimentation rate (ESR), fibrinogen, C-reactive protein (CRP), and interleukin-6 (IL-6). Your medical doctor can order these tests, as well as follow up on any abnormalities to determine the root cause(s). If you need help finding a practitioner to help you get these tests, [contact us](#).

Erythrocyte Sedimentation Rate (ESR) or Sedimentation Rate (Sed Rate)

Sedimentation occurs when the red blood cells (the medical term for red blood cells is erythrocyte) clump or aggregate together. ESR is the rate at which the red blood cells settle out of blood in one hour. This test is based on the fact that inflammatory processes cause an alteration in blood proteins that cause them to clump together. These clumps are heavier than single red blood cells and sink when blood is placed in a test tube. The faster these clumps fall or settle, the higher the ESR. ESR is not diagnostic of any particular disease, but rather that inflammation or a disease process is occurring and should be investigated.

Fibrinogen

Fibrinogen is a complex protein that is converted to a compound called fibrin. Fibrin, along with your platelets, forms the basis of the common blood clot. Increased fibrinogen can indicate acute inflammation and/or other disease processes; it is not often used as a first line measure of inflammation.

C-reactive protein (hs-CRP or CRP)

During any inflammatory process, a specific abnormal protein, called C-reactive protein (CRP) appears in the blood. This protein is virtually absent from the blood of healthy persons. CRP appears rapidly in the blood following injury or infections and remains elevated until the inflammatory process decreases. Therefore, it is a very useful measure to help evaluate the course and severity of inflammation. CRP levels tend to rise and fall sooner than ESR in response to inflammatory changes and are less prone to be influenced by non-inflammatory states than ESR, so CRP can be a very useful measure of one's chronic inflammation. A level lower than 0.5 mg/L is generally a good sign, while a level of 2-3 mg/L or more is an indication that there is a substantial amount of inflammation present that needs to be investigated and addressed.



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Interleukin-6 (IL-6)

Interleukin-6 can act as both a pro- and anti-inflammatory chemical. Increased levels occur after trauma, strenuous exercise, and infection. In addition, IL-6 causes CRP levels to rise and is secreted by fat cells. In fact, IL-6 is thought to be a reason why overweight and obese people have higher levels of CRP. Since IL-6 is necessary for a normally functioning immune system, some is necessary. A level below 0.93 pg/ml is generally a good sign, while a level of 1.50 pg/ml or above may be a cause of concern.

Other useful tests

Because **GI imbalances** and **toxic burden** play a vital role in the body's inflammatory state, using the assessment techniques mentioned in materials covering these two UMIs could also be beneficial to determine where your inflammation is coming from.

Supplementation to Reduce Inflammation

There are many supplements that have shown a beneficial role in helping the body to reduce inflammation, including buffered vitamin C, vitamin D, probiotics, proteolytic enzymes, *Irvingia gabonensis*, omega-3 essential fatty acids, turmeric, ginger, boswellia and cayenne pepper.

Vitamin C

Vitamin C has been shown in clinical studies to significantly reduce inflammation. In our clinic, we have had much greater success using a buffered vitamin C rather than just plain ascorbic acid. Buffered vitamin C is formed by combining ascorbate with minerals like calcium, magnesium and potassium, which makes the compound much easier on the system and allows for greater absorption and utilization. If you really want to maximize the inflammation reducing capacity of buffered vitamin C, do a Vitamin C Flush to determine your need for buffered vitamin C. (See Vitamin C Flush at the end of this chapter)

Vitamin D

Vitamin D is getting a lot of press these days, as low levels have been linked to numerous disorders including rickets, depression, pain, cancer and immune imbalances. Vitamin D has also been found to decrease inflammatory markers. Interesting, vitamin D levels are often lower in people that are overweight and obese.

One of the challenges with taking the necessary amount of **vitamin D** is the outdated acceptable upper limit for **vitamin D3** consumption, which was set at 2000 IU. However, researchers point out that more recent studies have shown that 10,000 IU is the safe upper limit. Sunshine is a great source of **vitamin D** – however, research shows that even in the sunniest areas of the world, **vitamin D** deficiency is common as most of us cover up the majority of our skin. Therefore, a **high quality vitamin D3 supplement** can fill in the gaps.

We generally recommend children 3-5 years of age receive 1000 IU/day; children 5-12 years of age receive 2000 IU/day; and kids older than 12 years as well as adults take 4000 IU/day as a



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minimum dose.

Vitamin D levels can and should be monitored to insure optimal levels and to adjust supplementation. This is a simple blood test that can be done at any hospital or clinic. The test you should request is called 25 (OH) Vitamin D and ideal levels are between 40-60 ng/ml.

Probiotics

Research has shown that as much as 70% of your immune function originates in your gut, and a major component of that system is the organisms that live in your GI tract. These organisms (mainly bacteria and yeasts) not only help you digest and absorb nutrients, they protect you from most of the bacteria and viruses you are exposed to on a daily basis and can help prevent and/or eliminate food hypersensitivity reactions. This is especially true for children. Once more, the presence of healthy flora in the gut and/or probiotic use has been shown to have an anti-inflammatory effect.

Probiotic dosage will vary based upon predisposing disorders (i.e., someone with severe GI imbalance such as Crohn's disease may require more probiotics than someone using them for prevention) and age. Strain specific effects are now just beginning to be published, but it seems that a multi-strain formula that contains the following strains may provide the best protection:

Beneficial Probiotic Cultures

Lactobacillus acidophilus

Lactobacillus paracasei

Lactobacillus plantarum

Lactobacillus rhamnosus

Bifidobacterium bifidum

Bifidobacterium lactis

Saccharomyces boulardii

Adult dosing in most clinical trials ranges from 10-75 billion CFU/day, with doses of 20-25 billion CFU/day to help normalize gut flora balance after antibiotic use. Therefore, we usually recommend that people take 20 billion CFU 1-2 times daily on an empty stomach for adults. We generally use **FloraBoost** – 1 scoop daily (mixed with juice or water on an empty stomach) for kids between 15-60 lbs.; 1 scoop twice daily for kids 60-100 lbs.; adults should use **Ortho Biotic** – 1 capsule 1-2 times daily on an empty stomach.

Enzymes

One of the most important natural tools available to combat inflammation are proteolytic (i.e., protein-digesting) enzymes such as papain, bromelain, serrapeptase, and trypsin. These enzymes actually digest and deactivate many inflammatory compounds while helping to improve blood flow and nutrient circulation in the body. Studies have also shown that taking a combination of proteolytic enzymes may provide a synergistic effect that can dramatically reduce inflammation.



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To use proteolytic enzymes properly to reduce inflammation, take an enteric-coated product (this means that it will get through your stomach intact) and take it away from food. Taking it away from food (at least 30-45 minutes before and 2 hours or more after eating) is important. If you take them with food, the enzymes will be used to digest the food and get hung up in the stomach until all the food is digested (which can be 4-6 hours). This means a slower and less potent response. Also, don't take proteolytic enzymes with probiotics, as the enzymes can destroy the probiotics and make them less effective.

Irvingia Gabonensis

Irvingia gabonensis is a fruit-bearing plant that comes from the jungles of Cameroon. Extracts of the fruit's seeds are now making headlines in the scientific literature due to their incredible ability to induce weight loss in the absence of other lifestyle changes.

One of the reasons *Irvingia* is so successful at helping people lose weight appears to be its ability to lower circulating levels of C-reactive protein (CRP).

One double-blind study showed that those overweight volunteers that took 150 mg capsules of *Irvingia* extract twice daily prior to meals for a period of 10 weeks had the following changes over those taking a placebo:

- Average of 28 lbs. weight loss (13.1% decrease in body weight)
- 6.7 inches lost from waistline
- Reduced overall body fat by an average of 18.4%
- 26% reduction in total cholesterol
- 27% reduction in LDL
- 32% reduction in fasting blood sugar
- 52% reduction in CRP
- Marked decrease in appetite

To date, there is not another single compound in existence, neither pharmaceutical nor nutraceutical, that can approach the magnitude and range of the results observed in this 10 week clinical trial of *Irvingia*. We use and recommend [Optimized Irvingia](#) – 2 capsules with your two largest meals of the day.

Essential Fatty Acids

As we discussed, the SAD diet contains a very high ratio of omega-6 (n-6) to omega-3 (n-3) fatty acids – approximately 20:1 – which can cause lots of inflammation. Therefore, reestablishing an omega-6:omega-3 ration closer to 2:1 can really improve the overall inflammatory response and help you to lose weight.

In particular, the omega-3 fatty acids eicosapentanoic acid (EPA) and docosahexanoic acid (DHA) have been shown to suppress NF-KB, IL-1, TNF-alpha, CRP and IL-6. Omega-3 fatty acids also prevent inflammation by competitively inhibiting arachidonic acid, allowing for a greater production of anti-inflammatory compounds as opposed to pro-inflammatory ones.



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Sources of omega-3 fatty acids can be found in a wide variety of foods such as fish (especially deep sea fatty fish, including salmon, tuna, anchovies, herring, mackerel and sardines), walnuts, flaxseeds, soybeans, tofu and many vegetables, although therapeutic doses require supplementation. Most studies show that about 3000 mg of EPA and 2000 mg of DHA provide significant decreases in inflammation. We recommend [Orthomega](#) – 1-2 gelcaps twice daily.

Turmeric and Ginger / Curcumin

Turmeric is a well-known flavorful spice that is often used in curry. Besides being a food flavoring and coloring agent, turmeric has been used in Ayurvedic medicine for numerous health benefits since ancient times and numerous papers have been published showing its role in the treatment and prevention of many inflammatory diseases ranging from heart disease to cancer. Typical doses for ginger are 200 mg (standardized to 5% gingerols) 2-4x/day; for turmeric – 300 mg (standardized to 95% curcuminoids) 2-4x/day.

Boswellia

Boswellia serrata, or Indian frankincense, is used in traditional Ayurvedic medicine for its therapeutic properties and has been used over the centuries for various inflammatory conditions. *Boswellia* down regulates the pro-inflammatory cascade in much the same way as turmeric and ginger. Typical dosages are 400 mg (standardized for 70% boswellic acid) 2-4x/day.

Cayenne

Hot and spicy, cayenne pepper adds zest to flavorful dishes around the world and health to those brave enough to risk its fiery heat. The hotness produced by cayenne is caused by its high concentration of a substance called capsaicin. All chili peppers, including cayenne, contain capsaicin, which in addition to giving cayenne its characteristic heat, is a potent inhibitor of the inflammatory processes. The hotter the chili pepper, the more capsaicin it contains. The hottest varieties include habaero and Scotch bonnet as well as cayenne peppers. Jalapeos are next in their heat and capsaicin content, followed by the milder varieties, including Spanish pimentos, and Anaheim and Hungarian cherry peppers.

Not only does cayenne thwart the inflammatory process, it can also help you to lose weight by reducing hunger and turning up your metabolic furnace. All that heat you feel after eating hot chili peppers takes energy - and calories to produce. Even sweet red peppers have been found to contain substances that significantly increase thermogenesis (heat production) and oxygen consumption for more than 20 minutes after they are eaten. What this means is that you will burn more calories just by eating this spice, and luckily it doesn't take a lot. About 1 gram (or ½ tsp) has been shown to burn calories and decrease appetite (especially for fatty, salty and sweet foods).

We recommend and use a product called Inflammation Intensive Care that contains therapeutic amounts of curcumin, ginger, boswellia, and cayenne pepper as well as key bioflavonoids and quercetin to promote a healthy inflammatory response and ease pain.

Many other compounds have shown anti-inflammatory potential, including folic acid, CoQ10, resveratrol, and L-carnitine.

If you would like help determining the exact products you need and/or the correct dosing for your situation, please [contact us!](#)



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Sizzlin' Lemonade

In addition to using cayenne in cooking, you can also consume the following refreshing, energizing and great tasting concoction; it works particularly well first thing in the morning or anytime you need a 'pick-me-up'!

- Juice of ½ lemon
- 6-8 ounces water (hot or cold)
- 2 tsp pure maple syrup (less to taste)
- 1/10 tsp cayenne pepper (gradually increasing to ½ tsp)

Combine all ingredients, stir well and enjoy!

If supplements are more your style, you could take cayenne capsules – 50 mg 2-4x/day.

Note: although you will still get the anti-inflammatory benefit from taking the capsules, the research shows that tasting the cayenne is necessary for the calorie burning and appetite suppressing effects.

Vitamin C Flush (Ascorbate calibration)

Which Ascorbate is best to use?

Use a 100% l-ascorbate, fully reduced, buffered mineral ascorbate form of vitamin C that contains a proper balance of the major essential buffering minerals: 1) potassium, 2) magnesium and 3) calcium. No dl-ascorbate or d-ascorbate should be used as the d-ascorbate form is not absorbable by humans and may irritate the intestines. [Ultra Potent C by Metagenics](#) is a great product to use.

How to do the Vitamin C Flush

When possible, it is best to start (especially if this is your first flush) on an empty stomach, first thing in the morning. You may eat small meals throughout the day. Allow yourself the day to finish the flush. Most people saturate their ascorbate need within a few hours. Occasionally, the need is much greater, and it may take a number of hours to complete the initial flush.

The amount of l-ascorbate needed depends on how quickly your body uses it up. Below are some suggestions for how to best determine how much l-ascorbate you may need based on your health:

- A healthy person begins with a level ½ tsp dissolved in 1-2 ounces of water or diluted juice every 15 minutes.
- A moderately healthy person begins with 1 tsp dissolved in 4 or more ounces of liquid every 15 minutes.
- A person in ill health begins with 1.5 tsps in 8 or more ounces of fluid every 15 minutes.

If after four doses there is no gurgling or rumbling in the gut, you should double the initial dosage and continue every 15 minutes.

Dissolve [Ultra Potent C](#) (~1/2 tsp = 2 grams buffered l-ascorbate) in water or diluted juice (juice diluted 1:1 with water); room temperature fluid is recommended, and allow any effervescence to subside (usually dissolves completely within 2 minutes) and drink. Record each dosage on the following chart.

Continue with these instructions until you reach a watery stool or an enema-like evacuation of liquid from the rectum. NOTE: do not stop at loose stool. You want to energize the body to flush out toxins and reduce the risk that they may recirculate and induce problems. Once you reach a watery stool, stop consuming the [Ultra Potent C](#) for the day.

HOWEVER, if your total buffered ascorbate consumption is more than 50 grams, you should consume a dosage of [Ultra Potent C](#) of at least 10% of the total needed to induce the flush in the later afternoon or



REDUCE INFLAMMATION OPTIMAL BODY BALANCE

Time _____	Dosage _____	Grams Ascorbate (Vit C) _____
Time _____	Dosage _____	Grams Ascorbate (Vit C) _____
Time _____	Dosage _____	Grams Ascorbate (Vit C) _____
Time _____	Dosage _____	Grams Ascorbate (Vit C) _____
Time _____	Dosage _____	Grams Ascorbate (Vit C) _____
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Time _____	Dosage _____	Grams Ascorbate (Vit C) _____
Time _____	Dosage _____	Grams Ascorbate (Vit C) _____
Time _____	Dosage _____	Grams Ascorbate (Vit C) _____
Time _____	Dosage _____	Grams Ascorbate (Vit C) _____
Time _____	Dosage _____	Grams Ascorbate (Vit C) _____
Time _____	Dosage _____	Grams Ascorbate (Vit C) _____

evening. Example: if you took 60 grams of buffered ascorbate (15 tsp **Ultra Potent C**) before you had a watery stool, you would take 60 grams x 10% = 6 grams of buffered ascorbate (1.5 tsp **Ultra Potent C**) later that evening.

Many people find that preparing a 'batch' of buffered ascorbate allows for easier, timelier consumption rather than making a new batch at each interval. Example: 40 grams (10 tsps) may be dissolved in 40 ounces of water. If this method is used, we recommend using a capped, dark bottle to avoid air or light oxidation of the ascorbate. Dissolved ascorbate is stable for a day if kept cool or cold and tightly sealed.

Daily Consumption of Ultra Potent C after the Flush

Between flushes, consume 75% of the total **Ultra Potent C** you needed to induce the flush. You may use **Ultra Potent C in powder** or **tablet form**, four or more doses per day. If you need a daily dose of 6 grams or less, you may take it in two doses. The usual need for a person in a state of optimal health is 2-10 grams/day.

Calculate the amount of ascorbate consumed (1/2 tsp = 2 grams; 1 tsp = 4 grams)

Multiply the number of grams by the number of doses. Example: 2 grams x 12 doses = 24 grams

75% of this total is your approximate daily need. Example: 24 grams x 0.75 = 18 grams. 18 grams divided by 4 doses = 4.5 grams per dose, so I would take about 1 heaping tsp **Ultra Potent C** four times daily (or 4 tablets **Ultra Potent C-1000** four times daily)

As you become healthier, the ascorbate will be used more effectively and is better conserved in your body, which means you will need less ascorbate to achieve the desired effect. As your need for ascorbate decreases, you may notice loosening of the stool indicating that your body is using the ascorbate more efficiently and that your need has decreased. That is the time to taper ascorbate intake and recalibrate (i.e., do the flush again to determine your new daily dosage). As you become familiar with your body's responses, your need for and best timing of ascorbate is likely to become clear through direct experience with this protocol. Most people find that repeating the calibration once per week is optimal.



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Outcome of Ascorbate Flush

Many people report a subjective sense of improved well-being after the completion of an ascorbate calibration. This may be of short duration initially, but is a promising sign for long-term improvement. As toxins are eliminated from the body and as it is energized through the action of ascorbate, you should feel progressively better for longer periods of time. Most people will feel a greater sense of well-being after the second or third calibration/flush.

Precautions and Troubleshooting

Be sure to consume adequate water with each ascorbate dose and follow the protocol. Gas, cramps or fullness is almost always due to dissolving the [Ultra Potent C](#) in too little water or rushing the procedure.

Room temperature liquid is best for absorption.

People with hemorrhoids, irritable bowel disease, or inflammatory bowel disease may find that the ascorbate activates their tissues in the healing process. They may need to increase [Ultra Potent C](#) slowly over time before doing an ascorbate calibration/flush.

Helpful Hints

Most people find the flush is easy to do. Since the amount of time can vary quite a bit, it is best to do your first ascorbate calibration (flush) on a day when you can stay home for most of the day. Once you have done an ascorbate calibration (flush), you will have a better idea of how much time is needed and can plan your day accordingly.

For most people, it takes somewhere between 3-8 teaspoons (12-24 grams of ascorbate) of [Ultra Potent C](#) to flush. Some may need 30, 40 or more than 50 grams of ascorbate depending on their state of health and how quickly their body uses up ascorbate.

Sometimes people remain bloated for the rest of the day of the calibration/flush. Occasionally, people have loose stools for a day or so after doing the ascorbate flush.

Some people have reported hot stools that seem to burn the anus after several evacuations. If so, you can use a natural salve, such as calendula ointment, to soothe the area. This tends to cease after the first few times you do the flush.

If one wishes to or must stop ascorbate for any reason, it is important to taper gradually. Sudden cessation of ascorbate does not allow the body time to accommodate to the change, and the body will continue to metabolize and excrete large amounts of toxins without the necessary nutrients to do so in a healthy manner. You should reduce your ascorbate level by several grams per day over a sufficient period of time (depending upon how much you were taking) to prevent this from occurring.

Doses from 50 grams to 200 grams or more per day are usual for immune dysfunction states and other serious inflammatory or autoimmune diseases.

Over a period of ascorbate use, the amount of ascorbate necessary to achieve bowel tolerance changes and fluctuates. During stress or illness, many times more can be taken (and is appropriate to take) than at other times.

Adapted from [The Joy of Food: The Alkaline Way Guide](#), Health Studies Collegium