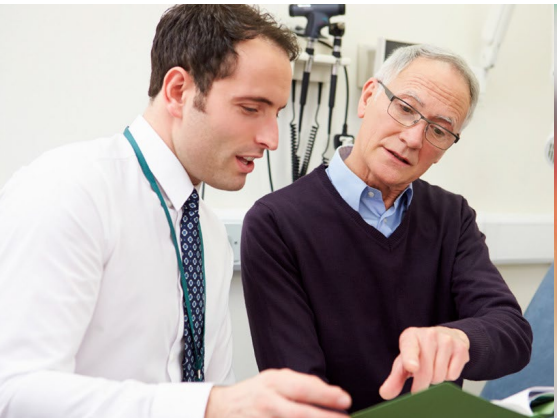
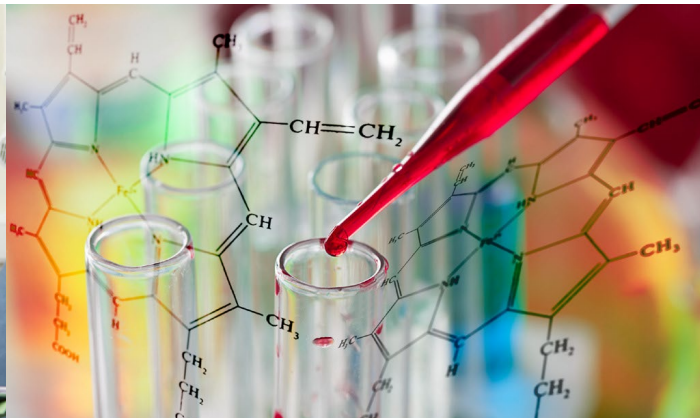
Tal Cohen, DAOM, MS-HNFM

Treating Pain & Inflammation with Functional Medicine

The Complete Clinical Guide to Finding and Treating the Ten Triggers of Disease





TREATING PAIN AND INFLAMMATION WITH FUNCTIONAL MEDICINE: THE COMPLETE CLINICAL GUIDE

To learn more about Functional and Nutritional Medicine, visit the American Academy of Functional Health at www.TheAAFH.org or call (503) 750-4202

This book contains information that is intended to help the readers be better informed consumers of healthcare. It is presented as general advice on healthcare. This book is not intended as a substitute for the medical advice of physicians. The reader should regularly consult a physician in matters relating to his/her health and particularly with respect to any symptoms that may require diagnosis or medical attention. Always consult your doctor for your individual needs.

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I believe that the greatest gift you can give your family and the world is a healthy you."

Joyce Meyer

A Word from

Tal Cohen, DAOM, MS-HNFM

At the age of six, I was diagnosed with chronic asthma and severe allergies. By the age of 16, I had spent years using prescription inhalers, steroids, injections, and other medications. However, I still suffered from lower back pain and headaches almost every day. Looking back, I now see how pain and inflammation controlled my life. It was limiting my social interaction. I was tired. I was choosing to stay at home and watch TV over spending time with friends and family. I had difficulty concentrating and my productivity was very low. I was tired of the medications, painkillers, steroids, and injections. I just wanted relief.

Since I had not found a solution in conventional medicine, I decided to try alternative medicine. I saw a chiropractor for several months, had an acupuncturist, a naturopath, and a homeopath. It wouldn't be exaggerating to say that I tried everything. After many months of treatments and thousands of dollars spent, I felt better, but the pain and discomfort were not completely clear. Eventually, I understood that I was not treating the underlying cause of the pain. Something was triggering this inflammation. I was not born with asthma, allergies, back pain, or headaches. So, what changed?

During my studies of nutrition and Functional Medicine, I learned about the triggers of disease, how different parts in our bodies are connected, and how inflammation can be triggered by factors, such as pro-inflammatory foods or harmful bacteria in our gut. Using a unique approach and advanced tests that are usually not offered in conventional medicine, I managed to find the root cause of my dysfunction. This time, the treatments were aimed towards fixing specific problems, rather than my symptoms. Within about six months of treatment, I was pain-free, my energy increased, and I no longer had asthma or allergies. It changed my life.

“If you are not testing, you are guessing!” one of my Functional Medicine mentors told me a few years ago. Today, I completely understand what he meant. If I had not invested in doing the “right” labs, the “right” treatment protocols, and making the “right” nutrition and lifestyle changes, then I would still be suffering from fatigue, pain, allergies, asthma, and brain fog, and my quality of life would be very poor. Today, knowing the power of Functional Medicine, we integrate it with natural medicine to help hundreds of people who, just like you, want to live a healthy and happy life, free of pain or disease, and to spend time with their family, friends, and favorite activities.

This book was born as a result of the knowledge, the research, and the clinical experience that my team and I have been gathering over the years. I hope that this book will serve you as a guide to discover the “triggers” of your symptoms and that it will help you improve your health, so that you can live the life you were meant to live. If you need guidance or help, do not hesitate in reaching out to me. I am in this with you.

To good health!

Tal Cohen

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Chapter 1
Why Do You Need to Be in Charge of Your Health?

Medicine is one of the fastest-developing fields. Every year, advances in technology bring us new discoveries in medicine, better imaging techniques, and smarter medications and vaccines. This leads to the question: With all this amazing change and progress, are we getting any healthier?

- Diabetes remained the seventh leading cause of death in the United States in 2010, with 76,488 deaths every year. That's 209 people every day who die of complications related to diabetes![1]

- The number of people diagnosed with diabetes is projected to increase by 46% through 2050. That is 305 people that will die from diabetes every day.[2]

- Every year about 795,000 people suffer a stroke.[3] That's more than one person every minute.[4]

- In 2017, there were 1,688,780 new cancer cases diagnosed, and 600,920 people died from cancer in the U.S.[5] That's about three new cancer patients every minute!

- American Institute for Cancer Research estimates that by the year 2030, that number will be over 50% higher.

With such advanced science in this modern country, why do so many people get sicker and why do so many people die every year?

To answer this question, we must understand what is holding us back from getting healthier.

What is "Holding Us Back" from Getting Healthy?

During the 15 years I have been in clinical practice, I have seen two types of patients. The first is the patient who has been suffering from chronic disease or pain and wants to get rid of the pain or other symptoms. The second type of patient, which was rarely seen in our clinic, wants to improve or maintain their health.

The majority of the patients who came in to our clinic waited until their symptoms were so debilitating that it was limiting them from being active and enjoying their lives. At that point, they shared with us that they had already seen a variety of doctors, were often on several medications, had been through surgeries that left them scared and hurting, or felt discouraged because they had tried everything. This phenomenon bothered me for years. Why do most people wait until their health problems are so the severe that it interferes with their quality of life?

There are probably several reasons for that. However, I found the four factors that might keep you sick. A few of my patients already recognized these factors and some were skeptical. It is alright to doubt what anybody is telling you (including your doctor). However, when you are sick for so long and do not get better, it is time for a change in mindset and approach. Here are the four factors that might prevent you from regaining your health and from living the life you deserve to have.

FACTOR #1

Prescription medications

For years, pharmaceutical companies have been spending billions of dollars to convince doctors, pharmacists, government agencies, you, and me that our health problems and symptoms are caused by getting older, "bad" genetics, or a lack of certain medications. That is why, in most cases, you get a prescription drug every time you go to see your doctor, even if they do not know what is causing your condition.

Since these prescriptions do not address or treat the root cause of your joint pain, headaches, depression, or heartburn, a prescription for chronic disease is usually a prescription for LIFE! Unfortunately, this problem has been getting worse, slowly becoming a social epidemic.

"The U.S. is 5% of the world's population and consumes 75% of the world's prescription drugs."
Source: Centers for Disease Control and Prevention. Diabetes.

The medical system is training doctors to "treat" inflammatory conditions and chronic diseases with prescription medication. What is the problem with that?

The first problem is that most prescription medications have harmful side effects to them. According to the *Journal of American Medical Association,* 106,000 people die every year from correctly prescribed medications (non-error, adverse effects of).[6] Medication harms your internal organs, especially your digestive tract, kidney, and liver, which needs to handle toxicity 24 hours a day, seven days a week.

Over the years that I have been in healthcare, I have noticed an increase in the number of prescription medications. According to a survey conducted in 2016 by the U.S. National Safety Council, 99% of doctors prescribe highly addictive opioids.

Many of my patients have been using Non-Steroidal Anti-Inflammatory Drugs, such as Advil, Aleve, etc., sometimes on a weekly or daily basis. A study published in the *Journal of Critical Care Medicine* showed that Advil, Ibuprofen, and other NSAIDs can cause acute or chronic damage to the kidney.[7] Another common medication is Tylenol, also called acetaminophen, which sends many people to the emergency room with liver failure. These medications can be easily obtained in many convenience stores and gas stations without a medical prescription. The damage to your body is done slowly and sometimes without any notice.

What is "Holding Us Back" from Getting Healthy?

FACTOR #2

Insurance companies determine which tests and treatments your doctor will prescribe and how many you are eligible to get

Unfortunately, many patients leave their health in the hands of their insurance company and do not get proper testing done to find the root cause of their problem.

"Insurance company restrictions of treatments and diagnostic procedures have made the same poor care […] become the new standard-of-care."

Source: Professor Steven M. Asch, MD, MPH Chief of Health Services Research at the VA, Professor of Medicine[8]

Think about your symptoms or the health concerns of somebody that you care for. Most likely, you or your loved ones were not born with these conditions. Something changed in your body or theirs that triggered the imbalance and led to symptoms, such as pain. If you don't find what triggered your condition, how can you solve it and regain your health?

Providing the right testing is key! Unfortunately, most doctors will not offer you these tests because of insurance restrictions, lack of knowledge, or the amount of time that it takes to go over your lifestyle and diet, and to find the triggers. During the years that I have been in practice, my team and I have discovered that, to find the triggers of disease and order the right tests for our patients, we had to leave the insurance companies. In the medical profession, it's called "getting out of contract" or "working out of network." This allowed us to work for the patient and provide them with what they needed, free of the limitations of insurance. Ask yourself: Who do you want your doctor working for, you or the insurance company?

What is "Holding Us Back" from Getting Healthy?

FACTOR #3

We ignore, minimize, or dismiss our symptoms

Imagine driving your car on your way home after work. You are listening to music and enjoying the ride on the highway when suddenly, a big red check engine lights up on your dashboard and your car starts to slow down. What will you do? Will you just cover the dashboard and keep on driving while ignoring the problem? Or, will you stop on the side of the road and look for the nearest garage to fix it?

What will happen if you decide to keep on driving while ignoring the problem? Most likely, your car will slowly (or quickly) start to break down. Your body does not have a big red warning sign, so how does it communicate to you that something is wrong? In most cases, you will start experiencing pain, discomfort, fatigue, or other symptoms. Unfortunately, many people minimize their problems or just mask the symptoms with drugs. They ignore the red check engine light that their body is putting out for them.

Have you been ignoring your symptoms because they did not bother you enough?

A young man was walking down the street when he noticed an old man sitting on his porch with a dog. He noticed that the dog was whining and crying. The young man asked the old man, "What's wrong with your dog? Why is he crying?" The old man said, "He's lying on a nail." The young man asked, "Laying on a nail? Well, why doesn't he get up?" The old man then replied, "It's not hurting him bad enough."

This little story reminds me of our nature. We tend to ignore pain or discomfort, and sometimes we take medication until it gets worse or intolerable. I have seen so many patients who suffer from pain or chronic conditions and told myself, "I wish that I had seen them years ago when their symptoms just started. It would have been so much easier to fix their condition and get rid of their symptoms." If you have symptoms, don't wait; take care of them as soon as possible.

What is "Holding Us Back" from Getting Healthy?

FACTOR #4

What your doctor does not know might keep you sick

According to a report published by the National Institute of Medicine, "the lag between the discovery of more effective forms of treatment and their incorporation into routine patient care averages 17 years." This means that it might take an average of 17 years for you doctor to get any new research or information about diseases, new lab tests, or new treatments. Take, for example, chronic inflammation and pain. Many studies show the factors that continuously trigger chronic inflammation, but most doctors—medical doctors, chiropractors, physical therapists, and sometimes even naturopaths—are not aware of them.

"Physicians' knowledge is lacking because they don't keep up with the medical literature."

Source: Dr. Claude Lenfant, M.D.,
Director of National Heart, Lung, and Blood Institute

Because most doctors do not know about the factors that contribute to chronic inflammation or how to test it, you end up with a few simple tests to "give a name" to your condition, like arthritis or inflammatory bowel disease. With this oversimplified diagnosis also comes a prescription, usually for life. In worse cases, a surgical procedure is offered. In the meantime, the hidden triggers of your condition continue to grow. I have seen this so many times: Patients on medications for arthritis, back pain, headaches, diabetes, hypothyroidism, and other chronic conditions slowly getting worse. Have you ever met a person who took medication for diabetes, high blood pressure, or arthritis and got "cured"?

"We do not have a healthcare system, we have a disease care system."

Source: Jeffrey Bland, Ph.D., Founder of Institute of Functional Medicine

The reality is far from that and is very sad. Most patients believe that their symptoms are balanced by medication, while they are actually slowly getting sicker. Would you prefer to work with an experienced professional who will find and fix your problems, or do you prefer to continue masking the symptoms?

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Chapter 2
How Big Pharma Got Us All

"Ask your doctor about Prozac"

You have probably seen it several times. The commercial with an elderly person. He looks in pain; she cannot sleep; or maybe they are depressed. Then a voice declares: "Are you depressed? Prozac can help you live the life you want." Then, they take a pill, quickly recover, and are shown running happily on the beach. The voice then says, "Ask your doctor about Prozac."

Medication is promoted heavily in the U.S. and around the world. Pharmaceutical companies have been investing billions (yes, billions) of dollars in promoting drugs and educating the public (you, me, our neighbors, friends, and family) that we need medications. As you have probably noticed, ads for prescription drugs that treat high cholesterol, diabetes, depression, pain, erectile dysfunction, and more appear on TV, on the radio, in newspapers, on billboards, and online every day. Spending for direct-to-consumer advertising of prescription drugs increased dramatically from $166 million in 1993 to $4.2 billion in 2005.[1]

Every day, pharmaceutical companies target us as consumers to buy more drugs. It is estimated that 40% of their marketing budget is targeted toward the public.[2] There is a lot of money that goes into selling to us and making us believe that our unhappiness, pain, or chronic conditions are caused by the lack of a certain medication.

"This medication will change your life. Immediately."

According to an article published in Scientific American, 60% of prescription drug ads and 80% of over-the-counter drug ads were found to be misleading or false. A few companies even claimed that that normal life conditions, such as sometimes feeling stressed, are signs of disease. In 2012, a drug called Strattera® was developed by Eli Lilly & Co. and promoted by suggesting that being frustrated, disorganized, or distracted are signs of attention deficit disorder. The commercials called the public to get checked by their physician and ask about Strattera®. The commercial ended with, "Strattera® can help you stay focused so you can get things done at work and at home."[1]

Why do all these commercials work on us so well? Maybe it is because we are looking for a quick fix, maybe it is because we actually believe that these drugs will cure us, or maybe it is because we trust our prescribing doctors to do what's best for us. Either way, statistics show that our understanding and treatment of majority of chronic diseases is lacking.

In 2015, Forbes magazine reported that pharmaceutical companies had the highest executive compensation and estimated that these companies have highest net profit margins in any industry. According to USA Today, in 2015, the CEOs of the 14 biotech and pharmaceutical companies received compensation packages that were valued on average at $18.5 million. Other CEOs, such as Leonard Schleifer, CEO of Regeneron Pharmaceuticals received a compensation package valued at $47.5 million in 2015.

While pharmaceutical and insurance companies making billion dollars every year and keep growing, the statistics show that the number of people with chronic diseases increases over time. As a healthcare provider, I often view medications as both essential and harmful at the same time. In times of emergency, when a patient's condition is critical and needs to be stabilized, or when you suffer from pain and need to go to work, medications are useful and may even be essential. On the other hand, chronic consumption

of medications may be harmful to your body and internal organs. One of our biggest challenges, is to understand that real health does not come from a pill. It comes from working out, eating the right foods, providing our body with rest, nutrients, and healthy environment to live in. If your body is already dysfunctional, following all of these healthy lifestyle recommendations are essential, but they are not enough. At that point, a stronger intervention is necessary. Drugs cannot give us health, they can only mask the pain or the symptoms.

Chapter 3
My Quest to Make Chronic Pain and Disease Optional

What led me to write this book and to share this information with you? It wasn't just my patients' journey. It wasn't just seeing how they suffered and how the drugs and surgeries they received were leading them to more pain and dysfunction. It was my own journey as well.

My introduction to healthcare started at the age of six as a patient. I started developing breathing problems, runny nose, headaches, itchy eyes, and fatigue. I was diagnosed with chronic asthma and allergies. Since my parents are very conservative, I saw several doctors and received a variety of prescription medications.

I was the kid in the back of the class with the inhaler and pain medication. I still remember the doctor telling my mom and I that my immune system was overactive and that I was allergic to almost everything—dust, plants, trees, cats, dogs, etc. "You will probably have to be on medication for a long time," I remember them saying. A few doctors said that I would need medication for the rest of my life.

Years later, when these drugs were not working well, I was "promoted" to steroids. I did a year and a half of injections at the age of 13, in an attempt to suppress my immune system and decrease the sensitivity to allergens. That was a very bad time in my life. I was weak, feeling sick most of the time, and at the age of 16, I had chronic back pain and experienced fatigue on a daily basis. It was hard. I stopped enjoying my hobbies and spent less time with my family and friends. I was told by one doctor that it was "in my head" and that I was experiencing depression. According to another doctor, I was suffering from health problems because I was not taking the medications that my body "needed." At the age of 18, after years of suffering and struggling with chronic pain, fatigue, and breathing problems, I was done with mainstream medicine.

The lack of confidence and the embarrassment at being the kid who was always sick or pulling medication and inhalers out of his backpack at school was too much for me. As I grew older, I slowly understood that I would

never get these days back. You see, most people think that the most valuable things in their life are family, friends, and money. Sometimes, not in this particular order.

However, what I learned from months and years of staying at home, watching TV, and missing out on spending time with my family and friends, hiking, enjoying my hobbies, and playing, is that TIME is the most important thing. While money comes and goes, usually on a monthly basis, every day that goes by will NEVER come back again. As I know today, time is the most valuable thing, and I wasted years at home, feeling tired and in pain. Looking back at the time you were sick, feeling tired, in pain, or depressed—how many days, weeks, or months did you lose? And how many of these days you could have spent with your family, friends, and hobbies like hiking or playing golf? Don't let more days go by. Decide today to change your life and to take control of your health and your future.

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Decide Today.
Commit to Changing Your Health.

Everybody deserves to be healthy, happy, and to spend time with their family, friends, and hobbies without pain or discomfort.

I am here with you on your journey to wellness.
Tal Cohen

Chapter 4
Environment, Genetics, Inflammation, and the Birth of Functional Medicine

Studies have found that the number of inflammatory diseases and autoimmune conditions, such as rheumatoid arthritis, osteoarthritis, multiple sclerosis, eczema, Colitis, and Crohn's have been increasing. In the past, personal or family genetics were perceived to be the main causes of diseases. A common belief among some doctors was that, if you do not have the genetics for diabetes or another disease, you would probably never develop it. The truth, as we know it today, is far from that.

Research in the last few years has shown us that, in most cases, "bad" genetics is just a tendency to suffer from a particular condition. Studies show that the recipe for disease is a combination of a genetic predisposition for a certain disease with gut dysfunction, nutrient deficiency, sedentary lifestyle, and external factors such as processed food, pro-inflammatory food, heavy metals, toxins, and infections. Studies also show that our intestines provide a barrier, which protects us from chemicals in digested food and water, and from harmful bacteria.[1] I have seen many patients for whom toxins, gut dysfunction, or dysbiosis was playing a major role in triggering their diseases.

This book will dive into the factors of inflammatory and autoimmune diseases, using the principles of Functional Medicine. To properly treat these conditions, it is important to find these factors and address them appropriately. This is the only way to correct the problem and eliminate symptoms.

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What Is Functional Medicine?

Functional Medicine is a new medical science that investigates the process of disease and dysfunction due to the effects of external factors (e.g., toxic chemicals, stress, food, or drugs) on our bodies. Some of these principles were reported earlier in Chinese medical textbooks or by naturopathic medicine practitioners. However, Functional Medicine was actually invented and developed by Dr. Jeffrey S. Bland, PhD, a former professor of biochemistry at the University of Puget Sound in Tacoma, Washington. Dr. Bland earned dual degrees in biology and chemistry from the University of California, Irvine, and completed his PhD in organic chemistry at the University of Oregon. He had extensive training in nutrition and lifestyle medicine.

"The doctor of the future will give no medicine, but will interest his patient in the care of the human frame, in diet and in the cause and prevention of disease."

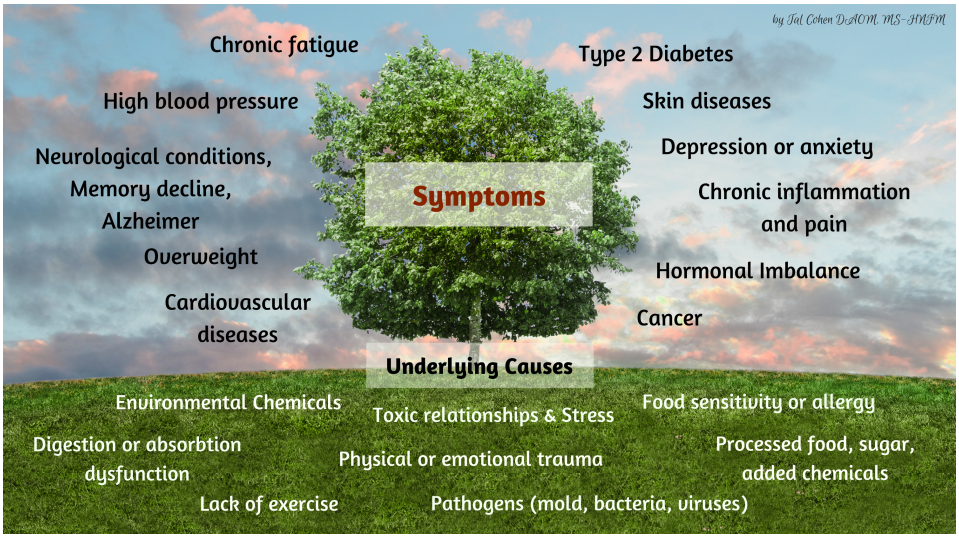
Source: Thomas Edison

The Birth of a New Approach to Medicine

Disease, according to Functional Medicine, is the result of an interaction of our cells and organs with environmental factors, rather than the result of genetics or old age. There is a common misconception about our health that, as we age or due to our genes, we lose healthy function, get sick, and have symptoms. While studies do show that genes do play a role in the development of disease, we now know that those genes are "triggered" by external factors.

As a biologist and biochemist, Dr. Bland understood that to treat chronic diseases, we must find the "triggers" of the the disease, instead of trying to manage the symptoms with drugs or surgery. After years of extensive research reviews, he founded the Institute for Functional Medicine in 1991 together with his wife, Susan.

Functional Medicine focuses on the latest medical research, comprehensive examinations, testing of systems in your body (e.g., hormonal, digestion and absorption, detoxification, and brain function), and individualized treatment plans. In comparison to mainstream medicine (which is derived from emergency medicine), the Functional Medicine doctor focuses on finding and eliminating the "triggers" of disease, as well as improving healthy function, instead of focusing on the symptoms. This book was created after years of studying integrative and Functional Medicine, and after successfully applying the principles of Functional Medicine.



Chapter 5
What Causes Pain in Our Bodies?

Inflammation

Inflammation is a process that involves immune system response to several factors, such as:

- Pathogens (virus or bacteria)
- Damaged cells (trauma)
- Irritants (toxins)

In a way, immune cells are like soldiers. They fight bacteria or viruses, and act when cells are damaged or when anything foreign or harmful enters the body, such as toxins.

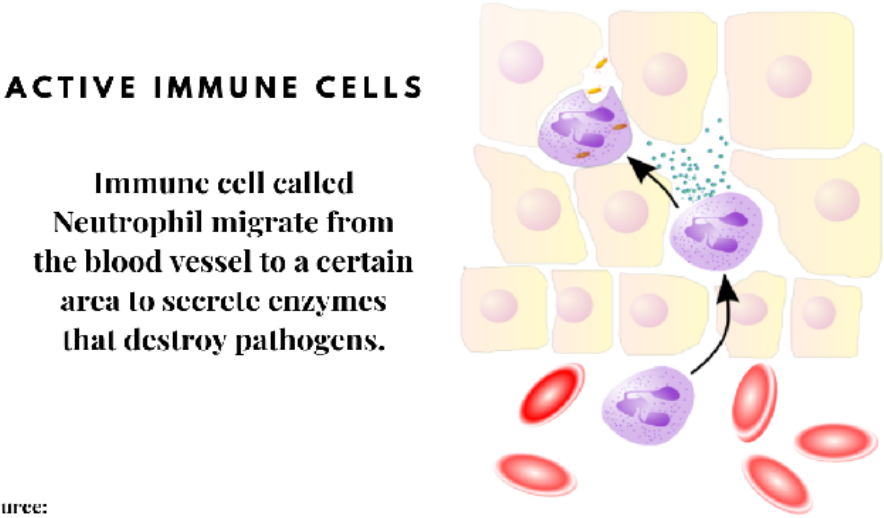
Signs of inflammation

The classic signs of inflammation are heat, pain, redness, swelling, and loss of function.

Is inflammation good or bad?

Inflammation—friend or foe?

Have you ever been hiking or running and suddenly sprained your ankle? What happened afterward? Under normal conditions, the tear of the muscle and/or ligament fibers will lead the immune cells to the damaged tissue. As a result, there will be swelling, redness, and pain when you touch or move the injured joint. The inflammatory process is what causes you to feel pain. Pain plays a role—an important role—in alerting you that something is wrong, in order to prevent more damage.

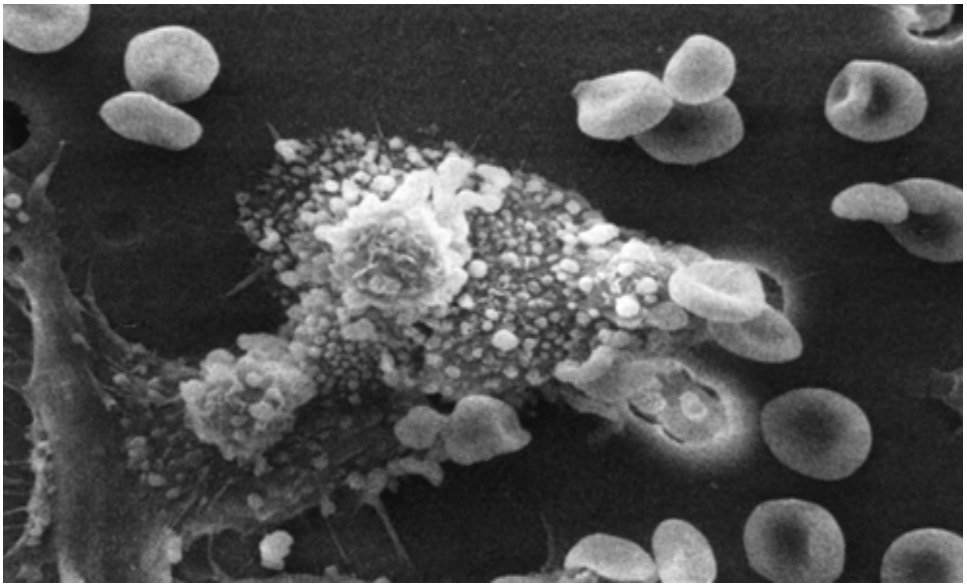


Source:
Uwe Thormann. Retrieved from wikipedia.org
commons.wikimedia.org/wiki/File:NeutrophilerAktion.png=filelinks

During the process of inflammation, you feel pain but might not know that your immune system is clearing damaged cells by secreting toxic materials, to allow the repair process to take place. In a way, the inflammatory process is essential for recovery.

Used as defensive agents of the body, immune cells secrete toxins which include reactive oxygen species to destroy bacteria, viruses, or cancer cells.

In the following picture, immune cells called macrophages begin to fuse with and inject their toxins into cancer cells.



A similar mechanism is used to clear injured, dysfunctional, or dead cells. If you injure a muscle or ligament, the dead cells need to be removed to make room for new cells.

Your immune cells secrete toxins that help the body to clear undesired cells or bacteria. Although necessary to clear damaged tissue and to make room for new tissue, toxins can also be destructive to our own cells and tissue, such as glands, organs, muscles, joints, and ligaments. What would happen if the immune system continued to secrete toxins without stopping?

The answer is a constant inflammation that does not resolve itself. Over time, this constant inflammation brings you not only pain, redness, swelling, and dysfunction but also the destruction of the cells in your joints, such as your meniscus or ligaments. Chronic inflammation also utilizes your body's resources and might cause you to feel fatigued or stressed. It can also cause damage to your cells and tissues.

Is inflammation limited just to muscles or joints?

When you think about inflammation, what picture comes to your mind? Is it a painful, swollen, or red joint? Maybe back pain? Studies show that inflammation is associated with much more than just joint pain. It is also a key player in many chronic diseases, such as diabetes, high blood pressure, cardiovascular diseases, hypothyroidism, and cognitive diseases.

To understand this, I want to introduce you to Tumor Necrosis Factor (TNF), a powerful protein that is secreted from immune cells called macrophages when you have inflammation. TNF increases the activity of the immune cells in a certain area, such as a joint, blood vessel, or organ.

TNF has the potential to trigger cell death and therefore was suggested as a therapy for cancer. Unfortunately, TNF is very toxic and can harm healthy cells everywhere in the body. It was found to have a central role in inducing inflammatory disease rheumatoid arthritis, ankylosing spondylitis, inflammatory bowel disease, and psoriasis.[1] It is also associated with depression and psychiatric disorders.[2] An article published in the *Journal of Cancer Metastasis Reviews* suggested that TNF might stimulate the growth of cancer cells.[3] Chronic inflammation, as it seems from research, can cause serious damage in your body and should be eliminated.

What happens if your inflammation continues and becomes chronic?

The answer is “an autoimmune condition!” As your immune cells continue to be activated in your joints, nerves, arteries, and organs, they will create discomfort, pain, fatigue, and eventual destruction. In other words, your immune cells are attacking your body. In medicine, it is called an “autoimmune” condition or disease. Auto means self and, therefore, “autoimmune” means an attack against oneself. An autoimmune condition is a chronic condition. In patients with rheumatoid arthritis, for example, their immune system is constantly attacking cells in their joints, leading to chronic pain, swelling, stiffness, and eventually to deformity and dysfunction. This is one of the leading causes of disability in the U.S.

Dr. Alejandro Junger, MD, the author of the book *Clean,* refers to this autoimmune process as the immune cells (the "police") attacking your own cells (the "citizens"). The immune system, which is necessary for normal fucntion and protection, has lost its ability to stop the attack. As a result, you continue to suffer. In cases of chronic inflammation of the back, neck, or joints, also called arthritis, the constant attack might lead to fast degenerative changes and disability.

An autoimmune condition is an inflammatory response against yourself, an "attack" on your own cells.

Chronic inflammation leads to severe reductions in quality of life

What is chronic pain and inflammation?

According to the National Institute of Health, “chronic pain is any pain lasting more than 12 weeks.”

If you have pain and inflammation for more than several weeks, it means that there is an ongoing, underlying condition that is triggering your immune system to continuously attack your own cells.

Chronic inflammation can lead to problems with your sleep, hormonal changes, mood changes, depression, and fatigue. We see many patients who describe that their health problems—difficulty sleeping, hormonal or thyroid dysfunction, and anxiety or other mood changes—started after or together with their pain. The inflammation, as I described earlier, can impact your brain, hormonal system, digestion, and other systems, leaving you with a very poor quality of life.

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How is pain impacting your life?

Check the box if it applies to you:

- ☐ My range of motion is limited.
- ☐ I feel tired.
- ☐ I am taking pain medication every day.
- ☐ I am not enjoying my favorite activities as much as I used to.
- ☐ I am not physically active, because of pain.
- ☐ I tend to limit my activities.
- ☐ I am limiting my time spent with my children, spouse, or friends.
- ☐ I used to be more active and social.
- ☐ I sometimes feel depressed or anxious.
- ☐ I am afraid of losing my job if my pain increases.
- ☐ I am less productive than I used to be before the pain.
- ☐ I wake up at night time or cannot fall asleep without sleeping medication.
- ☐ I am not as sexually active as I used to be.
- ☐ I sometimes feel irritable or “short-tempered” with family or friends.
- ☐ I often feel distracted and have difficulty concentrating.
- ☐ My memory is not as good as it used to be.

How many did I check:_____

If you checked more than two boxes, your body is already failing to function as well as it should. If you checked three or more boxes, you might be experiencing the disabling effects of chronic pain and inflammation. Unfortunately, this means that pain or dysfunction have become a part of your life and they are, in most cases, controlling and limiting your life.

Your Three Steps to Getting Rid of Pain and Inflammation

1. Find out what is triggering your disease, inflammation, and symptoms.

2. Avoid anything that triggers dysfunction or inflammation in your lifestyle or diet and that might be holding you back from healing.

3. Use natural, safe, and effective ways to treat these triggers, and to get rid of inflammation and regain your health.

How can you properly follow these steps and regain your health? Keep reading. You will find out.

Chapter 6
What Causes Chronic Inflammation?

What Causes Chronic Inflammation?

To answer that question, we need to ask ourselves: What triggers your immune system to constantly work?

If you find the causes that are triggering inflammation, you are halfway to fixing it.

Acute injury and pain

Physical injury or trauma (for example, a motor vehicle accident or falling down the stairs) can cause inflammation and pain. However, with time and some treatments, your ligaments, muscles, joints, and other involved tissues heal and the pain disappears. Unless your immune system has lost its ability to stop! It is also possible that something in your body keeps triggering your immune system, which leads to chronic pain.

The cause of chronic inflammation that no doctor explained to you

Inflammation can start in several locations in your body. It can start in your gut, your blood, your liver, your blood vessels, and your glands. Contrary to what some people or doctors might tell you, you are not sick or suffering from chronic pain or diseases because of “old age” or lack of medications. In this book, I will cover the main triggers for inflammation and chronic disease that nobody (including your doctors) told you about. I will also show you research about these triggers, which advanced labs to order, and the treatment protocols and supplements to get rid of your chronic inflammation.

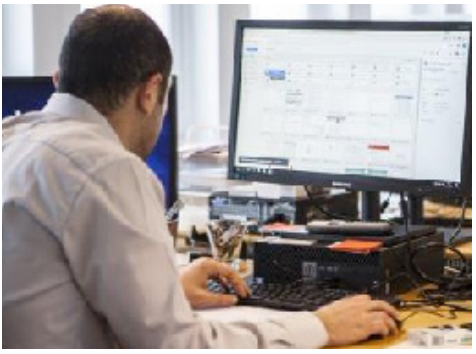
What causes injury in children?

A study in Cedars-Sinai Medical Center in Los Angeles, California found that, among children and teenagers with back pain, the cause of pain in 49% of them was an injury (trauma 25%, muscle sprain 24%).[1] Children can be very physically active and might not even consider that a fall or injury causes damage to their bodies.

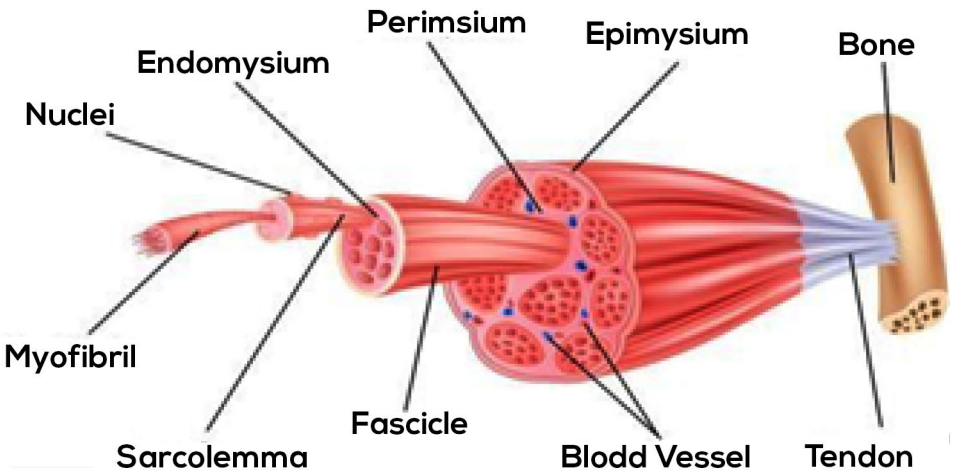
It is estimated that each one of us has more than 1,000 traumas (physical injury) during our childhood and up until the age of 18. How does that affect you as an adult? Many injuries can lead to microtrauma.

What is microtrauma?

Microtrauma is damage to the fibers of muscles, ligaments, or tendons, causing microscopic tears or injury. A microtrauma is caused by overuse (or abuse) of a joint or muscle, such as a hairdresser overusing their shoulders, or a high-tech engineer who sits all day and stresses his back and wrist joints.



In comparison, “trauma” usually involves damage to a larger amount of fibers and is a noticeable event, such as spraining your ankle when running, or straining your back when lifting something heavy, or falling on your hands or back. The response is immediate with pain, swelling, and/or redness. Both traumas and microtraumas will lead to an immune reaction. However, a microtrauma is an injury on a smaller scale with a subclinical immune response. It will usually be unnoticeable at the initial phases.



If you get injured in the gym or while running, how long should it take to heal? Under normal and healthy conditions, you should be healing within a few days or a couple of weeks. However, if your immune system is continuously being triggered and activated, it will lead to chronic inflammation and pain.

As with any injury, microtrauma triggers the initial inflammation. It is NOT the cause of chronic inflammation, but it might be the initial trigger. In the next chapters, we will discuss the factors that lead to chronic inflammation. Understanding and eliminating these factors is the key to getting rid of your chronic inflammation.

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Factors that Cause Chronic Inflammation and Disease

Chapter 7
Food Allergies or Sensitivity

Food sensitivity and allergies have been found to be involved in chronic inflammation, migraine, digestion issues, and brain dysfunction. Several observational studies found that consuming dairy products or milk increased inflammation and pain in some adults or children.[1, 2]

Eating foods that your body "does not like" might irritate your immune system and trigger or increase the inflammatory process. Recent research found that elimination of food that you are sensitive or allergic to will reduce the inflammation and pain.[3]

What is the difference between allergy and sensitivity?

Both food allergy and sensitivity can cause symptoms, such as discomfort or pain, as a reaction to certain foods. However, food allergy usually leads to stronger reactions that involve antibodies such as Immunoglobulin E (IgE), while food sensitivity might cause mild inflammation that you will not initially sense. You might eat something that you are sensitive to, and the inflammatory reaction will be so mild that you won't notice it.

Checking your own sensitivity to food

How do you know if you are sensitive to certain foods?

The only way to be sure is to run a test. One of my mentors once told me: "If you are not testing, you are guessing." In this case, I completely agree with him. While most doctors check antibodies, such as IgG or IgE, we found that the best test is a food sensitivity test called the ALCAT Test. The ALCAT Test may help to uncover which foods trigger chronic inflammation and its related health issues such as gastrointestinal or metabolic disorders.

How does it work?

After a blood draw, the white blood cells (your immune cells) are tested for their reaction when a specific food is introduced, for example, the reaction of your immune cells to cashew, chicken, and gluten. This test measures cellular reactions, rather than antibodies. Using the results from this test, our patients were able to eliminate sensitive foods from their diet and reduce inflammation. A study done by *Cell-Science* showed that, when patients eliminated foods that they were sensitive to, their symptoms of inflammation and pain were reduced.[3] This advanced test is used by Functional Medicine doctors, but most conventional doctors are not aware of it.

Results of immune reaction to food—the ALCAT test

Kevin (whose real name was removed to protect his privacy), came into the clinic and complained of several years of joint pain. He was 31 years old and was diagnosed with arthritis. The pain and swelling were spreading to his wrists and fingers. He was taking steroids and pain medication and was concerned that, if the pain increased, he might not be able to keep his job as a computer engineer. After the initial evaluation, we found that one of the main factors that could have been triggering his chronic inflammation and pain was a certain food. Kevin shared that he never noticed any reaction to food, that his doctor ran an antibodies test for gluten and other foods, and that nothing serious was found. I explained the difference between food allergy and sensitivity, we ran the ALCAT test, and these were the results:

Cell Science Systems

Food Sensitivities Test Report

237 Food Panel

ALCAT

Patient Information	[redacted]	Date of Birth:	[redacted]	Gender:	M
Lab Information	Date Received: [redacted]	Date Collected:	[redacted]	Date Reported:	[redacted]
HCP:	A New Way Clinic			Clinic ID:	[redacted]

Lab ID: [redacted]

Item Count: [redacted]

SEVERE

FLAXSEED
SPAGHETTI SQUASH
SPEARMINT
STAR FRUIT
TURKEY

MODERATE

ADZUKI BEANS
LAMB
PINE NUT
PINTO BEAN
RICE (BRWN/WHT)
SHRIMP
SORGHUM
TEFF
TUNA
WHEAT

MILD*

ANCHOVY*
ARROWROOT*
ARUGULA*
BANANA*
BAY LEAF*
BLACK PEPPER*
BRAZIL NUT*
BROCCOLI*
CABBAGE*
CANNELLINI BEANS*
CANTALOUPE*
COCONUT*
CUCUMBER*
CURRY*
EGG WHITE*
EGG YOLK*
FAVA BEAN*
GINGER*
HEMP*
HONEY*
HORSERADISH*
KIWI*
MACADAMIA*
PARSLEY*
PERSIMMON*
POMEGRANATE*
QUINOA*
RYE*
SAFFLOWER*
STRING BEAN*
SWEET POTATO*
SWISS CHARD*

ACCEPTABLE / NO REACTION

VEGETABLES / LEGUMES

ACORN SQUASH	ARTICHOKE	ASPARAGUS	BELL PEPPER MIX
BLACK BEANS	BLACK-EYED PEA	BOK CHOY	BOSTON BIBB LETTU
BRSSLS SPROUT	BUTTERNUT SQUASH	BUTTON MUSHROOM	CAPERS
CARROT	CAULIFLOWER	CELERY	CHICKPEA
CHICORY	COLLARD GREENS	EGGPLANT	ENDIVE
ESCAROLE	FENNEL SEED	GREEN PEA	ICEBERG LETTUCE
JALAPEÑO PEPP	KALE	KELP	KIDNEY BEAN
LEAF LETT (RED/GR	LEEK	LENTIL BEAN	LIMA BEAN
MUNG BEAN	MUSTARD GREENS	NAVY BEAN	OKRA
ONION	PARSNIP	PORTOBELLO MUSHRM	RADISH
RED BEET / SUGAR	RHUBARB	ROMAINE LETT	SCALLION
SHALLOTS	SHIITAKE MUSHRM	SOYBEAN	SPINACH
TARO ROOT	TURNIP	WHITE POTATO	YELLOW SQUASH
ZUCCHINI SQUASH			

FRUITS

APPLE	APRICOT	AVOCADO	BLACK CURRANT
BLACKBERRY	BLUEBERRY	CHERRY	CRANBERRY
DATE	FIG	GRAPE	GRAPEFRUIT
GUAVA	HONEYDEW MLN	LEMON	LIME
LYCHEE	MANGO	MULBERRY	NECTARINE
OLIVE	ORANGE	PAPAYA	PEACH
PEAR	PINEAPPLE	PLUM	PUMPKIN
RASPBERRY	STRAWBERRY	TANGERINE	WATERMELON

MEAT

BEEF	BISON	CHICKEN	CHICKEN LIVER
DUCK	PORK	VEAL	VENISON

As you can see from the results, foods such as flaxseed, spaghetti squash, adzuki bean, shrimp, tuna, and wheat irritate his immune system and trigger a severe to moderate reaction. Other foods, such as anchovy, bananas, egg white, and yolk trigger a mild immune reaction. I went over the list of foods and where these foods are used as added ingredients, and Kevin eliminated the foods from the severe, moderate, and mild reaction sections for 30 days. The results were incredible. He had a 60% reduction in his pain and swelling, and he was able to work with less pain. After two months, he was able to reduce the number of steroids that he was taking, and he felt an 80% reduction in his pain. He then started to eat foods from the mild list, slowly and in small amounts.

Any immune reaction to food—sensitivity or intolerance—might lead to health problems. Over many years in clinical practice, I have seen patients with depression, anxiety, digestion problems, chronic back or joint pain, and hormonal problems. These problems were all reduced as a result of eliminating the foods that trigger an excessive immune reaction. Remember, over 80% of your lymphatic and immune-related tissues and cells are in your gut. Ask yourself: Is it possible that you are eating foods that irritate your immune system?

FREQUENTLY ASKED QUESTIONS:

Do I need to eliminate the food that I am sensitive to for the rest of my life?

Not necessarily. It depends on the severity of the reaction and other factors in your body that might trigger an excessive immune reaction, such as infection or excess chemicals. Review this book for other triggers and eliminate them.

Do I need to repeat the test after a while?

We found that measuring once is usually enough.

My test showed that I am not sensitive to gluten. Can I eat wheat products, such as bread or pasta?

The simple answer is no. There are several reasons for this. First, gluten is a very complex food with many types of proteins. Most tests do not measure all the proteins in wheat. Second, every time we eat gluten our body releases an inflammatory protein called zonulin This protein leads to an opening of your intestinal tight junctions, which are the barrier between cells in the lining of your digestive tract.[4] Higher levels of zonulin have been found to be associated with inflammatory conditions and higher waist circumference, diastolic blood pressure, fasting glucose levels, and increased risk of metabolic disease.[5] The third reason is that a large amount of wheat in the U.S. is genetically modified. This creates a new type of food that might be foreign to our body and the long-term consequences of consumption is not clear.[6]

Not everybody is sensitive or allergic to gluten. However, since studies show that gluten can lead to inflammation and negative reactions in your body, I recommend avoiding consumption of gluten as much as possible.

Where do I get this test?

This test requires a healthcare provider's license and a blood draw. Look for a Functional Medicine doctor or contact our clinic (A New Way Clinic). We will be happy to help.

An important clarification about ALCAT test:

The ALCAT test measures the cellular reaction of your white blood cells, also referred to as immune cells. It does not measure antibodies. Therefore, it is intended to detect sensitivity, not to measure an allergic reaction as an antibody test does. It is important to know that food allergy can lead to symptoms such as diarrhea, indigestion, nausea, vomiting, hives or rashes, baby colic, cramping, flushing, itching, or tingling lips. It can also lead to swollen airways and difficulty breathing and can even be life-threatening.

According to the Food Allergy Research & Education (FARE) association, the proper way to measure food allergy is by measuring IgE antibodies to specific foods.[7] IgE, short for "immunoglobulin E," are specific antibodies produced by the immune system to fight pathogens (such as bacteria or viruses) and to protect your cells. When they encounter specific food, IgE antibodies will trigger an immune reaction that can be uncomfortable, destructive, and even dangerous.

Since most patients already know which foods cause them an allergic reaction, we mostly focus on testing for food sensitivity, instead of allergy. However, it is important to remember that some people have both sensitivity and allergy to foods.

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Factors that Cause Chronic Inflammation and Disease

Chapter 8
Are You Eating a Pro-Inflammatory Diet?

Research has associated a “healthy” diet with lower inflammatory markers such as C-reactive protein, serum amyloid A, and interleukin 6 (IL-6).[1]

The foods that reduce inflammation include fruits, vegetables, poultry, legumes, tea, fruit juices, and whole grains. Diets that increase systemic inflammation are high in refined grains, red meat, butter, processed meat, high-fat dairy, sweets and desserts, pizza, potatoes, eggs, hydrogenated fats, and soft drinks.

My recommendation is to increase the number of fruits, vegetables, legumes, and whole grains, to reduce animal products, and to eliminate fried food, refined grain (e.g., white flour bread or pasta), and processed food.

ANTI-INFLAMMATORY FOOD

"Let food be thy medicine and medicine be thy food."

Source: Hippocrates

A review of the statistics on chronic disease shows an increase in diabetes, cardiovascular disease, Alzheimer's, cancer, and inflammatory or autoimmune conditions. It is estimated that changes in our food (e.g., high sugar, processed food, and lack of nutrients) have been leading to an increase of diseases. Our food, as research shows, is very important in keeping us healthy or sick.

There are several nutritional approaches to inflammation. Among them is the Dietary Approaches to Stop Hypertension (DASH) and the Mediterranean diet. Both diets are high in fruits and vegetables. It is estimated that the high antioxidant content in fruits and vegetables is one of the leading factors of their health benefits. According to a study published in *The American Journal of Clinical Nutrition*, higher consumption of whole grains, fruits, nuts, and green, leafy vegetables is significantly correlated with a lower concentration of the inflammatory markers CRP and IL-6 in a multi-ethnic population.[2]

The DASH diet contains high amounts of fruits and vegetables, low-fat dairy products, and low saturated fats and cholesterol. Studies found that following the principles of the DASH diet might lead to an increase in serum vitamin C and a reduction in the levels of the inflammatory marker, C-reactive protein.[3]

The Mediterranean diet became famous around the world due to its health benefits, as well as being associated with greater longevity and quality of life. Patients with arthritis who followed the Mediterranean diet benefited with a reduction of inflammation, an increase in physical function, and improved vitality.[4]

Eat Mediterranean

For the full benefit of the anti-inflammatory effect of the Mediterranean diet, observe the following principles:

- ✓ High consumption of vegetables (at least 50% of your plate) with the exception of potatoes and vegetable juices
- ✓ High consumption of fiber, legumes, and beans
- ✓ Small amounts of nuts and seeds
- ✓ Abundant consumption of "real" organic olive oil
- ✓ Other oils to use: Avocado, butter, and coconut oil
- ✓ Alcohol limited to one glass of wine, if consumed at all (mainly with meals)
- ✓ Moderate consumption of fish, seafood, yogurt, cheese, and eggs
- ✓ Small amounts, no more than two or three times a week of meat, chicken, or turkey. Favor meat from grass-fed animals
- ✓ Only 20% of whole grains (e.g., brown rice, lentil pasta, or quinoa)

Omega 6 and omega 3 fatty acids: Eating the wrong type of fat can increase your inflammation

Omega 3 has become famous in the last few years due to their health benefits. Both omega 3 and omega 6 fatty acids are polyunsaturated fatty acids, meaning they have more than one double bond. They are classified as "3" and "6" based upon the location of the first double bond in their chemical structure.

Both omega 3 and omega 6 are essential fatty acids. Our bodies cannot produce these, and we have to consume them in our diet. The dietary ratio of these is greatly important. Most doctors are not aware of the importance and, if they are, they do not talk about it. Several studies have shown that a higher ratio of omega 6 to omega 3 (higher omega 6) may promote many diseases, including cardiovascular disease, cancer, chronic inflammation, and autoimmune diseases. However, increased levels of omega 3 (a low omega 6:omega 3 ratio) have been shown to reduce these diseases and were associated with a 70% decrease in total mortality.[5]

The food industry and the dietary habits of humans have changed drastically over the past 100 years. A decrease in consumption of omega 3 fatty acids and an increase in consumption omega 6 fatty acids have become two defining characteristics of the western diet.[6]

Why low omega 3 and high omega 6 is dangerous to your health

Evidence from research and clinical experience shows us that, if you eat more food that has omega 6 and reduce consumption of omega 3, you increase the risk of chronic diseases and inflammation.[7] Omega 3 appears to have anti-inflammatory properties and can benefit the prevention and treatment of chronic diseases and autoimmune conditions, while omega 6 is pro-inflammatory.

Omega 3 in Food	Omega 6 in Food
Cold water fish (herring, salmon, sardines, trout), fish oil, and algae provide EPA & DHA omega 3.	Canola oil, safflower oil, sunflower oil, corn oil, soybean oil, cottonseed oil, pine nuts, Brazil nuts.
Flaxseed and flaxseed oil, walnuts, leafy green vegetables, and chia seeds provide ALA.	Animal products, such as chicken, beef, and pork are high in omega 6, since they are fed grains all their lives.
Eicosapentaenoic Acid (EPA) Docosahexaenoic acid (DHA) Alpha Linolenic Acid (ALA)	Linoleic Acid (LA).

It is important to remember that both omega 3 and 6 are an integrated part of the membrane (outer protective layer) of each of your cells, so they are both required for healthy cell function. The increase in chronic diseases, inflammation, and cancer rates are estimated to be associated with the ratio change between these, due to the drastic changes in our diet. It is also estimated that, during the hunter-gatherer period, the ratio of fatty acids was 1:2 (omega 3:omega 6), while today the ratio is 20:1.[8] That puts us in a pro-inflammatory state.

Testing your levels of omega and fatty acids

Testing for fatty acid amounts and the ratio between them might be useful in some cases. The test, called OmegaCheck™, is usually recommended if your triglyceride (another type of fat that is considered "bad") or cholesterol levels are high, or if you have other factors that increase your risk of heart disease. Occasionally, the test is also ordered in order to check whether dietary changes or supplementation of omega 3 will lead to positive changes in your blood. In the next case, I will talk a bit more about the OmegaCheck™ test.

Case study: Mathew, chronic inflammation

Mathew, a 69-year-old, retired man, came into the clinic and reported several years of chronic neck pain with occasional headaches at the back of the head. He reported that the neck pain had started 20 years ago, and that he had tried a variety of pain medication, chiropractic care, physical therapy, and steroid injections that did not resolve the problem. Over the years, the pain had been increasing, and in the last few months, he gave up driving and playing golf. "I worked hard all my adult life and was looking forward to retirement, to enjoy traveling, playing golf, and spending time with my wife. The pain is constant, and I am tired of it," said Mathew. Mathew came to one of my seminars and learned about the triggers of inflammation. "I had a feeling that I am missing something. I went to so many doctors, and I am looking for relief and if possible, to find what is causing me pain."

After reviewing his medical history, his diet, and lifestyle I learned that Mathew's diet consisted mostly of chicken, every day, and usually from restaurants. He was on over 15 prescription medications and was taking between ten and 15 Advil or ibuprofen a day! To find the triggers of his inflammation, Mathew ordered a comprehensive lab analysis that included a Cardiometabolic test and an OmegaCheck™, a test to measure the amount of fatty acids in his blood.

RESULTS

Test	Normal	Abnormal	Flag**	Units	Ref Range
Dense LDL IV		110	B	nmol/L	<100
Buoyant HDL 2b		1755	B	nmol/L	>1500
Non HDL Partioloc		1192	H	nmol/L	<1000
Cardio Metabolic Risk Assessment		MODERATE	B		LOW
OmegaCheck		4.5	M	%by wt	≥5.5
Arachidonic Avoid/EPA Ratio		15.7	H		<5.0
Omega-6/Orrega-3 Ratio		9.0	H		<4.5
Omega-3 Total	4.5			%by wt	
EPA		0.7	L	%by wt	>20
DPA	1.5			%by wt	>1.0
DHA		2.3	L	%by wt	>4.0
Omega-6 Total	40.7			%by wt	
Arachidonic Avoid		11.0	L	%by wt	<9.0

As you can see in the test results, the most important omega 3 fatty acid levels (EPA and DHA) were found to be very low. Mathew's consumption of fish, green leafy vegetables, and other sources of omega 3 was very low. His levels of omega 6 fatty acid, arachidonic acid, was very high (11% when it should be below 9%). A combination of low omega 3 and high omega 6 in his body, as you can see from the high "omega 6:omega 3 ratio," leads to a harmful shift into a pro-inflammatory state. Reviewing his lab results, you can also see that his "Cardio-Metabolic Risk Assessment" resulted in "moderate" risk for cardiovascular diseases, including stroke, heart disease, and Atherosclerosis (a disease in which plaque builds up inside your arteries).

During the six months that followed these labs, Mathew has been introducing more vegetables—both raw, cooked, and in powders—to his diet and has reduced his consumption of chicken. He was placed on anti-inflammatory supplements, such as Boswellia, curcumin, and resveratrol, as well as large amounts of high-quality omega 3 fish oil (slowly increased from two to six grams a day) with meals. He received acupuncture and cupping for several months to increase circulation to the neck and shoulders

and was encouraged to start walking every day. After six months, his range of motion improved, he was able to drive, his pain reduced significantly, and he no longer had to take 15–20 Aleve and Ibuprofen.

Reviewing Mathew's case shows us how important healthy ratios of omega 3 to omega 6 are for healthy function and how increased omega 6 can cause more pain and inflammation.

How to correct an imbalance in omega 3 and 6 and reduce your inflammation

Correcting the imbalance between omega 3 and 6 is an important step in reducing inflammation and improving your health. This should be done in two ways: Increase supplementation of omega 3 and reduce consumption of omega 6.

Introducing supplement of omega 3 fatty acids (EPA and DHA) into your diet has been shown to be effective in correcting imbalance. This is by partially replacing arachidonic acid (omega 6) from the cell membranes of platelets and immune cells (e.g., erythrocytes, neutrophils, monocytes, and hepatocytes) with healthier omega 3 fats.[7] See more information about supplementation later, in the "supplements" chapter of this book.

Reducing omega 6 is an important step. Supplements alone will not be useful. In severe or chronic inflammation, it is important to reduce animal products or replace them with organic products from pasture-raised animals. The results of the first large-scale, nationwide study of fatty acids in U.S. organic and conventional milk was published in 2013. The study found that on average over 12 months, organic milk contained 25% less omega 6 fatty acids and 62% more omega 3 fatty acids than conventional milk.[9]

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Factors that Cause Chronic Inflammation and Disease

Chapter 9
Sugar, Candy, and Carbs as Triggers of Inflammation

A study published in the *American Journal of Clinical Nutrition* found that consumption of sugar, even in low to moderate amounts, leads to an increase of inflammation.[1] We also found that diabetes and obesity are associated with the presence of inflammation.[2]

What is the common thing between morning cereal, salad dressing, honey, candy, soda drinks, and ready-made or frozen meals? They all have sugar! Even refined flour, bread, pasta, baked potatoes, and fruit juice are converted to simple sugar in our bodies. Sugar, unfortunately, has become a key component in most of our foods. Eliminate sugar as much as you can from your diet to reduce inflammation.

Sugar has many names and be found in many chemical forms. Other names or types of sugar:

- Aspartame (not safe)
- Agave nectar
- Glucose
- Galactose
- Sucralose (also called Splenda)

- High-fructose corn syrup
- Dextrose
- Cane sugar
- Fructose
- Brown rice syrup
- Barley malt

Which sweeteners should I use?

- ✓ Stevia is the safest sweetener. It is actually an herb and can be found as a powder or fluid extract. It has no calories and does not increase insulin reaction in your blood. Therefore, it is our number one sweetener. Be wary of some stevia-related products on store shelves, which contain stevia with maltodextrin.
- ✓ Coconut sugar in small amounts. It might elevate your sugar and insulin levels almost as much as sugar, however it contains iron, zinc, calcium, potassium, some short-chain fatty acids, polyphenols and antioxidants, and a fiber called inulin which may slow down absorption.
- ✓ Xylitol. Relatively safe, however some health problems are suspected. Xylitol has 40% fewer calories and %70 fewer carbs than sugar. GI side effects (diarrhea) reported in small amounts.
- ✓ Real honey and maple in small amounts. They will still be converted to sugar in your body, so limit the consumption to very small amounts.

If you are consuming a meal with carbohydrates and sugar, here are a few tips that would help:

- ✓ Keep the amounts small. Carbs should not be more than 30% of your meal.
- ✓ Eat fats and protein. It will slow down the absorption of sugar and reduce the insulin "spike" that is so harmful for our body.
- ✓ Eat slowly and chew well. Protein should be at least 25% and fat should be between 10 to 20% of your meal at least.
- ✓ Add fiber to your diet. At least 25% of your meal should have green vegetables.

- ✓ Exercise before or mild movement after your meal. Any type of physical activity, such as walking, swimming, running, weight training, or push-ups can stimulate your muscles to pull the excess sugar from your blood and use it for energy, instead of storing it as fat.

Why is it important to measure levels of sugar?

High levels of sugar can cause stress to your body and damage your cells, arteries, nerves, and organs. They can also disrupt your emotional state, trigger your immune system, and increase levels of inflammation. One of the biggest challenges is that high levels of sugar cause destruction in your body, and while the damage is happening, most people do not feel it. You might have very high sugar levels in your blood—let's say after drinking soda or iced tea, or after eating cake or a processed meal—and you wouldn't know it. This is why testing for levels of sugar in your blood is very important.

There are two major blood tests that are simple to obtain, and your primary care doctor will be able to order them for you. The first one is glucose levels (that test requires fasting for 12 hours beforehand, with the exception of water) and the second is Hemoglobin A1C (HbA1C is also called glycated hemoglobin test). A fasting glucose of 99mg/dL or below is considered healthy.

The HbA1c test helps to identify the average levels of glucose concentration in your blood over the last three months. Many authorities consider a healthy level of HbA1c to be lower than 42mmol/mol or 6%. Many people have higher-than-normal levels of HbA1c, between 5.7% and 6.5% and are pre-diabetic (one step from becoming diabetic) and they don't even know it.

It is important to note that, while the American Diabetes Association suggests an HbA1c of 7%, I recommend following the guidelines of the Centers for Disease Control and Prevention, which recommends an HbA1c below 5.7%. If your HbA1c is higher than 5.5%, I would recommend seeing a healthcare provider to ensure that you stay within the healthy range and even reduce it.

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Factors that Cause Chronic Inflammation and Disease

Chapter 10
Small Intestinal Bacterial Overgrowth (SIBO)

Small Intestine Bacterial Overgrowth (or SIBO) is a form of dysbiosis of the intestines. Dysbiosis, also called dysbacteriosis, is an unhealthy imbalance of bacteria on or within the body. It is most common in the digestive tract, but can also occur in other mucous membranes, such as the skin, ears, nails, eyes, or vagina.

Dysbiosis that is caused by changes in the composition of the gut bacteria is called SIBO. Contrary to how it seems, SIBO does not usually cause infection-like symptoms of diarrhea, fever, or stomachache. Studies have found that SIBO is responsible for many health conditions, such as autoimmune diseases, allergies, and even cancer. The accumulation of harmful bacteria can lead to chronic irritation of your immune system and constant inflammation.[1]

So, what is SIBO? It is the overgrowth of harmful bacteria in the gut. In some cases, we may also lose certain healthy bacterial species, which are beneficial to us and protect us from the damaging bacteria. In other words, you now have more of the “bad” guys than the “good” guys in your gut.

Why is SIBO causing inflammation?

Your gut mucosa contains the largest population of immune cells in the body. These are also known as gastrointestinal immune cells. SIBO causes constant irritation to the immune system in the intestines, which leads to microscopic mucosal inflammation and destruction of the villi (intestinal cells that absorb food). Since your gut wall contains about 70% of the cells that make up your immune system, when you have harmful bacteria in your gut, you will begin to experience serious irritation.

Health conditions that are associated with SIBO

According to Dr. Gerard Mullin, MD, author of *Gut Balance Revolution*, a healthy gut microbiome is essential for the development of our brain and hormonal functions. Without healthy microbiome, you might experience high stress response, impaired cardiac function, increased appetite, and changes in your brain, neurotransmitters, and hormones. According to Dr. Mullin, a state of imbalance in your gut bacteria can also lead to mood disorders, such as depression and anxiety.

SIBO was found in patients with several diseases and is therefore suspected as a contributing and triggering factor. Excess of harmful bacteria combined with damaged intestinal cells and inflammation might lead to the following conditions:

- Irritable bowel syndrome[2]
- Celiac[2]
- Rheumatoid arthritis[3]
- Fibromyalgia[4]
- Neurodegenerative diseases (e.g., Parkinson's disease)[5]
- Weight gain or inability to lose weight[6]
- Disruption in the absorption of vitamins and minerals, fat-soluble vitamin (A, D, E, K) deficiency.

- Bacteria breakdown of bile salts from the gallbladder (which are needed for absorption of fatty vitamins and food), leading to malabsorption of fatty vitamins.

Take the SIBO test to see if you might have harmful bacteria in your gut. Check the following if you have:

- ☐ Abdominal pain/discomfort
- ☐ Bloating
- ☐ Abdominal distension
- ☐ Diarrhea
- ☐ Flatulence
- ☐ Weakness
- ☐ Fatigue
- ☐ Vitamin B12 deficiency (bacteria are consuming the vitamin before you can)
- ☐ Iron deficiency
- ☐ Excess Folate
- ☐ Chronic inflammation
- ☐ Constipation
- ☐ Frequent infections, such as UTIs, vaginal infections, or skin infections
- ☐ Seasonal allergies
- ☐ Use/used immunosuppressive medication, such as Prednisone
- ☐ Use/used antacid medication, such as Tums or Prilosec
- ☐ Use/used antibiotics for over 2 weeks

How many did I check:_____

If you marked more than two symptoms from this list, you might have bacteria in your gut that are irritating your immune system, secreting toxins, and causing damage to your body. You might have SIBO.

What causes SIBO?

There are several factors that might lead to the development of harmful bacteria in your digestion tract. Your body is designed to live in harmony with many bacteria. We have over 7lb of bacteria in our gut. While some of these species of bacteria are very useful to us, some bacteria are harmful. Our body is equipped with the tool to destroy and keep under control the number of harmful bacteria. Some of these tools are stomach acid, pancreatic enzymes, and gallbladder bile salts.[7] Bowel movements are important for both elimination of waste and toxins, as well as elimination of bacteria.[7]

Other factors that might cause SIBO are diet, medications, low immune function, stress, and anatomical problems. The number one nutritional factor that causes SIBO is sugar and carbs. Sugar feeds the harmful bacteria. Chronic alcohol consumption might also lead to SIBO, since alcohol is converted into sugar in our body. As part of our SIBO protocol in our clinic, we ask patients to remove sugar and processed food, as well as reduce the amount of carbs from their diet.[7] Otherwise, they will continue to feed the harmful bacteria, which can grow very fast in the gut. Stress was found to reduce immune reaction, leading to inability to fight and destroy harmful bacteria.

Medications that might lead to SIBO are antibiotics, antacid medication, such as Tums or Prilosec, and immunosuppressive medication, such as Prednisone. Antibiotics destroy the harmful bacteria and might be useful during infections. Unfortunately, it will also destroy your healthy bacteria and these are important. Your healthy bacteria are holding back the "bad" bacteria from growing. They compete for space and resources (e.g. sugar). Low stomach acid or low immune function allows the bacteria to grow out of control.[7] It is very unfortunate that so many users of these medications are not aware of the harmful effect that these medications have on their

gut and general health. Most doctors are not aware of it and therefore patients do not know.

Medical conditions that might lead to SIBO are diabetes (high levels of sugar in your blood), structural abnormalities (e.g. Diverticulosis), and partial obstruction of small bowel. Several systemic diseases that might increase your risk of developing SIBO are celiac disease, cirrhosis, pancreatic diseases or insufficiency, and non-alcoholic fatty liver disease.[7]

Which tests are the most accurate?

Our recommendation is the Glucose Breath Test (GBT), which has been found to be 100% accurate for the detection of SIBO. It is a simple test, and it can be done in a lab. After ingesting glucose, you breathe into a tube with a measuring device. However, there are two noteworthy disadvantages of using this test. First, it only detects bacteria in the duodenum and proximal jejunum (first parts of the small intestine). Second, it cannot detect which type of bacteria are found in the intestine.[8]

Another test considered to be the golden standard for detection of SIBO is the Jejunal Aspirate and Culture.[9] The test is performed in a medical clinic or hospital and is called esophagogastroduodenoscopy (EGD). The procedure includes the insertion of an endoscope to collect a sample of fluid from the small intestine. The fluid is placed in a special dish in the laboratory where biologists can identify the bacteria or other organisms that are growing in the gut.

Which test NOT to do for SIBO?

Currently, the mainstream test for SIBO is Lactulose Breath Test, which measures the amount of exhaled hydrogen (and methane) after you ingest lactulose (a type of sugar). Unfortunately, studies show that this test is not very accurate. A study published in *Digestive and Liver Disease Supplements* found this test to have poor specificity, sensitivity, and low diagnostic accuracy.[10]

Another study published in 2014 found that 41% of patients with irritable bowel syndrome but without SIBO tested positive using the lactulose hydrogen test. The researchers concluded that the diagnostic performance of this test is very poor.[8]

Comprehensive examination of your gut bacteria

In cases of chronic inflammation and pain, one of the most comprehensive tests recommended is called a Bacteriology Culture. This test can identify the presence of beneficial flora, imbalanced flora (including Clostridium species), and dysbiosis flora, as well as detect infectious pathogens that can harm your body, irritate your immune system, and lead to chronic inflammation.

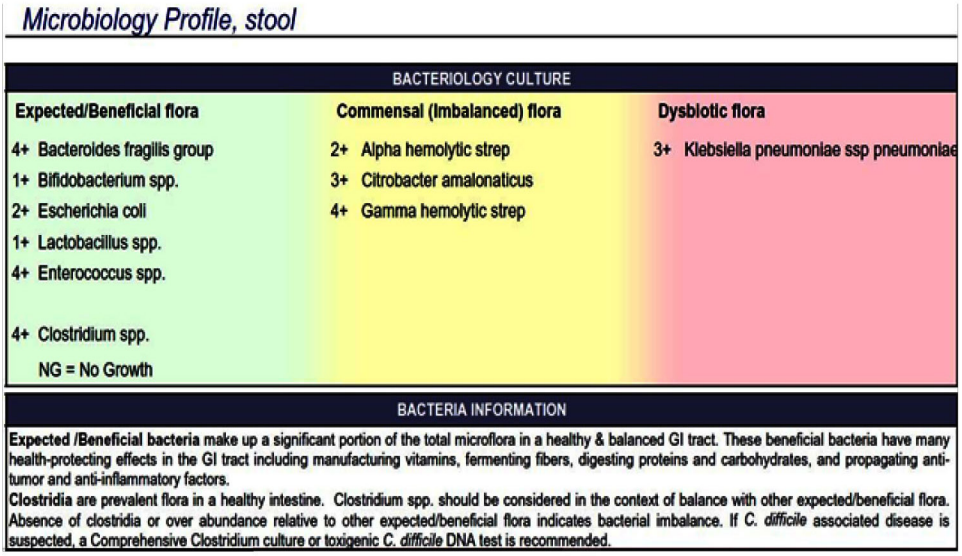
Case study: Carol, chronic joint pain

Carol, a 65-year-old woman, was generally healthy with no known chronic diseases. She complained of chronic joint pain in both hips, lower back, and neck that had been increasing over the last two years. She also reported fatigue and that she avoided any physical activity because of the pain. She was retired, after working hard for many years, and wanted to travel and enjoy activities with her family and friends.

I asked Carol what she had already tried to get rid of the pain and she replied: “I tried massages, different treatments, physical therapy, and I am taking medication for the pain.” I asked her about her lifestyle, relationships, and her diet. I found that she “loves” sweets and often craves sugar, candy,

cookies, and chocolate. After our evaluation, I suggested that she get a Bacteriology Culture and a candida test.

The results showed that she did not have candida (or yeast infection); however, harmful bacteria was found in her digestive system. Here are the results of the bacteriology test:



Microbiology Profile, stool

BACTERIOLOGY CULTURE

Expected/Beneficial flora	Commensal (Imbalanced) flora	Dysbiotic flora
4+ Bacteroides fragilis group	2+ Alpha hemolytic strep	3+ Klebsiella pneumoniae ssp pneumoniae
1+ Bifidobacterium spp.	3+ Citrobacter amalonaticus	
2+ Escherichia coli	4+ Gamma hemolytic strep	
1+ Lactobacillus spp.		
4+ Enterococcus spp.		
4+ Clostridium spp.		
NG = No Growth		

BACTERIA INFORMATION

Expected /Beneficial bacteria make up a significant portion of the total microflora in a healthy & balanced GI tract. These beneficial bacteria have many health-protecting effects in the GI tract including manufacturing vitamins, fermenting fibers, digesting proteins and carbohydrates, and propagating anti-tumor and anti-inflammatory factors.

Clostridia are prevalent flora in a healthy intestine. Clostridium spp. should be considered in the context of balance with other expected/beneficial flora. Absence of clostridia or over abundance relative to other expected/beneficial flora indicates bacterial imbalance. If *C. difficile* associated disease is suspected, a Comprehensive Clostridium culture or toxigenic *C. difficile* DNA test is recommended.

As you can see, the test showed beneficial bacteria on the left (including Bifidobacterium, and Escherichia Coli (several types of E. Coli are actually beneficial), commensal (imbalanced) bacteria in the middle, and dysbiotic bacteria on the right.

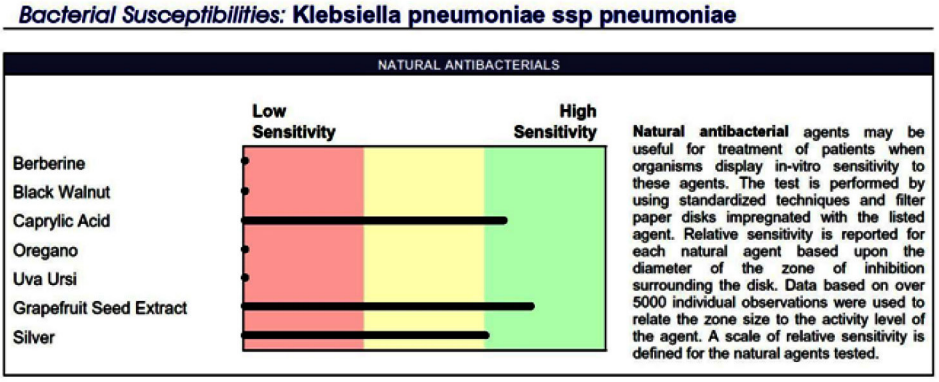
In your digestion, commensal (imbalanced) bacteria are usually neither pathogenic nor beneficial. I usually explain to patients that they are neutral. Unfortunately, like a bored high schooler, if they hang out with the "troublemakers," it isn't long before they start causing problems or damage. The imbalanced bacteria might also cause problems if you do not have enough healthy bacteria facilitating a healthy and peaceful environment in your gut.

One of the most concerning findings in Carol's test was the harmful bacteria Klebsiella pneumoniae at level 3+, which indicates, on a scale of 0–4+, a high amount of these bacteria in Carol's intestine.

Animal studies showed that the bacteria Klebsiella pneumoniae can increase inflammatory markers, such as COX-2, IL-1β, IL-6, and TNF-α expression, NF-κB activation, and lipid peroxidation in the intestine.[11]

Why is that important to know which bacteria you might have in your intestine?

Once you understand the composition of bacteria in your gut, you can design an effective treatment plan. The lab that we used, Doctor's Data, also provides a sensitivity scale that shows you what agents—natural and antibiotic—might be more effective in destroying these bacteria. Here is Carol's report:



As you can see from the results, Klebsiella P. is not sensitive to Berberine, Oregano, or UvaUrsi. I have met many patients who were taking these herbs and, unfortunately, they are not effective at all for these bacteria.

After three months of taking large amounts of Caprylic Acid, Grapefruit Seed Extract, and garlic, small amounts of anti-inflammatory herbs, and an elimination of sugar from the diet, Carol's hip, back, and neck pain were relieved completely. Her energy increased, and she returned to enjoying her activities.

If you have bacteria in your gut that is "triggering" inflammation inside the gut (such as Crohn's, Colitis, or Irritable Bowel Syndrome) or outside the gut (such as arthritis), then it is important to identify the bacteria. This is the reason why I usually prefer that patients use this test over breathing tests, which do not tell you which type of bacteria you have.

It is also important to note that many patients, such as Carol, might not have noticeable signs of digestion dysfunction or symptoms of classical bacterial infection in their intestine, such as abdominal pain, diarrhea, or vomiting. This is the reason why most doctors, especially mainstream doctors do not even think about bacteria in the gut as a harmful "trigger" of inflammation and other health problems. It is up to you to find an experienced Functional Medicine provider who will find the cause of your health problems.

How to treat SIBO

Since the administration of antibiotic medication does not provide a safe and healthy solution, we will look into a natural approach that will treat SIBO successfully. We found that using Caprylic Acid Grapefruit Seed Extract, and garlic as part of the antibacterial treatment was benifitial in addressing SIBO (see more information on these in the next chapter about treating yeast infection). As usual, I highly recommend testing instead of guessing which bacteria are present in your gut. Make sure to consult with a licensed and experienced provider.

Probiotics

Since bacteria constantly compete for nutrients and space, it was found to be beneficial to consume probiotics, in order to reduce SIBO and assist with the healing of the gut barrier. While NOT all probiotics were effective for SIBO, the bacteria Lactobacillus rhamnosus GG and Lactobacillus plantarum were especially effective.[12]

Prebiotics

Prebiotic fiber can help nourish the probiotics in your gut. It is important to start in low dosages (such as 1g daily) and increase to five grams daily in order to prevent an increase in abdominal symptoms. Among the fibers, partially-hydrolyzed Guar gum was found to be beneficial in improving the clearance of SIBO during three months of treatment.[13]

Diet

Check for nutritional deficiencies, such as iron, B12, and serum 25-hydroxy vitamin D. Eliminating foods containing lactose, corn syrup, maltose, maltitol, mannitol, sucralose (Splenda), and sorbitol is recommended. You should also avoid sodas and fruit juices. Fresh fruits, whole grains, animal protein, and fats are allowed.

Digestion aid

Studies show that it is vital to have normal and healthy levels of gastric acid, pancreatic enzymes, and bile acids, not only to breakdown and absorb our food properly, but also to destroy harmful bacteria and prevent them from growing in your gut.[7]

We recommend using digestion enzymes with every meal to assist you with breaking down the food. If you do not have gastritis, heartburn, or peptic ulcers, we also recommend the use of Betaine HCL (digestion acid) to help the enzymes with digestion.

Bowel movement

Stimulating bowel movement is very important since that is how your body gets rid of the pathogenic (harmful) bacteria. Use fiber such as inulin and stay physically active to maintain a minimum of two bowel movements a day. If you have any health problems that may cause you to have constipation, such as low thyroid problem, you may need to address that as well to maintain healthy bowel movements.

Gut-healing agents

Several compounds were found to be beneficial in healing the gut. Among these, you can find:

Saccharomyces cerevisiae var boulardii was found to be beneficial in reducing inflammation in the gut and promoting recovery.[14]

L-Glutamine is the main fuel source for enterocytes (intestine cells) and it assists with maintaining mucosal integrity.[15]

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Factors that Cause Chronic Inflammation and Disease

Chapter 11
Candida (Yeast) Overgrowth in Your Body

Candida is a microorganism classified as a fungus, and it is the most common cause of fungal infections worldwide.[1] Candida overgrowth can lead to infection, also referred to as Candidiasis.

There are over 20 species of candida yeasts that can cause infections in humans, the most common of which is Candida albicans. Candida can grow in several areas in your body, infecting others along the way. According to the Centers for Disease Control and Prevention, candida yeasts are normally found in small amounts in the intestinal tract and can be found on mucous membranes and/or the skin without causing infection.[2] However, overgrowth of candida, due to several factors, can cause infection that affects skin, nails, digestion, and brain function. It can also cause chronic inflammation.

Studies have found that overgrowth of candida is associated with elevated levels of Interleukin 17A, a cytokine that increases inflammation.[3] We estimate that many patients suffering from chronic inflammation, such as arthritis and pain, have candida. Most of your immune cells are in your gut, and this fungus can trigger an immune reaction that might lead to chronic inflammation.

Candida quiz

Check the boxes below if you have these symptoms:

- ☐ Chronic fatigue
- ☐ Cognitive decline, difficulty to concentrate, or brain fog
- ☐ Digestion problems, such as bloating, discomfort, or gas
- ☐ Low immune function
- ☐ Vaginal itching, discharge, or soreness
- ☐ Pain during intercourse (female)
- ☐ Skin disorders, such as psoriasis or skin patches
- ☐ Occasional itching of the skin in back, lower abdomen, or bra line

- ☐ Craving for sweets or carbs (e.g., bread or pasta)
- ☐ Allergies or asthma
- ☐ White spots in the mouth
- ☐ Occasional headaches
- ☐ Chronic joint, back, or neck pain

How many did I check:_____

If you marked more than three boxes, you might have candida and should seek professional testing. It is important to know that it is possible to have candida, even without these symptoms. In the next few pages I will be explaining about testing and how to treat candida infection.

How do we solve chronic pain in the knees, hips, and back without treating the back, hips, or knees?

Mrs. Stein came to see us for severe pain in her lower back, hips, and knees. The pain had started a couple years earlier and slowly progressed until she was feeling it all the time. “I cannot exercise or swim anymore, and I gave up social activities with my spouse,” she told me in our first meeting. She was seeing a neurologist, an orthopedic doctor, a massage therapist, and a naturopath. Mrs. Stein had “tried everything and [did] not know what to do!” It is always hard to hear that from patients. Unfortunately, the majority of our patients have seen many providers before coming to us and did not get real answers and solutions.

I told Mrs. Stein that, if we want to resolve this pain, we would have to go deeper to find the root cause of her inflammation. She agreed, and we started the evaluation process. After I reviewed her functional assessment, which covered a physical exam and the function of several systems/organs, I advised her to look into her gut.

To check her gut, we conducted a full gut test, which included testing for harmful parasites, bacteria, yeast, and gut function. When the results arrived, we found the cause of her inflammation. The trigger was hidden in her gut and nobody had bothered to check. Here is a sample of her lab results. As you see on the left, the microscopic yeast was very high ("Many").

As seen on the right, both stool sample 1 and 2, one each day, found yeast in moderate to high amounts. The second sample did not contain yeast. This is why it is important to test over three days for a comprehensive evaluation.

MICROSCOPIC YEAST	
Result:	**Expected:**
Many	None - Rare

The microscopic finding of yeast in the stool is helpful in identifying whether there is proliferation of yeast. Rare yeast may be normal; however, yeast observed in higher amounts (few, moderate, or many) is abnormal.

PARASITOLOGY/MICROSCOPY	
Sample 1	
None	Ova or Parasites
Rare	RBC
Many	Yeast
Sample 2	
None	Ova or Parasites
Rare	RBC
Rare	Yeast
Sample 3	
None	Ova or Parasites
Mod	Yeast

Mrs. Stein's personal protocol included professional-grade supplements and herbs to kill the yeast cells, specific probiotic bacteria that fight yeast, and some dietary changes. The results were amazing! After three months, her pain reduced by 90%. Two months later, she was pain free and reported that her sleep and energy had improved. I attribute this amazing change to the massive work we did to eliminate her yeast, clean her gut, and support healthy flora so that the candida won't grow again. Would I have gotten these results if I had treated her back like every other doctor? Probably not. The gut was the key to better health.

Yeast—the worst tenant to have in your body

Yeast is a parasite. I usually explain to my patients that yeast is like a terrible tenant or roommate living in your house. How would you feel if you had a roommate that lived in one of your rooms, ate food from your fridge, played loud music all day, and left a mess in your living room and bathroom? You would probably get rid of them as soon as possible. When growing and taking over space in your gut, yeast does the same thing! It consumes your food, takes up space, irritates your immune system, and leaves you with metabolic waste (trash or mess). When found, we need to use specific professional-grade herbs or supplements to eliminate this parasite. If you have chronic inflammation, you might have yeast overgrowth or harmful bacteria, even without digestion problems, such as diarrhea or abdominal discomfort. Since there are many types of bacteria or yeast, I recommend running the comprehensive stool analysis, sometimes over three days (with one sample each day).

Two most important steps to treat candida

When treating candida, it is important to follow these two steps. The first is to starve the candida and the second is to use herbs and supplements that kill candida cells. Using only supplements will keep on nourishing the candida and, in most cases, be a waste of time and money.

Stage #1: Eliminate foods that feed your candida

As written above, to kill the candida fungi in a safe and effective manner, you must starve it from nutrients. So, what does candida love? Sugar. It can be very challenging for many of us to avoid sugar. If you look at the list of ingredients on most products that we buy in stores, you'll see that most of these products have sugar. That includes cereals (which are said to be healthy), salad dressings, processed meat and chicken, bread, soda, and instant or processed meals. Furthermore, any type of carb that you eat—such as potatoes, carrots, fruits, honey, maple syrup, and rice—can turn into sugar in our bodies. Sugar, it seems, is in everything and is very addicting.

Stage #2: Destroy the candida

There are several supplements that you must use to get rid of candida. It usually takes about three to six months to get rid of it entirely. According to the Centers for Disease Control and Prevention, there are over twenty species of candida yeasts that can cause infection in humans, the most common of which is Candida albicans.

When using the anti-candida protocol, use the complete protocol with all the supplements for optimal results. As usual, make sure to consult an experienced healthcare provider.

Supplements

Grapefruit Seed Extract (GSE) is a commercial extract derived from the seeds and pulp of a grapefruit. It has been shown to help inhibit the growth of candida.[4] Studies show that GSE products with 33% water-glycerol solutions have antifungal activity against candida.[5] Since GSE has a very strong flavor and you may need high amounts, we recommend using GSE 250mg capsules from Nutribiotics or Pure Encapsulations.

Note: GSE has antibiotic properties and should be taken under the supervision of a healthcare provider. Also, GSE might destroy the "bad" pathogens (e.g., bacteria and fungi) in your gut as well as the healthy

and beneficial bacteria (what we call probiotics). We recommend using probiotics while taking this supplement.

Caprylic Acid is also called octanoic acid. It is a particular type of fatty acid that can be found in breast milk, palm oil, and coconut. A study published in the *Journal of Medical Food* in 2017 found that caprylic acid may be effective for treating candida albicans yeast infections.[6] Take 500mg twice a day for two weeks, followed by 1,000mg twice a day for five weeks.

Garlic provides the active ingredient allicin, which gives you the "garlic breath." It disturbs the normal metabolism and function of candida and has antifungal activity.[7] Eat at least two to four cloves of fresh garlic every day, in hummus or crushed and chopped in salads. Garlic should not be overcooked—usually no more than a few minutes—since the active ingredient allicin and other powerful antioxidants are lost in the heating process. If you find the taste of garlic too strong, I recommend using the supplement "Garlic Forte" by MediHerb, which has a patent to capture and preserve the active ingredient allicin in a tablet.

Probiotics

Probiotics are essential in creating healthy gut flora and in preventing the growth of harmful bacteria and fungi. When it comes to probiotics, not all strains are the same. A few specific strains of probiotics were found to have a powerful anti-candida effect.

Saccharomyces cerevisiae variety boulardii (Biocodex strain) was found to be as effective in reducing fungal colonization and invasive fungal infection as nystatin, an antifungal medication. Saccharomyces Cerevisiae was also found to be more effective in reducing the incidence of clinical infection from fungi (sepsis) in infants.[8] Use the product Biocodex Extra Strength twice a day with food for at least three months.

Lactobacillus acidophilus: A scientific study conducted over six months found that eight ounces of yogurt containing Lactobacillus acidophilus reduced vaginal colonization and infection of candida.[9]

Not all yogurt is created equal, and not all yogurts contain Lactobacillus acidophilus. We recommend Stonyfield yogurt because it is organic and has pure ingredients. We specifically recommend the plain version, which is unsweetened, so that you don't have to worry about all the added sugars. You can add organic vanilla extract or stevia to sweeten!

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Factors that Cause Chronic Inflammation and Disease

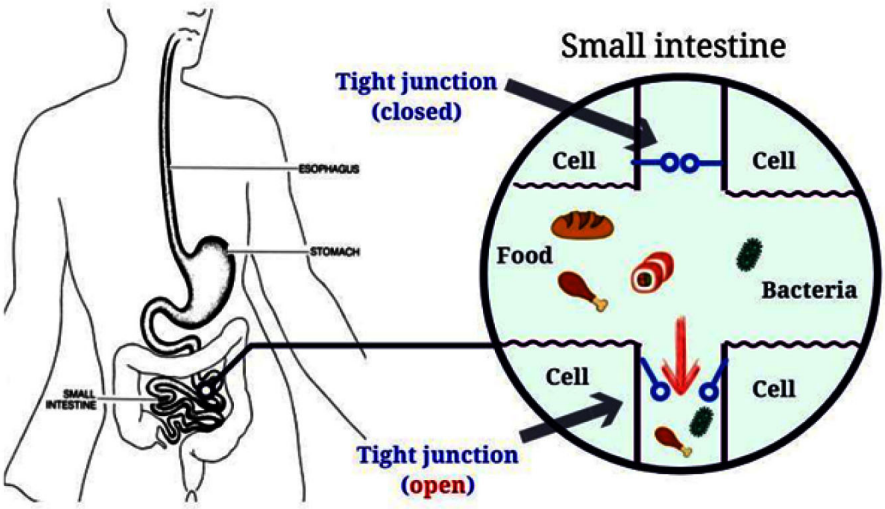
Chapter 12
Increased Intestinal Permeability (Leaky Gut)

Studies show that dysfunction of the gut is associated with several diseases, such as arthritis and joint pain. Children with idiopathic (unknown origin) arthritis who took NSAIDs (e.g., Ibuprofen or Aleve) were found to have increased intestinal permeability together with digestion symptoms.[1] Furthermore, dysfunction of the gut, in the form of intestinal permeability, was found to be associated with nerve damage, neurodegenerative diseases (such as Parkinson's), the development of autoimmune diseases, and tumors.[2, 3]

The gastrointestinal tract has a single layer of cells that separates the inside of the body from the external environment (i.e., food, bacteria, or toxins that are ingested). When we eat food, the stomach breaks down the food in both a chemical (using acid and enzymes) and mechanical way. After a few hours, the partly digested and "mashed" food is called "chyme" and is ready to be slowly released to the small intestine.

As chyme travels through the small intestine, friendly bacteria, enzymes, and bile from the gallbladder assist with the breakdown and digestion of nutrients. The length of the small intestine can vary greatly, from as short as 2.75m (9.0ft) to as long as 10.49m (34.4ft).

The following picture shows a close-up of the small intestine with the food and bacteria. In between the cells, there are doors called "Tight Junctions" with the very important role of keeping the undigested food, bacteria, toxins, and other materials from passing through the cells into the bloodstream, where they can flow anywhere. At the bottom of the small intestine picture, you can see what happens when the tight junctions are open—small particles, such as undigested food or bacteria can pass into your bloodstream.



What causes intestinal permeability or leaky gut? Zonulin, a molecule of protein, was found to regulate the tight junctions in the gut by opening and closing the spaces or "junctions" between cells in the lining of the digestive tract.

Leaky gut quiz

Mark the following check boxes if you:

- ☐ Have Celiac Disease (CD)
- ☐ Have abdominal pain two hours after eating or irritable bowel syndrome
- ☐ Have experienced emotional stress, anxiety, or sensations of being overwhelmed for more than several weeks
- ☐ Have consumed Nonsteroidal Anti-Inflammatory Drug (NSAIDs), such as Ibuprofen, Aleve, or naproxen for over four weeks
- ☐ Feel more pain or bloating, or have skin symptoms, loose stools, or brain fog after eating gluten
- ☐ Have yeast—vaginal, skin, or in digestion

- ☐ Have chronic consumption of alcohol
- ☐ Have food sensitivity or allergy
- ☐ Feel mood changes, decreased memory, or "brain fog" after eating certain foods
- ☐ Eat conventional (non-organic) fruits and vegetables
- ☐ Have gastric ulcers
- ☐ Suffer from allergies or sinus congestion
- ☐ Have or had unexplained infections
- ☐ Have chronic inflammation with joint pain
- ☐ Have occasional diarrhea
- ☐ Experience headaches
- ☐ Feel low on energy or have chronic fatigue

How many did I check:_____

If you marked more than three boxes, you might have candida and should seek professional testing. It is important to know that it is possible to have candida, even without these symptoms. In the next few pages I will be explaining about testing and how to treat candida infection.

What causes of "leaky gut"?

A large portion of your immune system is located in your gut; therefore, any chronic inflammation in your gut might lead to dysfunction of the tight junctions and "leaky gut." According to several studies, "leaky gut" is caused by:

- Celiac Disease (CD).[4]

- Chronic stress. In adults, this was found to cause a change in intestinal bacteria, an increase in interleukin 6 (IL-6) activity, and an increase in leaky gut .[5, 6]

- Consumption of Nonsteroidal Anti-Inflammatory Drugs (NSAIDs), such as Ibuprofen, Aleve, and naproxen. These can lead to loss of intestinal integrity.[7]

- Consumption of gluten. This might lead to Zonulin secretion, inflammation, and damage to intestinal epithelia.[8]

- Use of antibiotics, which reduces the amount (and type) of friendly and protective bacteria.[9]

- Chronic exposure to mercury from fish or seafood, even in concentrations similar to those found in food.[10]

- Exposure to pesticides by consuming non-organic food. Studies found that consumption of chlorpyrifos, a pesticide that is aimed to kill worms and insects, leads to increased permeability ("leaky gut").[11] This toxin results in more than 10,000 human deaths a year.[12]

- Harmful bacteria in your gut. Studies show that harmful bacteria secrete toxins that can damage your intestinal mucus layer, a protective layer over your gut lining.[13]

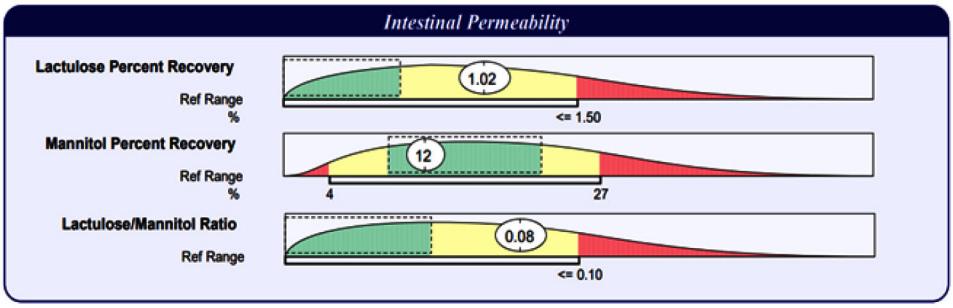
- Chemotherapy.[14]

- Yeast infection. Candida usually causes inflammation and elevation of pro-inflammatory cytokine IL-17.[15]

How to test "leaky gut"

There are several ways to measure gut permeability or "leaky gut." The simplest way to test gut permeability is through a test called the Intestinal Permeability Assessment. This test measures the ability of two large sugar molecules to pass through the intestinal lining. The patient drinks lactulose and mannitol and the lab measures the levels of the two sugars recovered in a urine sample. If they are found in urine, it indicates that they "leaked" through the gut. This is a simple and reliable test.[16]

The following picture shows sample results of a patient who was tested and diagnosed with leaky gut.



Lactulose is a large sugar molecule that is poorly absorbed in our gut. A large amount of lactulose in this sample indicates that it was "leaking" through the intestinal cells into the bloodstream. This indicates a state of "leaky gut." Mannitol, another molecule of sugar, is absorbed through the intestinal cells and serves as a marker for intestinal absorption. Lower-than-normal levels might indicate poor absorption of nutrients.

If the ratio is too high between both molecules, it also indicates leaky gut.

How to fix "leaky gut"

We have met many people who were trying to fix leaky gut by taking supplements and failed to completely correct the problem, because they missed or skipped a step. In Functional Medicine, leaky gut can be fixed in four simple steps. This system has been clinically tested and found to be effective. Remember, all of these steps are important. Skipping one of these steps will not bring you results. Here are the steps:

Step #1: Remove potential irritation (e.g., bacteria, yeast infection, heavy metal, or other toxins). Check the list of factors that might be causing irritation and inflammation in your gut and eliminate it. Otherwise, it will keep destroying your gut from the inside.

Step #2: Provide support to your digestion (e.g., Hydrochloric acid and digestive enzymes with every meal). I recommend "Organic Chewable Enzyme Supplement—Dr. Formulated Enzymes" by Garden of Life.

Step #3: Promote healthy gut flora with a combination of probiotics (the friendly and protective bacteria) and prebiotics. Prebiotics are soluble fibers that nourish bacteria in the gut. They are fermented by beneficial bacteria in the colon to produce short-chain fatty acids (SCFAs). This combination will help to restore healthy gut function. Studies show that a combination of prebiotics and probiotics, also called "Synbiotics," leads to a reduction in systemic inflammation by reducing C-reactive protein (CRP) and other inflammatory markers.[17]

Probiotics for "leaky gut" include:

- ✓ Lactobacillus rhamnosus GG, which might assist in repairing the gut. It is found in Advanced Multi-Billion Dophilus by Solgar.[18]

- ✓ E.coliNissle 1917 (EcN), which can be found in a product called Mutaflor®. It has been found to protect the gut lining.[13]

- ✓ Lactobacillus plantarum MB452, found to benefit the intestinal barrier by stimulating genes involved in the creation of tight junctions.[19] It is found in VSL#3 probiotics.

- ✓ Saccharomyces boulardii, which may also benefit the gut.[20]

Prebiotics include:

- ✓ Pectin from apples, apricots, blackberries, carrots, and oranges.

- ✓ Fructooligosaccharides (FOS) or inulin in supplementation. Start with 2.5g twice a day and increase to 5g twice a day. From food: Jerusalem artichokes, onions, leeks, and asparagus.

Step #4: Repair the gut lining and mucosa by providing the following recommended supplements.[21]

1. L-Glutamine provides nourishment and serves as "fuel" to your intestinal cells. It is essential for the repair and function of the gut barrier.[22] 1g with each meal is recommended.

2. Studies suggest that zinc may regulate tight junctions and reduce permeability and inflammation.[23] Low zinc was found to be associated with increased permeability.[24]

3. Vitamin E was shown to have a protective effect on the intestines.[25]

4. Studies showed that short-term treatment with 2000IU/day of vitamin D promote healthy function of the tight junctions and prevent leaky gut.[26]

5. Curcumin was found to reduce inflammation by blocking TNFα-and interleukin-1β (IL-1β). It also promotes activation of NF-κB, which regulates the function of the immune system, and is effective in preventing intestinal permeability.[27]

6. Quercetin, the most common flavonoid in nature, can improve the integrity of the intestinal barrier.[27]

Healthy levels of vitamin D are also important in maintaining healthy gut function. A study showed that levels of vitamin D (25(OH)D) equal to or above 75nmol/L were associated with significantly lower inflammation (CRP) and higher levels of Human cathelicidin (LL-37), which promotes healing in intestinal cells.[23]

Food

- ✓ Avoid consumption of anti-inflammatory medication, sugar, and unhealthy fat (e.g., vegetable oils, rancid oil, fried food, or roasted nuts).
- ✓ Favor organic food to avoid pesticides, genetically modified foods, herbicides, and other harmful chemicals.
- ✓ Reduce alcohol consumption and favor red wine in small amounts.
- ✓ Manage stress with meditation, exercise, etc. This is an important stem, since stress can lead to negative changes in the immune system and digestive tract.

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Factors that Cause Chronic Inflammation and Disease

Chapter 13 Environmental Toxins

According to the U.S. Department of Health and Human Services, there are more than 80,000 chemicals in use in the United States. Each year, an estimated 2,000 new ones are introduced for use in everyday items such as food, personal care products, prescription drugs, household cleaners, and lawn care products. You may be wondering: How can some of these chemicals trigger chronic inflammation and pain?

To understand the answer to this question, we must first be aware that there are several groups of chemicals that can potentially harm us. In this chapter, we will be focusing on heavy metals and their effect on your health. Low levels of exposure will probably not be harmful. However, higher levels of exposure or inability to properly detoxify might lead to an accumulation of heavy metals. This can increase the levels of free radicals, resulting in DNA damage, cell damage, and eventual organ dysfunction. Excess amounts of heavy metals might also deplete important proteins, such as glutathione, which protect your cells from damage. This damage to your cells triggers your soldiers, the immune system, to protect and repair the cells. In other words, it triggers an inflammatory reaction.[1]

Now, imagine that the toxins are constantly "floating" around inside your body and irritating cells that they come across. Your immune system might be constantly triggered! This could be caused by a variety of toxins. Studies show that heavy metals can accumulate and cause chronic inflammation and that they can even play a key role in triggering autoimmune diseases.[2]

Heavy metals are all around us. Mercury, for example, is a heavy metal that can be found in dental fillings, fish (especially tuna fish), creams, and the air. It can trigger and irritate your immune system and lead to chronic inflammatory conditions, even with low grade-chronic exposure.[3]

Chronic exposure to mercury was also found to be associated with the development of SSB/La autoantibodies. These immune particles can trigger a variety of inflammatory autoimmune diseases, such as Sjogren syndrome, lupus erythematosus, thyroiditis, multiple sclerosis, and rheumatoid arthritis.[4]

The harmful effects of these toxins are not limited to chronic inflammation and pain. According to a review article published in the *Journal of Environmental and Public Health*, several studies show that high levels of mercury might lead to dysfunction of the following organs: Thyroid, breast, myocardium, muscles, adrenals, liver, kidneys, skin, sweat glands, pancreas, enterocytes, lungs, salivary glands, testes, and prostate.[5]

Other heavy metals, such as lead, can also cause dysfunction. Approximately 96% of the lead that enters the body throughout your life is stored in your bones with a half-life of approximately 32 years.[6] That means that it takes 32 years to eliminate half of the lead in your bones!

Higher levels of lead can raise arterial pressure, thereby promoting the development of cardiovascular diseases.[7] Lead is also associated with inflammation, which can cause damage to your joints. A study published in *Arthritis Research & Therapy* measured 1,635 participants and found an association between whole blood lead levels and the presence and severity of osteoarthritis. Patients with higher levels of lead in their blood reported more severe symptoms of osteoarthritis.

Where do we get exposed to most of the heavy metals?

Approximately 80% of mercury vapor is released from amalgams (dental fillings) and is absorbed through inhalation.[8] A study published in 2006 reported that individuals with more amalgam fillings have higher mercury levels in several tissues, including the brain, thyroid, and pituitary glands.[9, 10]

Sources of atmospheric mercury include coal burning and mining (mercury and gold in particular). Mercury from the atmosphere settles in water, where it is converted by microorganisms into organic (methyl or ethyl) mercury. In the water, it is ingested by smaller creatures which are eventually consumed by larger fish.

That is the reason why fish at the top of the food chain, such as tuna, king mackerel, tilefish, and swordfish, may have considerably higher levels of mercury in their tissues.[11]

Today, the number one cause of lead poisoning in children is exposure to dust and deteriorating lead paint chips on interior surfaces.[12] According to the United States Environmental Protection Agency, homes built before 1986 are more likely to have lead pipes, fixtures, and solder.

Lead is absorbed through the air and water. Adults absorb 35–50% of lead through drinking water.[13]

Lead is leaked into our air from industrial sources like metal processing in refineries, coal burning in power plants, petroleum combustion, nuclear power stations and high-tension lines, plastics, textiles, microelectronics, wood preservation, and paper processing plants.[14]

Testing for heavy metals in your body

According to an article published by the *Journal of Occupational Medicine and Toxicology*, there is no correlation between mercury levels in blood or urine and the levels in body tissues or the severity of clinical symptoms.[15] Since levels in urine and blood can change daily, we measure heavy metals in hair samples. Analyzing an inch of your hair provides information about heavy metals and minerals inside your cells after a few weeks of exposure.

Here is an example of hair analysis done with one of our patients. The patient was a 27-year-old male who came to see us and reported the following:

- Chronic pain in his joints (mostly back, neck, and occasionally elbows for several years)
- A general sensation of fatigue ("sleeps in almost every day")
- Difficulty concentrating sometimes ("stopped reading books and started watching TV instead")
- Light-to-moderate physically demanding job ("It takes him longer to recover after each shift at work")
- Tried to eat vegetables as much as possible—occasionally ate canned food when on the go or in a rush
- Tried massages and chiropractic care for his back pain and reported only a temporary relief
- Took ibuprofen occasionally for pain

Toxic & Essential Elements; Hair

TOXIC METALS		RESULT µg/g	REFERENCE INTERVAL	PERCENTILE 68th 95th
Aluminum	(Al)	2.6	< 12	
Antimony	(Sb)	0.045	< 0.080	
Arsenic	(As)	0.12	< 0.12	
Barium	(Ba)	0.35	< 1.5	
Beryllium	(Be)	< 0.01	< 0.020	
Bismuth	(Bi)	0.008	< 2.0	
Cadmium	(Cd)	0.011	< 0.065	
Lead	(Pb)	0.91	< 1.5	
Mercury	(Hg)	0.03	< 0.80	
Platinum	(Pt)	< 0.003	< 0.005	
Thallium	(Tl)	< 0.001	< 0.002	
Thorium	(Th)	< 0.001	< 0.002	
Uranium	(U)	0.085	< 0.060	
Nickel	(Ni)	0.09	< 0.40	
Silver	(Ag)	9.3	< 0.10	
Tin	(Sn)	1.5	< 0.30	
Titanium	(Ti)	0.39	< 0.70	
Total Toxic Representation				

As you can see from his hair analysis, the patient had high levels of arsenic and uranium and even higher levels of silver and tin. The patient was actually consuming canned food almost every day and had very little fresh vegetables or cooked food in his diet.

The treatment protocol included:

- Microgreens, nutrients, and probiotics from organic fruits and vegetables to support detoxification.
- Fiber, Selenium, and detox powder to assist with toxin elimination.
- Replacing preserved and processed food from cans with fresh and home cooked foods.
- Supplements (e.g., Acetylcysteine 600mg, two pills twice a day which help to regenerate liver cells).
- Herbs (2g twice a day of each of turmeric, milk thistle, boswellia, and Schisandra to support liver function to get rid of toxins).

Treatment continued with:

- B-Vitamin complex from a whole foods supplement (we used Cataplex B from Standard Process or Garden of Life).

- Acupuncture to stimulate liver function and increase circulation.

After three months the client reported:

- No back or neck pain for a couple of weeks.

- A significant increase in energy.

- Waking up earlier in the morning ("I have more time during the day because I don't feel like sleeping in").

- Improved concentration ("going back to reading books").

When the treatment period was over, the patient noted that the pain never came back. I guided and taught him how to reduce toxicity and maintain his health.

I want to ask *you* a question…

If I had treated this patient's back, neck, and joints with acupuncture, or manual therapy WITHOUT asking for the right test, would I have achieved the results that I did? What if I had given him just herbs or supplements for inflammation and had NOT addressed the accumulation of heavy metals in his body? Would I still have gotten those results? Probably not! The patient had already gone through many treatments—including chiropractic care, massage, and taking anti-inflammatory drugs—and he was still in pain. We had to find the underlying problem and take care of it.

This case is another example of the importance of finding the root cause or "trigger" of disease, rather than just treating the symptoms.

Heavy metal toxicity quiz

It is important to remember that there are many toxins out there from air, water, food, clothing, cosmetics, soaps, walls, electronics, etc. Toxicity is all around us.

There are several symptoms that might be present with excess toxicity. Check any of the following that apply to you:

- ☐ Headaches
- ☐ Chronic joint pain
- ☐ Chronic inflammation
- ☐ An autoimmune condition
- ☐ Declined memory
- ☐ Irritability or anger
- ☐ Depression or mood swings
- ☐ Difficulty concentrating or “brain fog”
- ☐ Fatigue
- ☐ Have dental fillings
- ☐ Live or work in an industrial environment
- ☐ Live in a house built before 1978 and there is a chance it has lead-based paint
- ☐ Cook with aluminum baking plates

How many did I check:_____

If you answered yes to more than two of these symptoms, you might have an accumulation of heavy metals that is irritating your body, causing you dysfunction, and damaging the cells, joints, or organs in your body. However, as my mentor used to tell me, “If you are not testing, you are guessing!”

Some of these symptoms might be similar to other conditions; therefore, it is recommended to test.

Testing for toxicity

There are a few options to test for toxicity based on your unique presentation. In general, heavy metals should be tested through a hair or sweat sample. The simplest and possibly the most reliable way is through hair analysis, since it shows longer exposure than blood or urine. The test that I recommend is a hair analysis for chemical toxins and minerals by Doctor's Data labs.

Other environmental chemicals, such as pesticides or herbicides, are also important and should be tested through a urine test that measures 172 markers of toxicity. The test that I recommend is GPL-TOX by The Great Plains Labs. It is a comprehensive test for organic chemicals that you may be exposed to on a daily basis.

Another option is to test your liver's ability to detoxify. Remember that your liver is getting rid of toxins 24/7. It never stops working, even when you are sleeping, resting, or fasting. One of the best tests is called "Liver Detox Profile," which measures the liver's ability to detoxify. The test provides information about two detoxification pathways of the liver. This is a simple but powerful tool that can provide a Functional Medicine doctor with understanding of your toxification processes.

Note: The topic of toxicity, including pesticides, herbicides, and other industrial toxins, is too large to be covered in one book. Different toxins might require different treatment protocols. If you are interested in getting more information on toxin elimination, detoxifying, and improving liver function, please read my book, *The Ultimate Guide to Getting Rid of Toxins and Improving Your Health.*

Detoxification protocols can interfere with the way your body metabolizes medication. As usual, always consult with a professional healthcare physician.

How to reduce heavy metal accumulation in your body:

- ✓ If you are eating fish, avoid farm-raised fish or tuna (especially canned), and look for deep sea salmon or organic seafood.
- ✓ In cosmetics, deodorants, creams, and toothpaste, look for clean and natural products that do not contain arsenic, mercury, or aluminum.
- ✓ Avoid taking unnecessary medications.
- ✓ If you have any dental fillings, look for a holistic dentist that has experience with safe removal and replacement of dental fillings that contain mercury. Studies show significant improvements in health and chronic diseases (including Multiple Sclerosis and other autoimmune diseases) after amalgam removal.[16]
- ✓ Filter your water. Lead leaches into tap water through the corrosion of plumbing materials that contain lead.[17]
- ✓ Don't use any products that contain aluminum in cooking.
- ✓ Use aluminum-free baking powder.
- ✓ Test for heavy metal and toxicity levels.
- ✓ Eat organic food to avoid environmental toxins that animals are fed or exposed to.
- ✓ Use a HEPA filter for your vacuum and air filters at home. These can be found for $50–100 and they help to reduce contaminated particles in the air.

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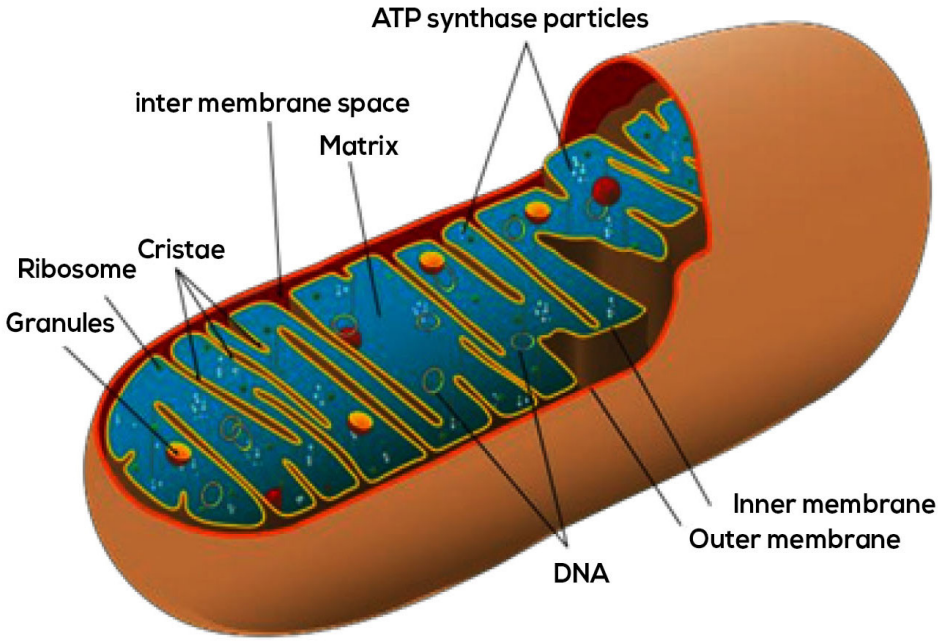
Factors that Cause Chronic Inflammation and Disease

Chapter 14
Mitochondria Dysfunction

Mitochondria (floral, in a single form called mitochondrion) are organelles found in large numbers in most of your cells. It is estimated that they have been in existence for two billion years. These organelles have a critical role in our existence and function, since they are responsible for creating the energy that your organs and most cells need to function. The more energy an organ requires (e.g., the heart, liver, and brain), the more mitochondria you will find in it.

Mitochondria are a very interesting organelle. Since they have their own separate DNA, a double membrane, and ability to produce energy, some scientists consider them to be a bacterium that settled in our cells a long time ago. This is a symbiotic relationship—we provide them with food (sugar or carbs, fats, protein) and a nice warm and protected place to live in, while they process that food and produce energy for us to live and thrive.[1, 2]



Mitochondria and diseases

Like any energy plant that burns fossil fuels (such as coal, natural gas, or petroleum) to create energy, the mitochondria create metabolic waste, such as reactive oxygen species (ROS), hydrogen peroxide, and ammonia. This waste, if it accumulates, can damage key components of your cells, including lipids, DNA, and other important enzymes and proteins.

Under healthy conditions, the mitochondria create enough energy for each cell in our bodies to function well and dispose of the waste. However, if the mitochondria do not work well, you might develop dysfunction or diseases, including diabetes, Alzheimer's, headaches, Parkinson's, cardiovascular diseases, and fatigue. Most medical doctors claim that mitochondria dysfunction can only occur as a genetic disease; however, studies show that mitochondria dysfunction can be developed at an older age.[3]

Mitochondria and inflammation

Mitochondria dysfunction can also cause activation of certain cytokines, caspase-1, and NF-κB (called nuclear factor kappa-light-chain-enhancer of B cells). This might lead to inflammation and pain in your joints, as well as damage and degeneration of your joint cartilage.[4]

Caspase-1 has a very strong potential to initiate a pro-inflammatory response. When activated, it can lead to activation of two inflammatory cytokines, interleukin 1β (IL-1β) and interleukin 18 (IL-18).[5] Therefore, ensuring that your mitochondria is functioning well is very important to preventing or eliminating pain and disease.

It is also important to mention that studies have found that chronic inflammation may lead to dysfunction of the mitochondria, by the effect of the inflammatory cells, interleukin-17 (IL-17) and IL-17-producing T helper (Th17).[6] This can provide an explanation for the fatigue and other symptoms that so many patients with chronic pain that we see complain of.

Do I have mitochondria dysfunction?

It is important to remember that, since mitochondria dysfunction can lead to a variety of symptoms and health conditions, this presents a challenge. Most doctors will not even think about mitochondria dysfunction as the "trigger" of pain, inflammation, or disease in their patients. This quiz might help you better understand whether you have mitochondria dysfunction. Mark the following if you have or feel:

- ☐ Chronic joint pain and inflammation
- ☐ Headaches
- ☐ Neurological conditions, such as Alzheimer's, dementia, Huntington's, or Parkinson's
- ☐ Neurobehavioral and psychiatric disorders, such as schizophrenia or bipolar
- ☐ Depression or mood disorders
- ☐ Diabetes
- ☐ Nerve pain (also called neuropathy)
- ☐ High blood pressure
- ☐ Muscle fatigue
- ☐ A need for more time to recover from physical activity
- ☐ An autoimmune condition, such as lupus, rheumatoid arthritis, or multiple sclerosis
- ☐ Memory problems
- ☐ Chronic infections
- ☐ Fibromyalgia
- ☐ Cancer

How many did I check:_____

According to several studies, mitochondria dysfunction is involved in all the above conditions.[7] If you answered yes to more than two of these symptoms, you might have a problem with the function of your mitochondria. As I previously mentioned, if your "power plant" does not function well, it might cause disease and inflammation.

Testing your mitochondria

Research and clinical information about the function of the mitochondria has been accumulating for several decades. Currently, there are several ways to test your mitochondria. Reviews of the research and different medical sources online often provide conflicting information. Even within the realm of Functional Medicine, the opinions are sometimes conflicting. Ask four doctors and you might get four different answers. So how do we decide which test to do?

The answer is simple. There is no single test that provides all the answers about your mitochondria. There are, however, several ways to examine its function. I will share with you the most important tests, which can provide you with information about your mitochondria, so that you will be able to find out whether your health problems are caused by mitochondria dysfunction. Please remember that a dysfunction of your mitochondria can be also caused by other factors, which are covered in this book.

Genetic or DNA testing

According to the Mitochondrial Medicine Society, genetic testing through a muscle biopsy is considered to be the gold standard test for mitochondria function.[8] The test is used to detect mutations in the mitochondrial genes, or to detect problems in its function. There are more than 1,400 nuclear genes that are either directly or indirectly involved in the function of mitochondria. Tests are available for one or many of these genes.

Who should take this test? It is recommended for patients with primary mitochondria, who are born with certain diseases or suspected to be genetically predisposed. Disadvantages of biopsy testing: According to Fran Kendall, M.D., CEO of Medical Genetics, muscle biopsy involves a removal of a small piece of muscle, about half an inch by half inch from the upper thigh. Dr. Kendall states that there are several disadvantages to the test. First, the test is invasive and leaves a scar that is several inches long. Second, it is expensive. Third, it is complicated and takes many weeks to complete.[9]

Metabolic testing

According to the United Mitochondria Disease Foundation, there are several metabolic tests that can detect mitochondria dysfunction due to a primary (genetic or born with it) or secondary (caused by another condition, toxin or chemical accumulation, certain medication, etc.) mitochondrial disease.[9, 10]

Metabolic tests include urine organic acids, liver enzymes and ammonia, basic chemistries, plasma amino acids, and creatinine kinase, among other tests.

Metabolic tests are less expensive and simple to perform with a urine and/or blood sample.

Organic acid testing

Organic acids are byproducts of protein, carbohydrate, and fat catabolism. Organic acid tests to evaluate the function of your mitochondria are a simple, non-invasive, and affordable. These tests are considered to be very valuable when a patient has symptoms that might indicate dysfunction of the mitochondria.

A comprehensive organic acid test, sometimes referred to as metabolic analysis, might detect levels of metabolites, which will indicate how your mitochondria works. Elevated or reduced levels of certain acids in your urine might indicate several problems:[11, 12]

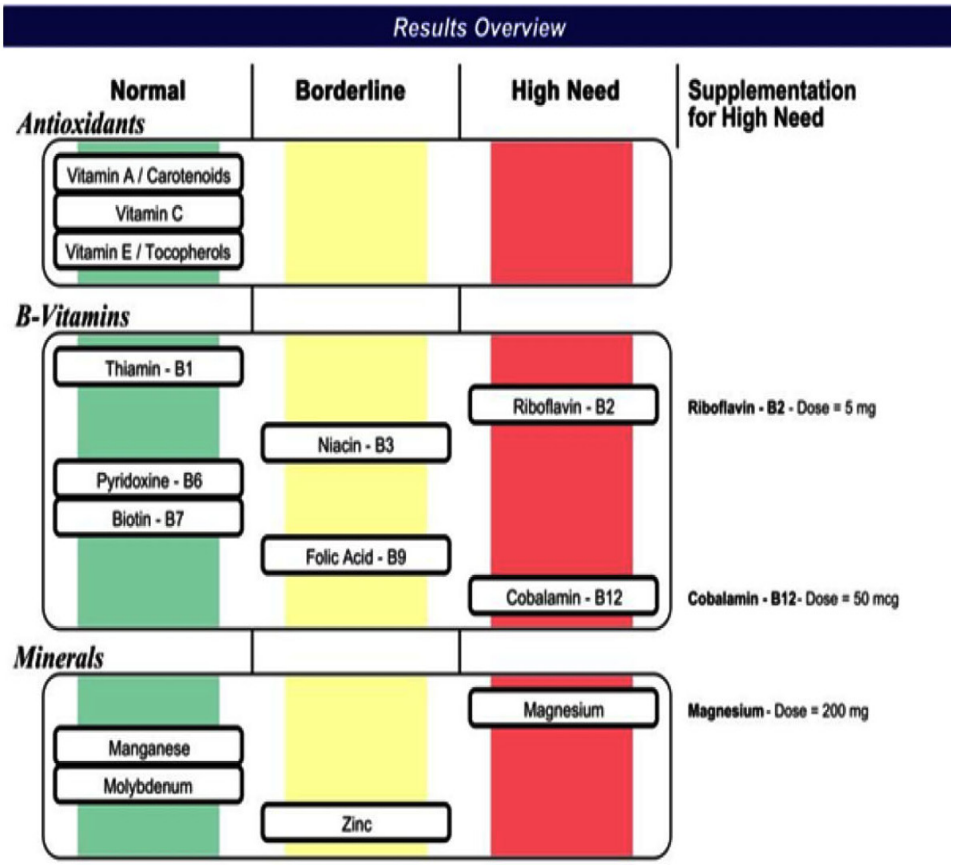
1. A decrease in energy production, as in molecules of ATP
2. An accumulation of reactive oxygen species or other metabolic waste, which can damage the cells
3. A dysfunction in the metabolism of fat, carbohydrates, or protein
4. A deficiency in certain nutrients, such as B12 or CoQ10, which are vital for the function of your mitochondria
5. Dysfunction in neurotransmitter metabolites, such as serotonin or dopamine, which might indicate imbalance in your cognitive, mental, and emotional function
6. Markers of toxicity and the detoxification process
7. Problems with the absorption of nutrients into cells
8. Markers of yeast (fungal) or bacterial dysbiosis

What results do I get from the organic acid test?

The results presented, after your urine is analyzed, might be different from lab to lab. Two of the labs that I recommend are Genova and Doctor's Data. The first part of your results will indicate levels of nutrients, such as B vitamins and CoQ10, which are important for the function of your mitochondria.

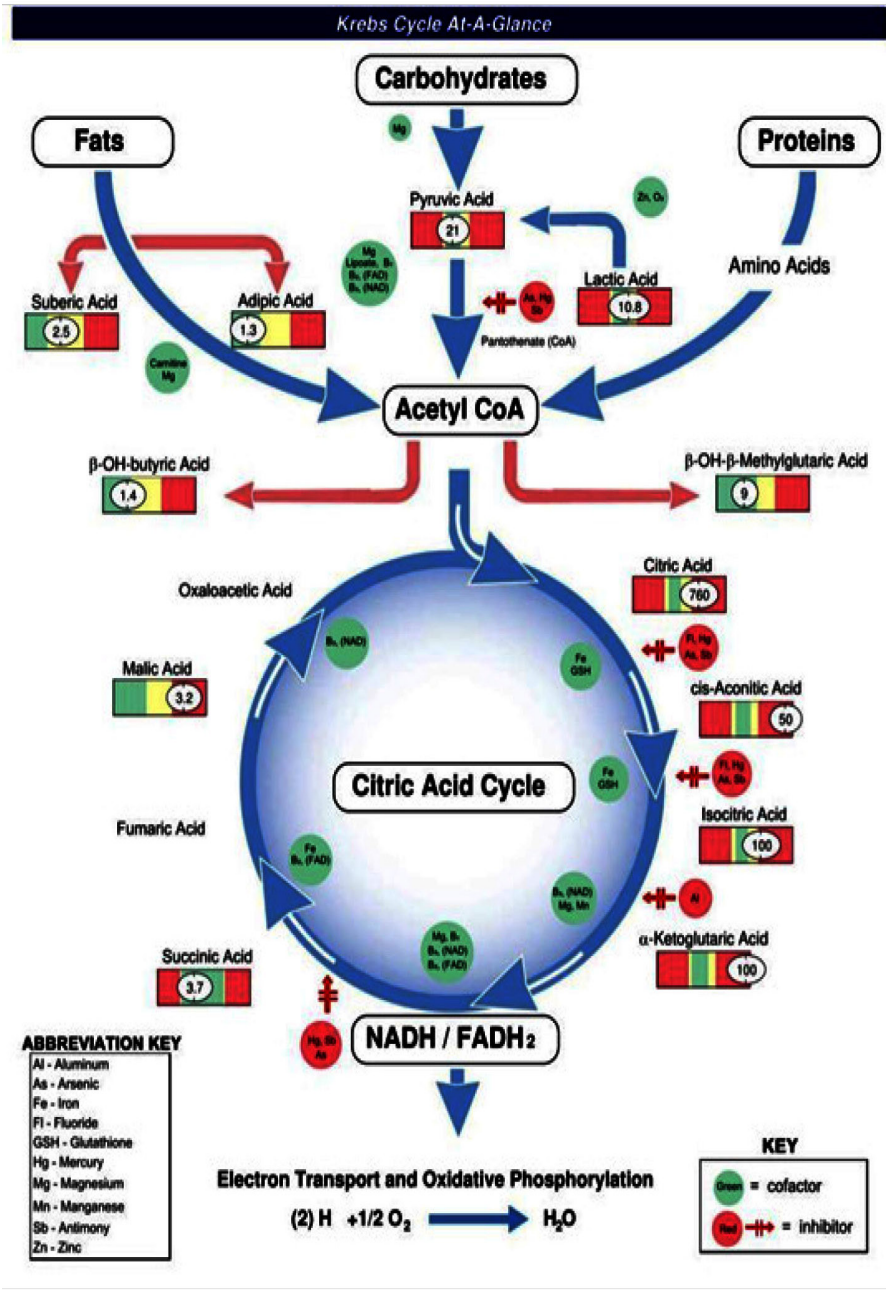
You can see a small part of a sample report, from the first part of Genova's metabolic analysis, in the following picture.

Addressing nutrient deficiency is the first and simplest step in addressing mitochondria dysfunction. It is important to mention that some patients might not absorb certain nutrients due to impaired digestion or a lack of healthy gut flora (bacteria) or digestion enzymes. Absorption may also decrease with age. Therefore, I usually recommend that patients supplement with high-quality vitamins or minerals in liquid or powder form.



The second part of the report is an analysis of metabolites, such as succinic acid and malic acid, which might indicate dysfunction in a certain part of the mitochondria. In the next page, you can see a sample of the second part of the test, showing the Krebs cycle, in which energy is created.

The arrows indicate a biochemical process. The green circles indicate vital nutrients, such as zinc or specific B vitamins. The red circle indicates factors or elements, such as mercury or aluminum, that can inhibit a process. Acid levels that are too high or too low might indicate a dysfunction of mitochondria due to deficiency in a nutrient, accumulation of chemicals or heavy metals, consumption of certain drugs, or genetic expression. It is important to remember that there are several factors that might cause problems with mitochondria. Always consult with a professional healthcare provider or a Functional Medicine doctor.



Disadvantages of the organic acid test: There are several limitations to urine organic acid analysis. First, you might get an artificially lower accuracy in very diluted urine specimens. The second is that the consumption of drugs may cause interfering peaks. The latter is less likely to happen.[13]

Pictures retrieved from Metabolic Analysis Profile by Genova Diagnostics.

According to The Mitochondrial Medicine Society, another disadvantage of the organic acid test is low sensitivity to detecting dysfunction or disease during a period of clinical stability. This means that, during the periods of time in which you do not have symptoms (e.g., pain or discomfort), the organic acid test might not be sensitive enough to detect abnormalities.[13]

Markers of mitochondria in plasma (blood sample)
There are several important markers that can be measured in a sample of your blood and that might indicate dysfunction of your mitochondria.

Glutathione
Glutathione is one of the most important antioxidants in your cells. Its main mechanism of antioxidant defense protects your cells and mitochondria against damage from metabolites, such as reactive oxygen species and electrophiles.[14]

Glutathione and mitochondria dysfunction
Like any factory, as your mitochondria create energy, they also create waste, called reactive oxygen species (ROS). Accumulation of ROS can cause a variety of problems, such as dysfunction and damage of the mitochondria, damage to DNA, and even cell death.[15]

Glutathione also has an important role in detoxification, communication inside the cell, and the function of the mitochondria.[16] Within your nucleus, where your DNA is kept safe, glutathione holds an essential role in the repair and expression of your DNA.[17] DNA damage or the expression of "bad" or "damaged" genes can lead to a variety of diseases or conditions, such as diabetes, autoimmune diseases, and cancer.

Only 10–15% of the total glutathione in your body is inside your mitochondria and it will mostly be found in a reduced form.[16]

Low levels of glutathione in mitochondrial disease
Several studies have shown that patients with mitochondrial disease or dysfunction had low levels of glutathione in their blood. These studies showed an association between low glutathione levels and a variety of health conditions, such as Leigh syndrome, Parkinson's, Alzheimer's, amyotrophic lateral sclerosis (ALS), and other neurodegenerative diseases.[18]

Carbon dioxide (CO2) and mitochondria

Studies show that high levels of Carbon Dioxide (CO2) can cause mitochondria dysfunction by several mechanisms. First, it might decrease cell proliferation, and second, it might increase levels of microRNA-183 (miR-183), which in turn decrease expression of IDH2 (isocitrate dehydrogenase 2).[19] In less technical words, high levels of CO2 can impair the function of your mitochondria.

Measuring CO2 in the blood should be relevant to everybody, especially patients with chronic obstructive pulmonary disease, asthma, cystic fibrosis, bronchopulmonary dysplasia, or muscular dystrophies.

Combining organic acid tests with blood tests

A study published in the *Journal of Pediatric Neurology* evaluated the effectiveness of a plasma and urine test in detecting mitochondria dysfunction in 20 patients with signs and symptoms suggesting mitochondria dysfunction. Patients with mitochondria dysfunction had the following elevated in their samples:[20]

- Alanine (plasma)
- Glycine (plasma)
- Proline (plasma)
- Urinary lactate (urine)
- Dicarboxylic aciduria (urine)
- Ketone bodies (urine)

The study concluded that a combination of organic acid testing (urine) and amino acids (measured in plasma) can be useful in the diagnosis of mitochondrial disease.[20]

Conclusion on mitochondrial testing and treatment

Treatment of mitochondria can be a complex subject. The best place to start is reviewing the results of your mitochondria function, also referred to by some labs as Metabolic Analysis or Organic Acids Test. Any deficiency of nutrients, such as B vitamins or CoQ10, should be addressed with supplementation. The second step is to look for the presence of any substance, such as heavy metals, that might interfere with mitochondria function, and removing them.

How can you increase the function of your mitochondria? There are several ways to promote a healthier function:

1. Support your mitochondria by providing essential nutrients, making sure that you are absorbing essential vitamins, and eliminating toxins on an ongoing daily basis.

2. Stimulate your body to eliminate mitochondria that do not work well. This process, called in biology mitophagy, is vital for healthy function of your cells and has been extensively studied.[21]

3. Support the creation of new and healthy mitochondria in a process called Biogenesis.

Here are a few ways to stimulate healthy mitochondria:

Exercise: Studies show that exercise training stimulates not only the creation (biogenesis) of new mitochondria but also the removal of old and unhealthy mitochondria.[22]

Cold showers: Exposure to cold was found to effective in stimulating expression of genes that promote the creation of new mitochondria, such as PGC-1α protein.[23]

Using adaptogenic herbs: Studies show that several herbs can be useful in promoting healthy function. Consumption of *Astragalus membranaceus (Leguminosae*) might assist in regulating mitochondria function, and consumption of Panax Ginseng might protect mitochondria and improve energy production.[24, 25]

Supplementing with Co-Q10: Coenzyme Q10 (CoQ10) is an essential molecule in the production of energy (complex I, II, and III) in the mitochondria. Studies found that supplementation with CoQ10 may enhance mitochondrial activity. This is especially important if you have fibromyalgia, cardiovascular diseases, neurodegenerative diseases, cancer, diabetes mellitus, male infertility, or if you are taking cholesterol-reducing medication (statins).[26]

Increasing antioxidants in your diet: Consumption of antioxidants was found to be effective in protecting against oxidative damage to mitochondria and reducing damage to brain cells. These nutrients include omega 3 fatty acids, vitamin C, zinc, Vitamin B12, folic acid, and magnesium. Several studies found that these nutrients can also enhance neurocognitive function and may have therapeutic benefits for depression and suicidal behaviors.[27]

Intermittent fasting: Studies on calorie restriction showed a pro-longevity effect, as well as changes in mitochondrial function, leading to decreased cell oxidative injury.[28] Intermittent fasting, such avoidance of food until the evening, one or two days a week, might be effective in improving mitochondria function. Always make sure to hydrate well and consult your physician before fasting.

Using resveratrol: A plant-derived polyphenol, called resveratrol, exerts a variety of anti-aging activities. It was found that consumption of resveratrol might promote the creation of new and healthy mitochondria and reduce damage to mitochondria by attenuating oxidative stress.[29]

Mitochondria are one of the most important organelles in your body. They are responsible for energy production that is necessary for the function of every cell in your body—nerves, brain cells, muscles, liver, heart, kidney, and more. Dysfunctional mitochondria can also lead to excess formation of harmful molecules, such as reactive species.

Testing and supporting mitochondria function can be a crucial step in correcting biochemical imbalances and dysfunction in some patients. If you have been suffering from chronic symptoms or conditions and have not found relief, I highly suggest finding a Functional Medicine doctor with extensive training and experience to evaluate you and run the correct tests, since if you are not testing, you are guessing.

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Chapter 15
Oxidative Stress and Damage to Your Body

Your body is constantly working to maintain a healthy balance between oxidative stress and your defensive system, also referred to as antioxidants.[1] It is very similar to the constant fight between the bad guys and the heroes in movies.

Under healthy conditions, free radicals and oxidants play a role as beneficial compounds, since they can be helpful to the body in many processes, such as signaling between cells. They are produced either from normal cell metabolisms in situ or from external sources (pollution, cigarette smoke, radiation, medication).[2]

Free radicals are "incomplete" molecules. To simplify their biochemical reaction, they are missing one or more electrons and will therefore steal electrons from other cells in your body. This leads to dysfunctional and unstable cells in your body. The accumulation of free radicals in the body generates a phenomenon called oxidative stress. This process plays a major part in the development of chronic and degenerative illness.[2]

If your body is in a state of oxidative stress, it means that there are more free radicals (also called reactive oxygen species) than antioxidants. Under these conditions, the "bad guys" are free to cause damage to your mitochondria, DNA, cells, arteries, and organs.

Which diseases are associated with oxidative stress?

Studies show that high oxidative stress leads to an accumulation of harmful substances, called lipid peroxidation (LPO), which are associated with several harmful changes or conditions:[3, 4]

- Aging process
- Neurodegenerative diseases (Alzheimer's, Parkinson's)
- Diabetes
- Chronic fatigue
- Macular degeneration
- Liver and kidney diseases
- Cardiovascular diseases

- Emotional or neuropsychiatric disorders, such as anxiety, depression, or even schizophrenia[5]

- Rheumatoid Arthritis (RA). Free radicals inside an inflamed joint play a role in both initiation and progression of RA[6]

High oxidative stress may also cause inflammation and pain, mutation in your DNA, and even cancer.[7]

The main players that cause damage in oxidative stress are reactive oxygen species and reactive nitrogen species (ROS/RNS).[3]

What causes high oxidative stress?

There are several factors that might cause a state of oxidative stress. The first is an accumulation of ROS and the second is a deficiency of the antioxidant system. Here are the conditions that can lead to this:

- The number one source of oxidative stress in your cells is your mitochondria. As part of the process of creating energy, your mitochondria also create ROS.

- A decrease in antioxidant levels, such as vitamin C or glutathione, might lead to an increase in ROS.[8]

- Certain methods of cooking your food might lead to the formation of oxidative stress. See advanced glycation end products (AGEs) at the end of this chapter.

- Emotional or psychological stress can lead to an accumulation of oxidative stress in the brain.[9] Oxidative stress might be especially high in severely stressful events, such as abuse, war, or divorce.

- Deficiency in nutrients, especially antioxidants such as vitamin C, might reduce your ability to protect cells from oxidative stress.[10]

Can I measure my levels of oxidative stress?

The short answer is yes, you can! The longer answer is that it's a bit more complicated than that. The reason is that oxidative stress is a state caused by many enzymes and processes in your body. Currently, there is no agreement on what exactly to measure and what levels are healthy or not. It is also important to know that this is a unique topic that is mostly studied by Functional Medicine doctors, and that it is not practiced by primary care doctors.

I will mention here some of the simple ways to evaluate your oxidative stress levels. Remember, there is no ONE definite way to do that. Your levels of oxidative stress should be evaluated by looking at the amount of antioxidants in your cells, with markers that might indicate high oxidative stress:

- Gamma-Glutamyl Transferase (GGT) test. GGT can be measured in your blood and, if elevated, might indicate disease of the bile ducts or some liver diseases. Studies show that elevated GGT may be used as a cheap, quick, easy, and precise marker to indicate high levels of oxidative stress.[11]

- Uric acid, a major antioxidant outside your cells and pro-oxidant inside your cells.[12] Levels that are too low or too high (even within the normal range) might indicate an unhealthy state. Elevated levels of uric acid are associated with diseases of oxidative stress, such as cardiovascular and metabolic diseases, stroke, kidney diseases, hormonal imbalance, hypertension, and vascular dementia.[13] On the other hand, low levels of uric acid were associated with a variety of conditions, such as cognitive impairment (MCI) and Parkinson's.[14, 15] In general, a high level of uric acid might indicate a state of high oxidative stress, while lower uric acid might indicate a state of low oxidants that are required to protect cells.

- Bilirubin, an orange-yellow pigment formed in the liver and extracted by the gallbladder in the bile. Bilirubin is created by the breakdown of hemoglobin (the protein inside red blood cells).[16] Bilirubin was previously considered to be a substance of waste; however, studies are showing that bilirubin has an important role as an antioxidant and in the prevention of oxidative changes.[17] The concentration of bilirubin in your blood is highest between the ages of 19 and 24, and it declines as you age.[18] The decrease in plasma bilirubin is associated with increased risk for several diseases, including cardiovascular diseases and neurodegenerative diseases, such as Alzheimer's. An increase in bilirubin showed a reduced risk for several diseases.[17]

How to decrease your oxidative stress

There are several ways to do so. First, you must improve the function of your mitochondria. As I mentioned before, most oxidative stress is made by the mitochondria. Second, studies show that an increase of antioxidants is associated with a decrease of ROS.[19]

Take the following steps:

- Increasing your intake of antioxidants, such as glutathione, carotenoids, and vitamins A and C, can help reduce the amount of free radicals.[8]

- Increase consumption of vitamin E ("RRR-alpha-tocopherol," also referred to as "natural" or "d-alpha-tocopherol"). You can find vitamin E in olive oil, nuts, whole grains, and green leafy vegetables. Studies show that a daily consumption of α-tocopherol doses of 400IU or more can increase the risk of death. Consumption of 200IU per day or less was found to be safe.[19]

- Consume vitamin C from acid fruits, green vegetables, tomatoes, and organic vitamin C supplements. Vitamin C works synergistically with vitamin E to quench free radicals and also regenerates the reduced form of vitamin E.

- Increase the amount of flavonoids in your diet by simply adding green tea, citrus fruit, berries, apples, and legumes to your diet. Flavonoids are a group of natural compounds that can be found mostly in plants. Flavonoids have several roles in reducing free radicals—they suppress the creation of ROS, they scavenge ROS, and they improve the antioxidant defenses.[20] One of the most interesting and well-studied flavonoid compounds is called Genistein. It is an isoflavone and is mostly found in soybeans, soy products, and as a supplement. Genistein was found to be highly effective in reducing ROS, preventing damage to cells and DNA, and reducing inflammation.[21]

- Selenium is a trace mineral found in soil, water, vegetables (garlic, onion, grains, nuts, soybean), seafood, meat, liver, and yeast.[22] Selenium has many health benefits and, at healthy dosages, it can be used as an antioxidant, anti-carcinogenic, and immunomodulatory agent.[23] The general recommendation is to consume 200 micrograms per day, since consumption of 400µg Se/day can lead to selenosis, which is selenium poisoning.[24]

- Increase consumption of omega 3 fatty acids. Patients who consume omega 3 supplements increased their antioxidant capacity and enhance their antioxidant defense system.[25] You can enrich your diet with omega 3 fatty acids by taking supplements and by eating fat fish (salmon, tuna, halibut, sardines, pollock), krill, algae, walnuts, nut oils, and flaxseed. It is important to mention that eating certain big fishes like tilefish, shark, swordfish, or tuna should be avoided because of their high mercury levels.[26, 27]

- Reduce exposure to toxins and heavy metals, such as mercury or arsenic, which can create harmful ROS and RNS. Several heavy metals can also deplete one of your most important antioxidants, called glutathione.[28] For more information, read the chapter on environmental toxins.

- Reduce or manage your stress levels. Several studies show that the practice of meditation, Tai Chi, and yoga can lead to a reduction in oxidative stress and the prevention of several chronic diseases.[29]

- Reduce consumption of alcohol.

- Clear infections. Chronic infections can cause high amounts of oxidative stress, since the body produces a high number of free radicals to "fight" microorganisms such as bacteria.[30]

- Drink clean water. To make sure that your water is clean, I recommend using a reverse osmosis filtration system, as it can help in removing harmful chemicals from your drinking and cooking water. A study conducted in Nevada found that reverse osmosis systems were useful in removing an average of 80.2% of arsenic from well water.[31] I recommend getting a filter system that has additional carbon filters and Alkaline Remineralization to add minerals (such as magnesium and calcium) to your water.

Advanced glycation end products (AGEs)

Many books and doctors discuss the importance of eating healthy food. Most of these sources of information, however, do not discuss the effect of cooking methods on your health. The way you cook your food has a significant effect on your health.

How is that?

Cooking involves a chemical process that can change the formation of your food or create new compounds in your food. A few of these major compounds are advanced glycation end products (AGEs), also known as glycol-toxins. AGEs are a diverse group of highly oxidant compounds, which can increase oxidant stress and inflammation in your body. They can also cause damage to your cells and were found to be associated with chronic diseases, such as diabetes and cardiovascular diseases.[32] How do we create AGE in our food?

AGEs are created by non-enzymatic reactions between reducing sugars and free amino groups of proteins, lipids, or nucleic acids.[32] Cooking food that is high in fat and protein, such as animal-derived foods, can create a high amount of AGEs, while cooking carbohydrate-rich foods such as vegetables, fruits, and whole grains will lead to a relatively low amount of AGEs.[33]

How do you reduce the formation of these toxins in your food? The simplest way to reduce AGEs in your food is to cook with moist heat, such as water, sauce, soup, or steam. Studies show that cooking in dry heat, such as grilling,

broiling, roasting, searing, and frying, creates and accelerates the formation of new AGEs.[33, 34] For example, roasted chicken (back or thigh) has 7,922 units of AGEs (AGE kU) per serving, while the same chicken cooked in soup for one hour has 1,011 units of ACEs (kU).[32, 35]

Remember that, although the formation of AGEs is a part of a normal metabolism, excess formation of AGEs will slowly cause damage in your body. Therefore, avoid dry cooking, such as grilling, broiling, roasting, searing, and frying. Instead, favor cooking by boiling, poaching, stewing, and steaming, which can reduce the formation of AGEs to less than one fourth of dry heat.[32]

Other ways to reduce the formation of AGEs when you cook your favorite dish is by using shorter cooking times, cooking at lower temperatures, and by use of acidic ingredients such as lemon juice or vinegar.[32]

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Chapter 16
Is Your Anti-Inflammatory Organ Working?

Did you know that you have your own anti-inflammatory glands?

Are you tired in the morning? Do you have chronic lower back pain? Do you feel depressed? If so, you just might have adrenal fatigue. In this chapter, I will explain the term “adrenal fatigue” and how you can restore your adrenal function and feel great again. Did any of your doctors ever mention or ask you about your adrenals? Your adrenals are among the most important glands or organs you have in your body, yet most doctors do not ask about, talk about, or check the function of your adrenals when you complain of the symptoms mentioned above. From years of clinical experience, I have found that adrenal problems exist in eight out of ten patients who complained of fatigue or pain. So, what do the adrenals do and why are they so important?

The most powerful anti-inflammatory glands

Your adrenals are very important for the creation of several hormones, such as testosterone and adrenaline, which keeps you awake and alert.

One of the most important hormones secreted by the adrenals is cortisol, also called the “stress hormone.” Cortisol is secreted by your adrenals as a response to stress.[1] This could be physical stress, such as an injury, falling down the stairs, or a motor vehicle accident. It could also be emotional stress due to a “toxic” or abusive relationship, emotional trauma, or a stressful job.

The adrenal-cortisol-inflammation connection

Have you ever heard of somebody that complains to their doctor about chronic pain and gets a cortisone injection? Why are they among the most common injections? Because cortisone is very important in reducing and shutting down inflammation. Unfortunately, most injections do not work in the long term and some do not work at all. They also have negative side effects.

Your body has its own cortisol-making machine: The adrenals! Chronic pain, in most cases, is caused by inflammation and it is the job of your adrenals to secrete cortisol and stop inflammation. In other words, without inflammation, you would not have pain! Sounds simple right? It actually is. That's exactly how I got rid of years of back pain. It's also how one of our patients, Dana, experienced a significant reduction in the back pain she'd had for years and completely resolved her wrist pain after two months of treatment.

Dana was referred to us by one our wellness program patients. She reported several years of chronic pain in her lower back as well as pain in her wrist joint that had started a few weeks prior. She had tried medication, chiropractic care, and acupuncture several times. When I asked, she said, "I felt a bit better after chiropractic and acupuncture, but the pain kept coming back." The pain was starting to slow her down and often caused her to be impatient or moody with her children or husband. She described her concerns about the future and said, "I got used to living with the lower back pain, but I am afraid that, if it gets worse, I won't be able to spend time with my family and I may lose my job." That is a concern that I can identify with. I experienced lower back pain when I was younger, and I know how it can affect every aspect of your life, including your sleep, job, mood, and relationships. We started the evaluation with Dana and found that her adrenals were functioning less than they should. So, how did we test her adrenals?

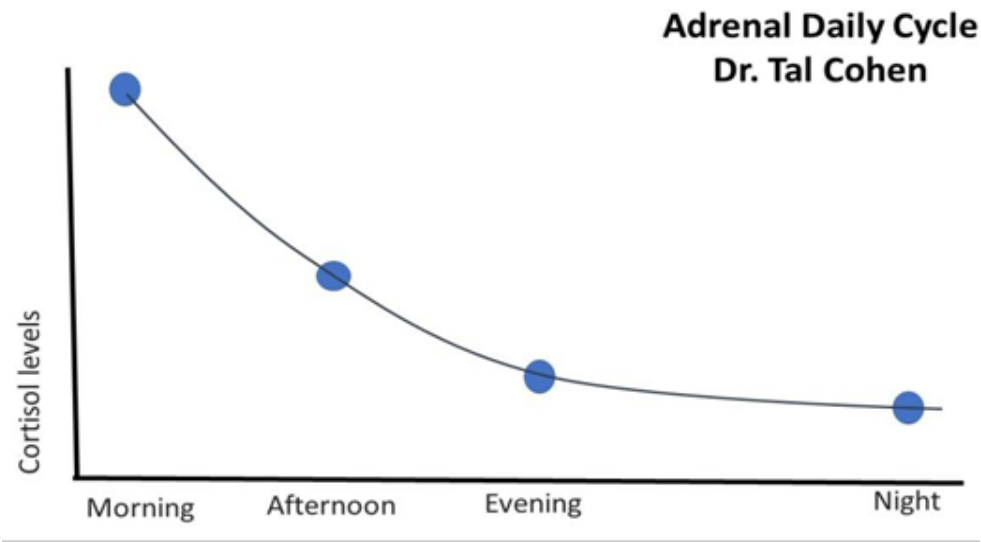
How to test your adrenals

Testing your adrenals is simple. However, to get accurate results you must do the complete panel. To measure the function of your adrenals, we measure the levels of the hormone they secrete, cortisol. Since adrenal function changes during the day, your cortisol levels change as well.

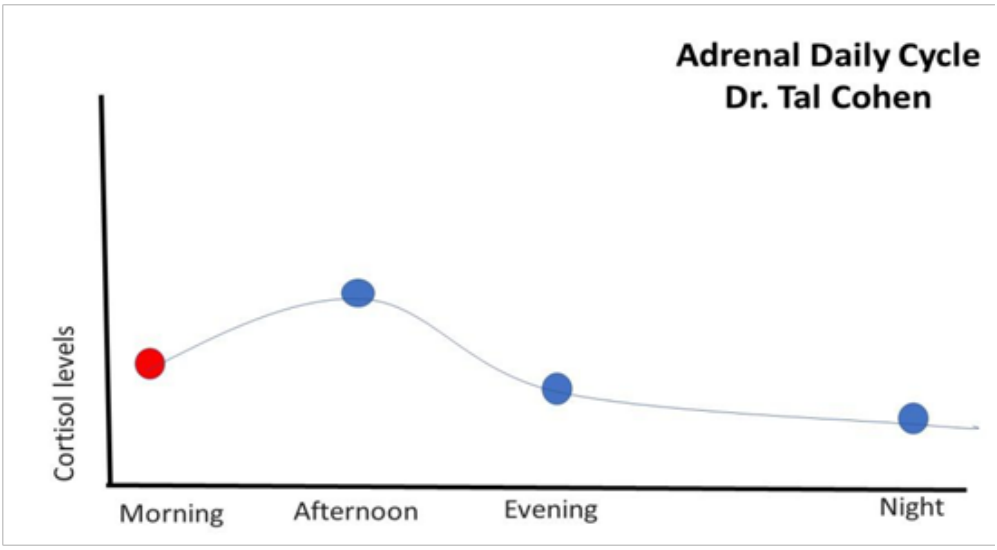
Remember, cortisol does not only reduce inflammation. It also elevates and balances your sugar levels, which causes you to feel awake and energetic. If you have less cortisol in the morning or afternoon, your energy levels will drop, and you might feel tired, physically or mentally. If your adrenals are working less than they should, your cortisol levels will be lower than they should. With lower cortisol, there will be increased inflammation in your lower back, neck, shoulder, or knees. Without healthy cortisol levels, there will be nothing to stop your inflammation and you will experience chronic pain. Like Dana, you might take drugs for pain, go to the chiropractor, or see your acupuncturist. However, without addressing your adrenals, the relief will only be temporary, and your pain will return. Sometimes, it may develop in other parts of your body.

The test of cortisol levels is done at least four times a day, for the entire day. In some cases, we will also order a measurement of your DHEA levels, since it could be an important hormone in determining adrenal function. The measurement is done using a saliva sample three times a day and there is no need for a blood draw.

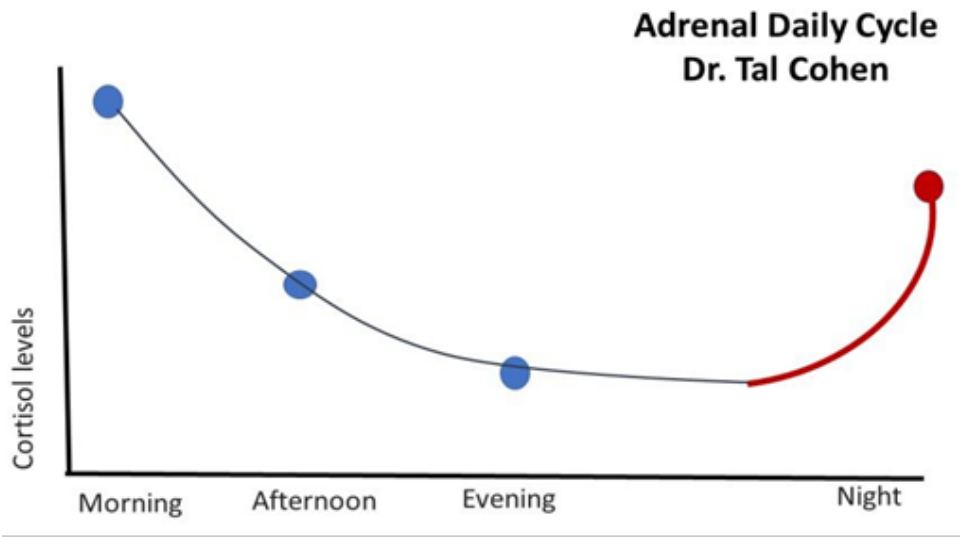
Here is a chart of a healthy cortisol level, which indicates healthy adrenal function. As you can see, adrenals secrete the highest levels of cortisol in the morning, which leads to higher sugar levels in your blood and more energy. It also reduces inflammation. As the day goes by, the levels of cortisol slowly reduce until the late evening, around 8:00 p.m., when your energy levels are low, and you are ready to go to sleep.



In the second chart, you can see lower levels of cortisol in the morning, which indicates that the adrenals are not working well. It is a subclinical dysfunction that can lead to fatigue in the morning and mild inflammation. This adrenal fatigue is usually due to chronic physical or emotional stress. This is typically stage one or two of adrenal fatigue (also called hypoadrenalism)



In the next chart, you can see that the cortisol levels look normal during the day, but increase at night. We have seen this with patients that experience a “second wind,” meaning that they suddenly feel an increase in energy at night time and feel like they can write, clean, or just watch TV for hours. They are completely awake. This is a dysregulation of adrenal function. It is usually caused by long-term exposure to external stimulation, such as a TV or computer, in the evening. It could also be caused by chronic stress.



This disturbance can also lead to problems with sleep (insomnia), since the cortisol levels will increase blood sugar and cause you to wake up. Imagine that your levels of cortisol suddenly spike at night time. Most likely you will wake up, maybe even several times, and feel completely awake.

The treatment of this condition is different, since it is not a usual adrenal deficiency, but an irregular function. It requires supporting and calming the adrenals with supplements at night.

Adrenal fatigue quiz

Answer the adrenal questionnaire:

- ☐ I feel tired in the mornings
- ☐ I get lower back soreness or pain
- ☐ My back pain increases if I am tired or standing for a long period of time
- ☐ I tend to be a night person
- ☐ I often feel tired or tend to yawn in the afternoon
- ☐ I sometimes feel dizziness when standing up quickly
- ☐ I had or still experience shortness of breath or asthma
- ☐ I crave salty foods
- ☐ I have joint pain or arthritis
- ☐ I often grind or clench my teeth at night
- ☐ I had or have allergies
- ☐ I often feel anxious
- ☐ I had or have a stressful/abusive relationship
- ☐ I have dark circles under my eyes
- ☐ I have puffiness under my eyes
- ☐ I like to sleep in and have difficulty getting out of bed
- ☐ I sleep less than six hours a day
- ☐ I work or used to work night shifts
- ☐ I am often feeling stressed or overwhelmed
- ☐ I am tired all the time
- ☐ I consumed steroids (e.g., prednisone) for over a month

How many did I check:_____

1–2 boxes: Your adrenals might be working less than they should. Cortisol levels might be lower than optimal range. Your adrenals need support to avoid further reduction in function. Also, make sure to rest, reduce stress, and read how to support your adrenals.

3–5 boxes: It is likely that you have adrenal fatigue, possibly stage one to three. Adrenal testing will probably show cortisol levels at a minimum in the morning, afternoon, or both. Treatment protocol requires adrenal support, stress management and rest, and adrenal-stimulating herbs and supplements.

6 boxes and above: Please contact a professional Functional Medicine doctor as soon as possible to address this.

Adrenal symptoms explained

Here are the five main symptoms that might indicate that your adrenals are not working well and an explanation of the dysfunction.

1. Chronic inflammation and pain: Studies found that patients with higher levels of inflammatory markers, such as Tumor Necrosis Factor (TNF-a) or interleukin 6 (IL-6), had lower levels of cortisol in the morning than healthy patients.[2]

2. You have chronic lower back pain. Your family doctor might have told you that nothing is wrong with your back. Maybe an orthopedic specialist told you that you have degenerative changes or bulging discs and need surgery. Some of our patients were seeing a chiropractor or physical therapist for months and still had pain. In any case, if you had lower back pain for more than three months, you probably have adrenal fatigue that is allowing the inflammation and pain in your back to continue. Sometimes, the same applies to shoulder or knee pain.

3. You feel tired in the morning. Cortisol elevates your sugar levels to keep you awake. Lowered function of the adrenal glands will lead to low cortisol and lower blood sugar levels. The result is feeling tired, unmotivated, and perhaps even experiencing brain fog.

4. You experience anxiety. Your adrenals are also called the "stress glands." We found that your ability to deal with any type of stress, physical or emotional, is dependent on adrenal health.

5. Low sugar levels. Low adrenal function often leads to low levels of cortisol, which leads to lower levels of sugar and fatigue. This is why you might have a craving for coffee or sugar in the afternoons.

6. Sleep issues. If you wake up at night or find it difficult to fall asleep, it is possible that your adrenals are "pumping" cortisol or adrenaline at night time, keeping you awake or waking you up. Sleep is very important for adrenal health, and unfortunately, lack of proper and healthy sleep will slowly lead to adrenal deficiency.

7. Chronic fatigue. Studies show that patients with chronic fatigue had significantly lower levels of cortisol in the evening, as well as lower levels of cortisol over 24 hours, when compared to healthy people. Patients with chronic fatigue also had elevated levels of the Adrenocorticotropic (ACTH) hormone in the evenings, which is the hormone that tells the adrenals that it is time to work. In other words, the study found that the adrenals were not responding to stimulation from the brain in the evenings, which indicates adrenal dysfunction or weakness.[3]

8. Craving salt or salty food. The adrenals regulate blood pressure. In some individuals, when the adrenals are fatigued, blood pressure might be lower. Since salt helps increase blood pressure, you might feel a craving for salty food as an attempt by the body to increase blood pressure. If you are craving chips, potatoes, bagels, or other salty foods, you might have adrenal fatigue.

9. Feeling depressed or moody. Studies show that, in adults, abnormal levels of cortisol are associated with depression while, in children, elevated levels of cortisol are associated with a sensation of anxiety.[4, 5]

10 Dizziness when you stand up quickly. Adrenals play a key role in balancing your blood pressure. If you feel dizziness sometimes when you stand up quickly, it is very likely that you have adrenal fatigue and your adrenals cannot increase your blood pressure fast enough. The result: Your brain does not get enough of a supply of blood and you get dizzy.

Frequently asked questions:

Why didn't my doctor talk to me about adrenals when I described my pain?

Adrenal fatigue, also called subclinical hypoadrenalism, is a medical condition that is not yet recognized by mainstream institutions. According to mainstream medicine, the adrenals do not have a lower state of function like the heart (chronic heart failure) or the kidneys (chronic kidney failure) do. Therefore, most doctors will not test or will ignore a condition in which you might have low-functioning adrenals. This is despite the fact that measuring cortisol four times a day was found to be a reliable tool in indicating adrenal dysfunction for years in both clinical practice and studies.

In Functional Medicine, we believe that the function of each organ can change according to the factors that stimulate recovery or health factors that inhibit, weaken, or damage an organ.

In my opinion, there are several reasons as to why the medical community does not recognize adrenal fatigue. The first reason is that most doctors have not learned in medical school about the connection between adrenals and pain or inflammation. The second is because conventional medicine is a medicine that is based on pharmaceutical or surgical solutions. Since there is no pharmaceutical solution that actually treats the adrenals, your doctor probably never learned about it. That is what Functional Medicine doctors do the best. In most chronic conditions, your doctor will give you a pill to stabilize the condition but will not resolve it.

For more information about adrenal function and treatments, check out our videos and articles online at: www.ANewWay.Clinic or call (503) 545-6285 for a consultation with one of our Functional Medicine doctors.

How do I treat my adrenals?

It is possible for you to do some work on your adrenals. I will provide you with a few of our tools from our adrenal protocol below. However, before I do, let me ask you a question: If your fridge or car breaks down, will you try to fix it yourself? You might research solutions on how to fix your car or fridge. However, if you are like me and do not have the training and experience to fix a fridge or a car, I would recommend calling a professional to do it in the most effective way possible. Fixing your adrenals is not much different. Your adrenals are complex glands that function as part of a bigger system, the hormonal system. For that reason and others, I recommend finding a professional who can test you, build a custom protocol that fits you, and guide you through the process to get the results you want.

Adrenal protocol:

- ✓ Make sure that you get eight hours of sleep.
- ✓ Create a restful environment an hour before sleep and avoid television, computers, or cellphones. I know it's hard, but light-emitting diodes (LEDs) interfere with your natural hormones, such as melatonin, and "trick" your brain into thinking that it's daytime. Listen to music or read a book instead.
- ✓ Eat enough healthy fats, such as avocado, olive oil, and small amounts of coconut oil or organic butter.
- ✓ Consume enough protein but minimize consumption of animal proteins.
- ✓ Supplement with a variety of nutrients, especially B vitamins and vitamin C, from a natural source (not synthetic).
- ✓ Calm your mind. Since stress reactivates your adrenals, it is very important to manage stress by meditating, doing yoga (even five to 20 minutes a day), or taking a walk with a friend.

- ✓ Use adrenal-supporting herbs. A good combination is licorice root (Glycyrrhiza glabra root) with Korean Ginseng (Panax ginseng root). Use a minimum of 300mg of each twice a day. Note: Licorice can raise blood sugar levels.

- ✓ Use adrenal-stimulating herbs, such as Withania (Ashwagandha) root and HerbaEpimedii (a Chinese herb called Yin Yang Huo). Start with 500mg of each twice a day and increase slowly.

Solving ten years of back pain and chronic low mood with adrenal support

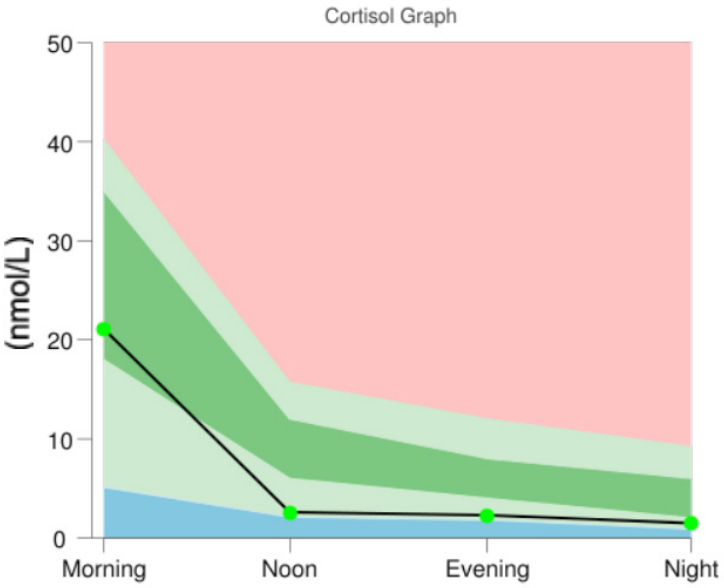
Cory, a woman in her 50s, came to see me for lower back pain that she had been experiencing for over ten years. She described the pain as soreness that increased with prolonged standing or when she was tired. She saw a chiropractor for a while, which helped a bit but did not solve the problem.

She also complained of mild depression for the past year, which she described as, “not feeling happy.” She was feeling better in the mornings, but her energy decreased in the afternoon, and she was very tired. She was worried, since she had started to miss days at work and was avoiding any social activities.

After an evaluation, which included functional surveys as well as a review of her lifestyle and diet, it was obvious that she’d had a long period of stress in her life, when she was transitioning to become a preschool teacher. During her physical examination, I noticed that her blood pressure decreased significantly from a supine position (lying face-up) to a sitting position. She also had a few signs of adrenal fatigue. I recommended an adrenal test as soon as possible. The results correlated exactly to her presentation, which you can see here

ADRENALS

Cortisol Morning	21.09	nmol/L	◆	5.1-40.2; optimal range: 18-35†
Cortisol Noon	2.59	nmol/L	◆	2.1-15.7; optimal range: 6-12†
Cortisol Evening	2.29	nmol/L	◆	1.8-12; optimal range: 4-8†
Cortisol Night	1.48	nmol/L	◆	0.9-9.2; optimal range: 2-6†



As you can see, the levels of cortisol were measured four times a day—morning, noon, evening, and night. The levels were within optimal range (the green area) in the morning, however they dropped significantly from the afternoon, as seen below the green area. Cory reported feeling good in the morning, but her energy dropped around noon or afternoon and her lower back hurt. This correlated with the low levels of cortisol found in her labs from the afternoon.

The treatment protocol

Cory's levels of cortisol remained very low throughout the day, from afternoon to evening. Her body was not getting enough cortisol to reduce the inflammation that she was developing. The treatment, therefore, was focused on nourishing and stimulating her adrenals.

Treatment included:

- ✓ Adrenal herbal support (e.g., withania and rehmannia) from the afternoon.
- ✓ Adaptogenic herbs to support her energy production (e.g., Co-Q10 and Siberian ginseng) in two dosages: morning and afternoon.
- ✓ A complex of vitamin C and minerals, from an organic source, to support adrenal function twice a day.
- ✓ Education on stress management and reading material to reduce the activation of adrenals.
- ✓ Acupuncture to support relaxation and to stimulate the healthy function of adrenals once in two weeks.

A follow-up was scheduled once a week, in person with acupuncture or over the phone. The treatment protocol was altered as symptoms changed.

Treatment results after four months:

- ✓ Sensation of relief and happiness ("more emotionally balanced and feeling more joy").
- ✓ Energy increased and stayed balanced until night time.
- ✓ No back pain.
- ✓ Enjoyed activities with family and friends after work.

After the program was over, Cory was happy to return to a healthy and normal functionality. She now understands the importance of maintaining healthy stress-management activity and nourishing her adrenals.

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Chapter 17
Anti-Inflammatory Supplements

"My opinion, however, is that [herbs] are superior 95% of the time to any pharmaceutical drug!"

Source: Robert E. Willner, M.D, Ph.D.
Author of The Cancer Solution & Deadly Deception

The use of anti-inflammatory herbs has been documented for thousands of years in different cultures. The following chapter focuses on the use of anti-inflammatory supplements and herbs. When consumed for a long period of time, some of these herbs were found to be as effective as anti-inflammatory drugs, without the side effects of synthetic medications.

A successful anti-inflammatory protocol has three important parts: Choosing the right herbs, making sure that they are high-quality, and taking the right amount for you. As usual, please consult a healthcare provider or a Functional Medicine doctor for safety and for best results.

It is important to make sure that you address all the triggers of your inflammation or condition, as discussed in chapters 7 to 16, to make sure that you truly achieve a corrective care. Taking supplements without testing and treating the triggers would be helpful, but usually only as a temporary fix.

Curcuma Radix

Curcuma Radix (Yu Jin), or turmeric, is a plant. It is the main spice in curry. The root of the plant has been used in traditional medicine for more than 4,000 years.

Turmeric has a strong anti-inflammatory effect. Studies have shown that taking turmeric extract alone or in a combination with other herbs can reduce arthritic pain. One study showed that Turmeric was as effective as Ibuprofen for the treatment of Osteoarthritis pain. The study had two groups. All of the participants were randomly allocated to receive either 1,200mg/day of ibuprofen or 1,500mg/day of Curcuma Domestica extract. After several weeks, all the participants experienced reduction in pain and stiffness, and

improvement in function. The number of side effects, mostly abdominal pain/discomfort was significantly higher in the group that received Ibuprofen.[1] Therefore, Curcumin is an effective and safe anti-inflammatory agent.

Curcumin was found to be effective and safe even in high amounts.[2] I recommend starting with 1,000mg twice a day for two weeks, and slowly increasing to 2,000mg twice a day for six weeks.

Resveratrol

The natural polyphenol resveratrol can be found in the skin of red grapes, cranberries, peanuts, and root extracts of the weed Polygonum Cuspidatum. Resveratrol has biological and pharmacological effects, including antioxidative, anti-inflammatory, anti-mutagenic and anticarcinogenic.[3]

Studies show that resveratrol can reduce joint inflammation by inhibiting immune proteins that are involved in inflammation—Tumor Necrosis Factor (TNF-α) and Interleukin 1 beta (IL-1β). Resveratrol can also regulate the activation of NF-κB, which is associated with a healthy immune response, to prevent inflammatory and autoimmune diseases.[4]

My recommendation is to use resveratrol extract from Japanese Knotweed (Polygonum cuspidatum) Root. Take 500mg three times a day with 100mg of vitamin C. Also, make sure that it is standardized for 50% Trans-Resveratrol to make sure that you are getting a high concentration.

A good supplement that you can buy without a healthcare license is Resveratrol capsules by Nature's Answer, which also contain a complex of antioxidants from fruits and herbs.

Quercetin

Quercetin belongs to a group called Flavonoids. These are powerful antioxidants that scavenge particles in the body known as free radicals. Free radicals are known to damage cell membranes, dysregulate the DNA, and even cause cell damage or death. Antioxidants can neutralize free radicals and therefore reduce or prevent some of the damage that is caused by them.

Quercetin can be found in fruits and vegetables as part of a variety of antioxidants. Although some of the studies are conflicting, quercetin was found in studies to have anti-inflammatory properties by blocking of pro-inflammatory compounds called cytokines.[5]

In 2016, a study was published on the therapeutic effects of quercetin on inflammation, obesity, and type 2 diabetes, since these diseases are associated with low-grade inflammation. The study concluded that "positive results have been found in both animal and human studies and support the use of quercetin in fighting inflammatory disease".[6]

The recommended dosage is 250mg three times a day.

Omega 3 Oil

Omega 3 fatty acids are long-chain polyunsaturated essential fatty acids (PUFAs) from foods such as fish, seafood, nuts, and grass-fed animals. Studies show that consumption of 3g per day for 15 weeks leads to a reduction in joint inflammation and stiffness in arthritis patients.[9] A beneficial anti-inflammatory protocol includes two grams of omega 3 fish oil in soft gel twice a day with food. I recommend Ultra-Pure Fish Oil 700 by Vital Nutrients, due to their purity and high-quality control.

Spirulina

Spirulina is a type of blue-green algae that is high in protein, vitamins, minerals, carotenoids, and antioxidants. Several studies have shown the health benefits of spirulina. Spirulina can activate the antioxidant enzymes in your cells and prevent cell damage.[10] In the treatment of inflammation, studies show that consumption of spirulina can regulate the function of the immune system and that it has anti-inflammatory properties. Animal studies showed that administration of spirulina for 45 days significantly reduced the levels of pro-inflammatory immune cells called cytokine TNF-α, IL-1β, and IL-6.[11]

Consumption of freeze-dried spirulina (8.0g/day) for 12 consecutive weeks in diabetic patients reduced triglycerides and blood pressure.[12] Other studies showed that spirulina might improve detoxification of heavy metals,[13] protect the brain, and prevent decline in cognitive function.[14]

Caution with use of spirulina

Reviewing articles and blogs online about spirulina might be very confusing and sometimes contradictory. While some doctors promote it as a "magic" supplement for inflammation and autoimmune conditions, it is important to mention that several cases reported that spirulina might increase symptoms of autoimmune diseases, such as lupus or rheumatoid arthritis.[15] It is suspected that spirulina activates the Th1 immune cells and might aggravate the autoimmunity in patients with dominance Th1.

Also, spirulina might lead to changes in gut bacteria, so if you have an intestinal permeability (see the chapter on leaky gut), I recommend avoiding it.

Dosage: 500mg daily from a good, clean source, to avoid contamination.

Boswellia Serrata (Frankincense)

Boswellia has been used for many years in India as an anti-inflammatory herb. It contains many compounds, including boswellic acid, which are responsible for the inhibition of pro-inflammatory enzymes.[16] For maximum results, combining Turmeric with Boswellia will improve the anti-inflammatory and pain reduction effect of Turmeric.

Dosage: Start with 500mg of Boswellia twice a day for a couple of weeks and increase it to 1,000mg twice a day for six weeks. Make sure that it contains a minimum of 90mg of boswellic acid in each dosage.

Antioxidants

The role of antioxidants in fighting inflammation was discussed in the previous chapter about nutrition. Antioxidants protect our cells from the damage of free radicals. In normal and healthy conditions, there is a balance between the formation of free radicals and the internal antioxidant system in our bodies. However, if this equilibrium is disturbed, it can lead to oxidative stress and damage all parts of your cells, including DNA, proteins, and membrane lipids. It may also lead to cell death.[17] Several factors increase free radicals, such as fried foods, alcohol, tobacco smoke, pesticides, air pollutants, and other toxins that we covered in previous chapters.

The amount of antioxidants in food can be measured and is referred to as "Oxygen Radical Absorbance Capacity (ORAC)." In 2012, the United States Department of Agriculture (USDA) removed the measurement of antioxidants, also called ORAC, from their charts and data, since it is not completely clear how antioxidants benefit our health and since some manufacturers of food and supplements are using ORAC measurement to promote their products.[18]

Past studies showed the potential benefits of antioxidants in promoting a healthy cardiovascular system and reducing the risk for the development of cancer.[19, 20] A study of 5,182 participants from the age of 55 to 95 showed that lower consumption of beta-carotene was associated with a decline in cognitive function.[21] Studies show that the use of food with high antioxidants can significantly reduce markers of inflammation and reduce joint inflammation.[22, 23]

How to increase your consumption of antioxidants

Studies show that two factors are associated with consuming of antioxidants or ORAC, improving your health, reducing the risk of diseases, and reducing inflammation. The first factor is the amount that you consume every day. According to the Centers for Disease Control and Prevention, each of us should consume two cups of fruits and two to three cups of vegetables every day.

Unfortunately, only ONE out of ten adult Americans actually eats that many fruits and vegetables.[24] The national surveys show it. Over the years that I have been in practice, I have seen many patients whose nutritional lab results showed severe deficiencies in certain micronutrients, such as vitamins and minerals. That includes patients who eat organic salads and fruits. Reviewing these labs and the national surveys taught me that we are overfed and undernourished. Most people focus on the amount of protein, fats, and carbs they consume, rather than starting their plate with vegetables and finishing with fruits for dessert.

The second factor is equally important. It is eating a variety of fruits and vegetables to gain a variety of vitamins, minerals, and antioxidants. Remember that different groups of antioxidants might provide you with different health benefits. Studies show that even different berries have different health benefits, so mix it up.[20]

There are two recommendations that I can give you, based on my personal and clinical experience with antioxidants. The first is to consume a minimum of two cups of different vegetables every day. Make sure you get all the colors—greens (e.g., broccoli or lettuce), whites (e.g., cauliflower or onions), blues (e.g., berries or Plums), and reds (e.g., beets or grapes).

My second recommendation is to enrich the number of micronutrients and antioxidants by using a whole food supplement, rather than a multivitamin pill. An example for that would be SuperFood powder by Amazing Grass or Raw Organic Perfect Food Green Superfood by Garden of Life. These products contain over 25 organic vegetables and fruits, prebiotics (the fiber that feeds the healthy bacteria on your gut), probiotics, and fiber. It is a great way to supplement your daily intake, and I have seen many patients who felt better just by adding this product to their diet. I have been using it for years, and my family uses it and loves it as well.

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Chapter 18
Bringing it All Together

How to Use This Book

The purpose of this book is to educate you on the triggers of disease and dysfunction. If you have been suffering from pain, fatigue, or chronic disease, you have probably seen several doctors and tried different treatments, medications, or supplements. I have been there and I know how frustrating it is to spend time, money, and energy on treatments that do not resolve these health issues. I also know how much pain can hold you back from enjoying your life. This book was born as result of the amazing, life-changing results we achieved when we applied the principles of Functional Medicine. I hope that, like our patients, you too will apply these principles and change your life.

How do I start?

This book contains the majority of the tools that any healthcare provider needs in order to address chronic pain, inflammation, and disease. The first and most important step is to perform a comprehensive evaluation. That includes comprehensive lab testing, review, and health history to answer one question: "What triggered a change in your body that led to the development of your condition?" Answering this question is vital in providing real solutions to your chronic condition and in switching from a symptom care to corrective care.

The second step is to build a custom treatment plan in order to address these triggers. It is important to mention that, with any chronic condition—diabetes, Alzheimer's, joint pain, cardiovascular problems, or others—it is important to reduce inflammation. Research presented in the first chapters of this book shows that inflammation is one of the major causes of dysfunction in chronic conditions and therefore, it should be addressed as well.

Treatment Approach

From our experience, the majority of the correction of chronic conditions could be achieved using professional-grade supplements and herbs. What most people do not know is that taking the right supplements and/or herbs can be incredibly powerful. To achieve real change, it is important to work with a healthcare provider who is highly trained and experienced in prescribing

the right supplements, the right dosage (not too low or high), and in the appropriate time. Building a treatment plan is a science and an art. Over the last 15 years, we have modified our protocols to make sure that correction is achieved in the best (and most comfortable) way.

"Many conventional drugs originate from plant sources: a century ago, most of the few effective drugs were plant-based. Examples include aspirin (from willow bark), digoxin (from foxglove), quinine (from cinchona bark), and morphine (from the opium poppy)."

Source: Vickers, A., Zollman, C., & Lee, R. (2001). Herbal medicine. The Western journal of medicine, 175(2), 125-8.

A Word of Caution

While this book provides medical information, as well as a large amount of information on medical evaluation and treatment, it is not intended to replace medical care. In some cases, medical care and medications are needed to stabilize a patient's condition while a medical care professional works on finding and treating the triggers of dysfunction. If you are in this place, do not be discouraged. Find a healthcare provider who is experienced in integrative medicine and has training in Functional Medicine, to guide you in your journey to health.

Congratulations!

In this guide, I shared with you how to reduce your inflammation and pain without drugs or medication!

Why will reducing inflammation help you reduce or get rid of pain? Well, in most cases, the process of inflammation causes pain, such as joint, back, or neck pain. In other words, without inflammation, there is no pain.

Many of my patients suffered from chronic pain for years, sometimes after an injury or surgery. Some of my patients did not know what started the pain. There was no injury that they could remember. All of them went to doctors and, unfortunately, were given more and more pills, drugs, or surgeries, without really testing and checking what was continuously triggering the inflammation and pain. This guide will expose these triggers. During my 15 years of clinical practice, I found that, as soon as the triggers were discovered and eliminated, the pain reduced and even disappeared!

If you or your loved ones are suffering from chronic pain, applying the steps in this book is the key to recovery and improving your health.* To learn more about Functional, nutritional, and herbal Medicine, visit the American Academy of Functional Health (AAFH) at www.TheAAFH.org

To become certified in Functional and/or Nutritional medicine, check out the certification programs offered by the AAFH or call (503) 750-4202 to learn how you can become a Functional or nutritional practitioner.

I wish you the best of health!

Tal Cohen, DAOM, MS-HNFM

*It is recommended to consult with a licensed health care provider before making any nutritional, lifestyle, or medical changes.

In this book, I will cover the ten triggers of inflammation and chronic disease that no one (including your doctors) has told you about. I will show you the research on these triggers, which labs are recommended, and the treatment protocols and supplements that were found to be beneficial, in order to get rid of your chronic conditions.

- Tal Cohen, DAOM, MS-HNFM

"A must read for anyone serious about addressing the underlying causes of disease, and exploring what Functional Medicine can offer. This is an excellent resource filled with case studies, research, and an abundance of useful recommendations."

- Jonathan Nadal, ND, MSAOM, LAc.
Naturopathic Physician and Acupuncturist

Tal Cohen, DAOM, MS-HNFM, is a speaker, author, and a teacher with over 16 years of clinical experience. He is the Program Director at the American Academy of Functional Health and he has gained years of experience through teaching and clinical training in several hospitals and private clinics. Tal's education includes a Doctorate in Acupuncture & Oriental Medicine from Oregon College of Oriental Medicine and a Master of Science in Human Nutrition and Functional Medicine from University of Western States. He specializes in integrative solutions for chronic pain and chronic diseases.

Tal Cohen is the author of several books about chronic pain, nutritional medicine, Functional Medicine, detoxification and environmental toxins, and stem cell therapy. He has presented these topics for several institutions and associations, such as Oregon Health and Science University, Linfield College of Nursing, National University of Natural Medicine, and Oregon College of Oriental Medicine.

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