

PART I

The Inflammation- Disease Connection

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CHAPTER 1

Meet the Inflammation Syndrome

The Inflammation Syndrome Helps Janet Make Sense of Her Health Problems

Janet was in her midforties and felt worn down and much older because of a growing list of health problems. She was overweight and prediabetic and had high blood pressure, allergies, inflammatory bowel disease, rosacea, gastric reflux, and morning aches and pains. Janet was taking seven different prescription drugs that had marginal, if any, benefits—but that did zap her energy levels.

Her life wasn't getting better, it was getting worse. And as she looked at her parents and older sisters, she could see her future: a debilitating combination of diseases that forced her parents into early retirement and that led to long-term disability for her sisters. Tough-minded and tenacious, Janet didn't want to follow in her family's footsteps.

As she searched for a solution, she found a nutritionally oriented physician who understood that eating habits had a strong bearing on health and disease risk. He ordered Janet to undergo blood tests for nutrient levels, food allergies, and high-sensitivity C-reactive protein (hsCRP), an indicator of chronic low-grade inflammation.

His diagnosis stunned Janet. Her vitamin C and D levels were low, she was sensitive to wheat and dairy products, and she had high blood

levels of hsCRP. Chronic inflammation was underlying most of Janet's health problems. "I was a disaster—and an even bigger disaster waiting to happen," she said.

The doctor explained how Janet's health problems were related to one another, and he outlined a new approach to eating that focused on high-quality proteins (such as fish and chicken) and high-fiber, non-starchy vegetables (for example, salad greens and steamed broccoli and cauliflower). He suggested that Janet avoid all packaged foods containing wheat and dairy products. On the doctor's advice, Janet began to take a number of supplements, including vitamins C and D, anti-inflammatory omega-3 fish oils, and an anti-inflammatory plant oil called gamma-linolenic acid.

By the end of the first week, Janet's energy levels were higher than they had been in years, and her general sense of well-being had increased considerably. By the end of Janet's second week on the anti-inflammatory diet and supplements, she had lost seven pounds and her gastric reflux had stopped. Even though it was springtime and the height of allergy season for Janet, her nasal symptoms were relatively mild. After one month, most of Janet's symptoms had either diminished or disappeared, and, working with her doctor, she was able to cease taking most of her medications. She also continued to lose weight.

"I'm a new person," she said. "I had forgotten what it was like to feel good and energized about life."

Even if you seem to be pretty healthy today, there's a good chance that inflammation is simmering in your body, quietly damaging your heart, your mind, and other tissues. Such inflammation may be stirred up by physical injuries, by frequent colds and flus, allergies, by eating the wrong types of fats and carbohydrates, and by having a "spare tire" around your middle. At a certain point, your inflammation will boil over into painful and debilitating symptoms.

Inflammation is a normal process that can go dreadfully wrong. It is supposed to protect us from infections and promote healing when we are injured.

Yet chronic inflammation does just the opposite: it breaks down our bodies and makes us more susceptible to disease. Inflammation forces millions of people with arthritis to alter their daily lives, and it compels millions of people with asthma to be cautious because they do not know when their next suffocating attack will occur. Millions of other people—

with multiple sclerosis, lupus, diabetes, and other disorders—also suffer from chronic inflammation.

The Inflammation Syndrome

Individual inflammatory disorders such as asthma or rheumatoid arthritis are bad enough. Far more insidious is the inflammation syndrome, the significance of which is only now being recognized in medical circles.

A syndrome is a group of symptoms that characterizes a particular disorder. For example, in my earlier book *Syndrome X: The Complete Nutritional Program to Prevent and Reverse Insulin Resistance*, Syndrome X was defined as a combination of abdominal fat, insulin resistance, hypertension, and elevated cholesterol—all of which significantly increase the risk of diabetes and coronary artery disease.

Similarly, the inflammation syndrome reflects the coexistence of at least two (and often more) inflammatory disorders that greatly increase the risk of developing more serious inflammatory diseases. What causes this ongoing buildup of inflammation? Although an inflammatory response may primarily affect specific tissues, such as the knees, it frequently radiates through the body and attacks other tissues. Over a number of years this systemic (bodywide) inflammation contributes to diseases that might appear unrelated but that do share a common thread of chronic inflammation.

Some examples of the inflammation syndrome are in order. Let's start with being overweight, a condition that affects two-thirds of Americans and growing numbers of people in most other developed countries.

Excess weight contributes to inflammation because fat cells secrete chemicals, such as interleukin-6 and C-reactive protein, that promote inflammation. Being overweight increases the risk of developing many other diseases, and part of the reason is related to the undercurrent of inflammation. If you are overweight, you have a greater risk of developing adult-onset (that is, type 2) diabetes, which also has a strong inflammatory component. Inflammation in diabetes is related to being overweight, to having elevated blood sugar and insulin levels, and to consuming too many refined carbohydrates (such as white bread and sugary breakfast cereals).

The inflammation syndrome does not stop here. Having diabetes also heightens your chances of suffering from periodontitis, a type of dental inflammation. Each of these disorders—overweight, diabetes, and periodontitis—is serious by itself. But as the inflammation in these

disorders simmers year after year, it also increases the risk of developing coronary artery disease, which medicine has recently recognized as an inflammatory disease of the blood vessels. In a nutshell, each inflammatory disorder has an additive effect, aggravating the body's overall level of inflammation and the risk of succumbing to very serious diseases.

Other examples of the inflammation syndrome abound. Allergies stir up the inflammatory response, which may give rise to rheumatoid arthritis, an autoimmune (self-allergic) disease. Infections also trigger an immune response, and chronic infections and inflammation account for an estimated 30 percent of cancers. Joint injuries frequently put an inflammatory response into motion, setting the stage for osteoarthritis. Serious head injuries and their resultant brain inflammation increase the long-term risk of developing Alzheimer's disease, which is also being viewed by doctors as an inflammatory process affecting brain cells.

This is serious and scary stuff, and the stakes for your health are very high. But the point of this book is to teach you that chronic inflammation and the inflammation syndrome can be prevented and reversed.



Connecting the Dots in the Inflammation Syndrome

Unless inflammatory problems are controlled or reversed, they tend to get worse, creating a cascade that leads to more serious inflammatory diseases, such as coronary heart disease and Alzheimer's. This list describes the greater risks associated with certain inflammatory disorders.

- Obesity boosts the risk of developing diabetes.
- Obesity and diabetes set the stage for coronary heart disease.
- Diabetes increases the likelihood of macular degeneration and cataracts.
- Joint injuries often lead to osteoarthritis.
- Brain injuries increase the chances of developing Alzheimer's disease.
- Periodontal disease heightens the risk of getting coronary heart disease.
- Allergies can aggravate the pulmonary system and may give rise to asthma.
- Allergies increase the odds of suffering from autoimmune disorders.

- Rheumatoid arthritis may bring about conditions that promote coronary heart disease.
- Chronic inflammation increases the risk of getting cancer.
- Gastritis may eventually result in gastric cancer.
- Inflammatory bowel disease increases the risk of developing osteoporosis.



What Is Chronic Inflammation?

Inflammation assumes many different forms, and everyone experiences it at one time or another. The most familiar type of inflammation is sudden and acute, such as when you burn yourself in the kitchen, overuse your muscles while moving furniture, or injure your tendons when playing sports. The injured area swells, turns red, and becomes tender to the touch.

Under normal circumstances inflammation helps you heal, and it can even save your life. For example, if you accidentally cut your finger with a knife, bacteria from the knife, the air, or the surface of your skin immediately penetrate the breach. Unchecked, these bacteria would quickly spread through your bloodstream and kill you.

Your body's immune system almost immediately recognizes these bacteria as foreign, however, and unleashes a coordinated attack to contain and stop the infection. Inflammation encourages tiny blood vessels in your finger to dilate, allowing a variety of white blood cells to leak out, track, and engulf bacteria. Some of these white blood cells also pick up and destroy cells damaged by the cut. In addition, inflammation signals the body to grow new cells to seal the cut. Within a day or two, your cut finger becomes less inflamed, and a few days later, it is completely healed.

Your body responds in similar fashion if you strain a muscle, for example, when you lift too heavy a box or overexert yourself during sports. The resulting inflammation, characterized by swelling, pain, and stiffness, is designed to remove damaged muscle cells and help initiate the healing process to replace those cells. Again, within a few days the inflammation decreases and you are well on the road to recovery.

Chronic inflammation, however, is very different. It does not go away, at least not quickly, and many people believe from their own experience

that it will never go away. It results in persistent swelling, stiffness, or pain. Furthermore, you have a greater susceptibility to inflammation as you age, but that, too, may be reversible.



The Inflammation Syndrome Quiz

Many people know that they regularly experience inflammation—the pain, stiffness, and swelling are obvious signs. Yet other people interpret stiffness and pain as vague signs of not being in good health, or they don't connect their use of certain drugs (such as ibuprofen and aspirin) to inflammatory diseases or the inflammation syndrome. This quiz is designed to help you make those connections. Circle Y (yes) or N (no) for each item or question.

Do you have any of the following health problems or issues?

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| AIDS or HIV infection | Y/N |
| Allergies (any type) | Y/N |
| Arthritis (any type) | Y/N |
| Asthma | Y/N |
| Blood sugar (elevated) | Y/N |
| Bronchitis | Y/N |
| Cancer | Y/N |
| Celiac disease or gluten intolerance | Y/N |
| Coronary artery (heart) disease | Y/N |
| Chronic obstructive pulmonary disease | Y/N |
| Chronic fatigue syndrome | Y/N |
| Dark circles or puffiness under the eyes | Y/N |
| Diabetes | Y/N |
| Diverticulitis | Y/N |
| Cholesterol (elevated) | Y/N |
| Fibromyalgia | Y/N |
| Food cravings (e.g., chocolate, carbs) | Y/N |
| Forgetfulness | Y/N |

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| Gingivitis or periodontitis | Y/N |
| Glucose intolerance | Y/N |
| Heartburn or gastric reflux | Y/N |
| Hepatitis | Y/N |
| Inflammatory bowel disease | Y/N |
| Irritability | Y/N |
| Eczema or psoriasis | Y/N |
| Lupus | Y/N |
| Metabolic syndrome (or Syndrome X) | Y/N |
| Multiple sclerosis | Y/N |
| Obesity | Y/N |
| Prediabetes | Y/N |
| Sinusitis | Y/N |
| Sleep apnea | Y/N |
| Stomach ulcers | Y/N |
| Ulcerated varicose veins | Y/N |

Interpretation: These health issues have either strong or subtle links to inflammation. If you have answered yes to more than one of these health issues, you may have signs of inflammation syndrome.

Do you have any of the following symptoms?

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| Do you bruise easily? | Y/N |
| Does your body feel stiff when you get out of bed in the morning? | Y/N |
| Do you have any stiff or aching joints, such as those in your fingers or knees? | Y/N |
| Do you have frequent backaches? | Y/N |
| Do you have frequent muscle aches? | Y/N |
| Do you experience premenstrual syndrome (PMS)? | Y/N |
| Are you overweight, and is some or all of this excess weight around your belly? | Y/N |
| Is your nose stuffy or runny a lot of the time or during certain seasons? | Y/N |
| Do you suffer injuries from falls or from bumping into objects? | Y/N |

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| Have you been hospitalized for surgery during the last twelve months? | Y/N |
| Do you get frequent colds or flus? | Y/N |
| Do you have any skin sores, cuts, or rashes that don't seem to heal? | Y/N |
| Do you tend to feel tired after you eat, particularly after lunch and dinner? | Y/N |
| When you were younger, did you experience a lot of athletic injuries? | Y/N |

Interpretation: Answering yes to any of these questions suggests that you are dealing with inflammation, although it may not always be obvious.

Do you take any of the following medications once or more each week?

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| Aspirin | Y/N |
| Ibuprofen (e.g., Advil, Motrin) | Y/N |
| Acetaminophen (e.g., Tylenol) | Y/N |
| Naproxen sodium (e.g., Aleve) | Y/N |
| Any other kind of over-the-counter drug to reduce pain | Y/N |
| Celebrex or any other kind of prescription drug to reduce pain | Y/N |
| Lipitor, Zocor, or another cholesterol-lowering drug | Y/N |
| Corticosteroid drugs (e.g., cortisone or prednisone) | Y/N |

Interpretation: Most of these drugs are used to reduce inflammation and pain. Frequent use indicates that you are trying to ease the inflammation symptoms but are not addressing the underlying causes.

Do you take any of the following dietary supplements (other than the amounts found in a multivitamin), or have you found that they reduce any of the symptoms you have indicated?

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| Omega-3 fish oils | Y/N |
| Gamma-linolenic acid | Y/N |
| Glucosamine or chondroitin | Y/N |
| Herbal products, including curcumin, devil's claw, green tea, mushrooms, Pycnogenol, grape-seed extract, quercetin, Saint-John's-wort, ginseng, ginkgo biloba, or any others | Y/N |

Interpretation: Many people take these supplements to reduce inflammation and pain. If you do, you may already be on the right track.

These questions are about your cooking and eating habits at home.

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| Do you, or does your spouse or domestic partner, cook mostly with corn, peanut, sunflower, safflower, or soybean oil (as opposed to olive oil)? | Y/N |
| Do you eat prepackaged microwave meals for breakfast, lunch, or dinner more than once a week? | Y/N |
| Of the foods you've eaten at home during the last week, would you estimate that half or more came from boxes, cans, bottles, or jars (as opposed to being fresh vegetables, chicken, fish, or meat)? | Y/N |
| When you eat at home, do you use bottled salad dressings? | Y/N |
| Do you eat pasta, bread, white rice, or pizza (one, some, or all three) daily? | Y/N |
| Do you eat potatoes (baked, mashed, French fries) once or more a week? | Y/N |
| Do you eat cookies, ice cream, cakes, doughnuts, brownies, candy, or pastries at least once a week? | Y/N |
| Do you use margarine instead of butter? | Y/N |
| Do you eat a lot of ground beef (e.g., burgers)? | Y/N |
| Do you dislike eating most vegetables? | Y/N |
| Do you dislike eating fish? | Y/N |
| Do you consume regular (sweetened) soft drinks or add sugar to your coffee or tea? | Y/N |
| Do you really enjoy eating tomatoes, potatoes, eggplant, or chile peppers? | Y/N |
| Do you eat pork more than once a week? | Y/N |

Interpretation: If you have answered yes to one or more of these questions, your dietary habits likely promote inflammation.

These questions are about your eating habits at restaurants.

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| Do you eat at fast-food restaurants (e.g., McDonald's, Burger King, KFC, Taco Bell, or others) once or more each week? | Y/N |
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| Do you consume soft drinks? | Y/N |
| Do you eat pasta or pizza in a restaurant at least once a week? | Y/N |
| Do you eat breaded and fried chicken, shrimp, or fish more than once a month? | Y/N |
| Do you like barbecue sauces on your food? | Y/N |
| Do you eat French fries? | Y/N |
| Do you eat at a Chinese restaurant more than once a week? | Y/N |

Interpretation: If you have answered yes to one or more of these questions, your dietary habits likely promote inflammation.



Recognizing Inflammatory Disorders

Physicians often speak in their own language, but it is actually very easy to identify most inflammatory diseases when you hear them referred to in conversation or read about them. Inflammatory diseases usually end with the suffix “-itis.” For example, gastritis means inflammation of the stomach, tendinitis refers to inflammation of the tendons, and gingivitis means inflammation of the gingiva (gums).

At one time, a physician’s diagnosis typically included both the symptoms and the apparent cause of a disease. Unfortunately, that has changed, and the diagnosis of an -itis disease (and most other diseases as well) is now often nothing more than a description of symptoms. Dermatitis, an inflammation of the skin, can have many causes, including allergies, infections, a toxic reaction to a chemical, or abrasion.

In the case of coronary artery disease, something inflames the blood vessel walls, triggering a cascade of events. That “something” might be a corrosive protein by-product called homocysteine, a low-grade infection, or oxidized cholesterol, all of which increase the risk of developing heart disease. (This relationship between inflammation and cardiovascular disease will be discussed in depth in later chapters.) In response, white blood cells migrate to artery walls, where they release free radicals, fuel inflammation, and exacerbate the damage. The most accurate predictor of whether you will have a heart attack is not your cholesterol, triglyceride, or blood sugar level. Rather, it is a high blood level of C-reactive protein, an indicator of your body’s overall inflammation.



Common Inflammatory Diseases and Disorders

Inflammation is a symptom of virtually every disease process, and it often makes the condition worse. These are some examples of common disorders that involve inflammation:

Arthritis

- Osteoarthritis
- Rheumatoid arthritis

Injuries

- Athletic: tendinitis, bursitis, muscle strains, and bruises
- Cuts, broken bones, bruises, surgery

Infections

- Colds, flus, otitis media, hepatitis C, HIV, parasites
- Vague low-grade infections, Epstein-Barr disease

Allergies/autoimmune problems

- Pollen and other inhalant allergies (rhinitis, nonallergic rhinitis)
- Food allergies
- Celiac disease (gluten intolerance)
- Lupus erythematosus

Pulmonary

- Asthma
- Chronic obstructive pulmonary disease
- Bronchitis

Cardiovascular

- Coronary artery disease, myocarditis, hypertension
- Stroke
- Phlebitis, varicose veins

Cancer

- Various types, including gastric, lung, breast, and prostate

Neurological

- Alzheimer's disease

Skin

- Sunburn (erythema)
- Eczema and dermatitis
- Psoriasis

Dental

- Gingivitis
- Periodontitis

Eye

Conjunctivitis

Uveitis

Digestive tract

Gastritis, ulcers

Crohn's disease

Ulcerative colitis

Inflammatory bowel disease

Diverticulitis

Miscellaneous

Sinusitis

Multiple sclerosis

Obesity

Diabetes

**The Prevalence of Inflammation**

One way to look at the prevalence of inflammatory diseases is to track the sales (and, by implication, the use) of anti-inflammatory drugs such as aspirin, ibuprofen, naproxen sodium, and Cox-2 inhibitors. Each year more than 30 billion tablets of nonsteroidal anti-inflammatory drugs (NSAIDs) are sold over the counter in the United States—more than one hundred for every man, woman, and child. In addition, doctors write 70 million prescriptions for even stronger NSAIDs. Although some NSAIDs are often used to treat headaches (which may be caused by inflammation), these numbers reflect an enormous dependency on anti-inflammatory drugs.

Indeed, one piece of evidence that coronary artery disease and Alzheimer's disease are inflammatory diseases is the fact that both may be prevented with certain anti-inflammatory drugs. Aspirin reduces the risk of suffering a heart attack, and ibuprofen (the active ingredient in Advil) appears to reduce the risk of developing Alzheimer's disease. Unfortunately, serious and sometimes life-threatening side effects are common from both drugs, which make them undesirable approaches to prevention or treatment.

None of these drugs treats the underlying causes of inflammation. At best, they provide short-term relief. Worse, some NSAIDs hasten the breakdown of joint cartilage, aggravating the damage and speeding the progression of osteoarthritis. You will learn more about the dangers of anti-inflammatory drugs in chapter 5.