



# Inflammation overload

**Thomas Lodi, M.D. explains the role of inflammation in the body's repair mechanisms, what happens when inflammation becomes chronic, and why a raw vegan diet is the best prevention.**

**T**he synchronized flow and precise orchestration of the approximately 150,000 biochemical reactions occurring in our bodies each moment resonate as a functional whole permitting the human experience.

Optimal biochemical and physiological functioning is the imperative that Nature has established for each organism in order for it to fulfill its role in the larger drama of geochemical and biochemical cycles as they perpetuate their intimate exchange of energy, in association with the sun.

From the primitive, fermenting, single-celled organisms to the incomprehensible complexity of mammals, much of what is occurring at the cellular level is repair and regeneration from disturbances in the dynamic balance (homeostasis) as energy and materials are exchanged. This renewal process is relatively simple in single-celled creatures but becomes progressively more complex in multi-cellular creatures.

Ultimately, the highly intricate and bewildering cascade of events called "inflammation" can be found in all creatures with circulatory systems (blood/lymph). Single-celled organisms and small multi-cellular organisms either survive or perish rather quickly while those with circulatory systems undergo an extremely elaborate defence, cleansing and repair process.

The blood and lymph vessels, white blood cells, platelets and fibroblasts all produce a vast array of biochemicals which orchestrate the inflammatory response, the purpose of which is to restore balance by removing toxins and dead cells while simultaneously stimulating the production of

new cells and vessel growth. Inflammation, therefore, is the primary process which corrects imbalances as they occur. This is the process known as "healing".

When this vital cascade of events is thwarted, both cellular wastes and exogenous wastes accumulate and new cells fail to be produced, leading ultimately to cellular dysfunction, organ dysfunction and death.

Inflammation is initiated or stimulated by three distinct pathways:

- 1 Micro-organisms such as bacteria, fungi or viruses**
- 2 Trauma, whether slight or life-threatening**
- 3 Toxic ingestion or accumulation**

Inflammation can be thought of as consisting of three parts. Although this division is artificial, it does allow for a mechanical description of events.

- Defence, which involves neutralizing all threats to the organism, whether chemical or biological, through an influx of leukocytes (white blood cells), which "eat," as well as produce chemicals to dissolve and recycle, aberrant tissue.
- Removal of all debris (toxins, dead cells).
- The production of new cells to maintain the functioning of the whole organism.

Cells necessary for tissue regeneration continue proliferating as a consequence of growth factors and other chemicals being produced locally, resulting in granulation tissue (new cells and blood vessels). This is termed the "proliferation stage" of wound healing and is necessary for the resolution of the repair process.

As an additional requirement for tissue proliferation, the normal processes which prevent excessive or unnecessary growth must be suspended. All cells are programmed to have their components recycled at certain intervals. This is called apoptosis (programmed cellular death), and it must be interrupted or slowed down in order for wound healing to succeed.

When stimulation of one or more of these pathways persists, the inflammatory process turns chronic. Unchecked, this proceeds to a condition known as neoplasia, or cancer – "the wound that never heals".

In 1863, Rudolph Virchow MD, PhD, discovered that leukocytes are present in cancerous tissue, thus establishing the association between inflammation and cancer. Since that time, chronic inflammation has been identified, repeatedly, as a risk factor for cancer development and even as a means to diagnose cancer as well as develop a prognosis (prediction of outcome).

The relationship between cancer and inflammation is not limited to the development of the condition. It has been well established that chronic, systemic inflammation is also a consequence, resulting from the micro-environment surrounding the tumour and, in fact, it is

this chronic inflammatory state that serves to provide a protective shield for the tumour from the immune system.

This micro-environment surrounding the tumour quite clearly resembles the inflammatory state, with its abundance of cytokines, chemokines, leukocytes, lymphocytes and macrophages – all of which contribute to new vessel growth, increased blood flow, immune suppression (associated with the malignant disease) and metastasis. Furthermore, the inflammatory condition of cancer reduces the effectiveness of many of the modalities employed to treat cancer, including chemotherapy. If this inflammatory state is not quenched, the tumour remains protected.

Of note, it is the chaotic blood flow in tumours which results in a vacillation between hypoxia (oxygen deprivation from decreased blood flow) and reperfusion (return of blood flow). Reperfusion, in turn, generates a super-abundance of reactive oxygen species (ROS). These free radicals not only destroy cells and tissues, but damage DNA, thus stimulating an increase in mutations. Hence, the hypoxia and oxidative stress of the tumour micro-environment further induce inflammatory consequences resulting in a proliferating snowball of pathology.

What is quite evident from an understanding of the biochemistry of cancer is that the reduction of inflammation is not only the cornerstone of healing cancer, but that without it there can only be failure.

Allergies, autoimmune conditions, heart attacks, strokes, arthritis, “infections”, IBS (irritable bowel syndrome), inflammatory bowel conditions and almost every other category of “disease” are examples of the other directions that inflammation can take. The word “almost” was used to distinguish those conditions that result from genetic mutations, like cystic fibrosis and Down’s syndrome, from conditions that are the result of living out of harmony with nature.

In spite of the genetic defects, those conditions referred to are manifest through inflammatory states and are, therefore, ameliorated by the same “return to healing” that corrects all the other conditions which have resulted from a divergence from healthful living.

One’s total body state of inflammation is easily measured with the use of two simple blood tests, CRP and AA/EPA. In fact, C-reactive protein (CRP) is considered to be more predictive of a heart attack than any other test known.

The biochemistry of inflammation is both initiated and mediated by a family of chemicals called prostaglandins. There are two groups of prostaglandins: one that

produces an *inflammatory* cascade, and the other that produces an *anti-inflammatory* cascade.

Arachidonic acid (AA – an essential fatty acid) initiates the inflammatory prostaglandin cascade, which is required for several absolutely vital functions. In fact, animals that are unable to convert linoleic acid (omega-6) into arachidonic acid are obligated to eat the flesh of animals that are capable of that vital conversion. In case you might be wondering, humans *can* easily make this conversion and are, therefore, not required to consume flesh.

Eicosapentaenoic acid (EPA – another essential fatty acid) acts on AA to initiate the anti-inflammatory cascade and it is the balance of these two pathways, *inflammatory and anti-inflammatory*, that results in health or disease. EPA is converted

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from alpha-linolenic acid (omega-3) obtained from such dietary sources as flax and hemp seeds. It is also available directly, i.e. not requiring metabolic transformation, from such dietary sources as human breast milk, micro-algae and spirulina.

Fish, by the way, must consume algae since they are not capable of producing EPA. In other words, we do not need fish to serve a “middleman” function. We can both produce EPA directly by conversion from omega-3 oils and ingest algae containing EPA.

When the AA/EPA ratio in the diet is 1:1, there is perfect balance between these two pathways, which preserves the integrity and optimal functioning of the organism. Although a ratio of up to around 5 will allow for (relatively speaking) very good health, most people range from 7 to 20 in favour of AA, although it is not uncommon for us to find significantly higher ratios,

especially in people with cancer.

Unfortunately, the “solution” offered by medical doctors is often to prescribe pharmaceutical agents to block key enzymes in these pathways in order to subvert nature. This is offered instead of recommending that their patients restore the balance of their biochemistry and physiology naturally – which, by the way, is the only way that balance can be restored!

Blocking one enzyme, as pharmaceuticals do, initiates in the body homeostatic mechanisms designed to restore that enzyme’s function and rid the body of the drug. Eating and living according to nature produces a biochemistry which is balanced, easily capable of excreting metabolic wastes, and which utilizes the acute inflammatory process at appropriate intervals for short duration to maintain optimal functioning.

Luigi Fontana, MD, PhD, a research clinician, has published several studies evaluating the role of diet and inflammation. The most relevant findings are as follows:

Uncooked, plant-derived food results in a uniformly low CRP (a measure of total body inflammation) in all age groups. In other words, a diet of uncooked, unprocessed, organic plants and their products produces an overall un-inflamed metabolism, which precludes the development of “disease”.

Calorie restriction has been found to lower both CRP and TNF-alpha – inflammatory cytokines responsible for disease and aging. Studies at several centres around the world have been conducted on a variety of creatures from insects to mammals, and corroborate this finding in humans.

What we are left with after reviewing the literature and diving deep into our collective psyches, is that when we eat according to our nature, we are blessed with a life of uninterrupted health, leading to a vigorous and lasting old age.



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