

Research Article

Pathogenesis Due to Inflammation

P D Gupta*

Former Director Grade Scientist, Centre for Cellular and Molecular Biology, India

*Corresponding author

P D Gupta, Former Director Grade Scientist, Centre for Cellular and Molecular Biology, Hyderabad, India. Tel: 09460892478; Email: pdg2000@hotmail.com

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Abstract

Since inflammation is a protective response normally should not be translated; indeed it is essential for maintaining health and for fighting disease. Acute inflammation was previously recognized as a passive process; a natural decay of pro-inflammatory signals, however, in general many types of chronic inflammations resulted in various diseases depending on the organ is inflamed. The damaged cells due to inflammation release chemicals such as, histamine, bradykinin, and prostaglandins. These chemicals cause blood vessels to leak fluid into the tissues, causing all the three subphases, namely, acute, subacute, and chronic (or proliferative). Shifts in the inflammatory response from short- to long-lived can cause a breakdown of immune tolerance and lead to major alterations in all tissues and organs, as well as normal cellular physiology, which can increase the risk for various non-communicable diseases in both young and older individuals. When living with chronic inflammation, animal body's inflammatory response can eventually start damaging healthy cells, tissues, and organs. Over time, this can lead to DNA damage, tissue death, and internal scarring. Indeed, chronic inflammatory diseases are the most significant cause of death in the world today, with more than 50 percent of all deaths being attributable to inflammation-related diseases

INTRODUCTION

Inflammation is an organic process which ultimately converted in to a pathological event. Inflammation results from activation of the immune system in response to a broad range of different stimuli (1). The immune system is a highly complex and evolutionary optimized defense system with cellular and humoral components. Both cell-mediated and humoral responses of the immune system are central to inflammation (2). Inflammation is frequently a key element which results in dysregulation of one or more of biochemical pathways responsible for pathological progression of inflammation-associated disease (3).

These factors may induce acute and/or chronic inflammatory responses in the heart, pancreas, liver, kidney, lung, brain, intestinal tract and reproductive system, potentially leading to tissue damage or disease. The biological response of the immune system that can be triggered by a variety of factors, including pathogens, damaged cells and toxic compounds infectious and non-infectious agents and cell damage activate inflammatory cells and trigger inflammatory signalling pathways (4).

Inflammation

Inflammation is a protective response towards any microbial, mechanical or chemical injuries to the body is essential for maintaining health and for fighting disease for an individual (Figure 1). Termination of acute inflammation was previously recognized as a passive process; a natural decay of pro-inflammatory signals (5). The events leading to inflammation are characterized by leukocytes adhesion to the endothelium, diapedesis and migration, cells activation and tissue remodelling.

The biochemical mediators of inflammation include cytokines,

neuropeptides, growth factors and neurotransmitters (6-7). Irrespective of the type of pain whether it is acute or chronic pain, peripheral or central pain, nociceptive or neuropathic pain, the underlying origin is inflammation and the inflammatory response. The chemokines, cytokines and pro-inflammatory mediators act in a co-ordinated fashion to drive the initiation of the inflammatory reaction.

Inflammatory response

The inflammatory response occurs when tissues are injured by bacteria, trauma, toxins, heat, or any other cause. The damaged cells release chemicals including histamine, bradykinin, and prostaglandins (8).

These chemicals cause blood vessels to leak fluid into the tissues, causing swelling. Based on visual observation, the ancients characterised inflammation by five cardinal signs, namely redness (rubor), swelling (tumour), heat (calor; only applicable to the body' extremities), pain (dolor) and loss of function (functio laesa) (9)

There are 5 steps of inflammation (Figure 2)

Types of Inflammation: There are two types of inflammation: acute and chronic (10).

Acute inflammation: This is a type of short-term inflammation that the body produces to address injuries, illnesses, and infections. When there is an injury or contract a virus, the white blood cells begin to flood the area to provide protection and healing. Symptoms of acute inflammation include redness, warmth, and swelling (Figure 3). Depending on the severity of the infliction, the inflammatory response will slowly fade away over hours or days.

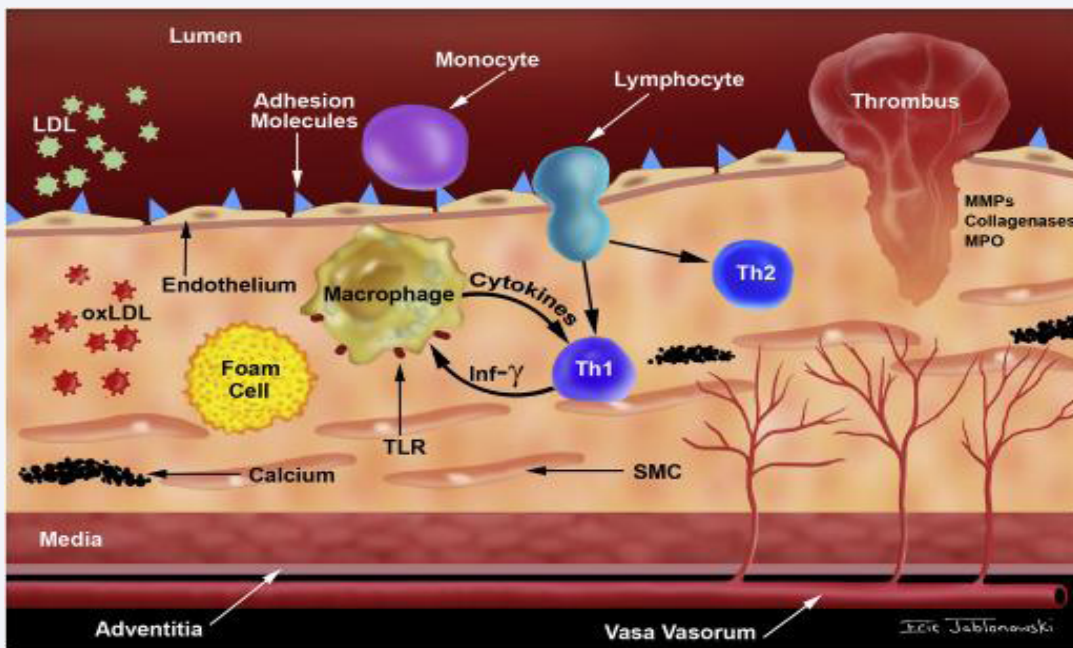


Figure 1 Molecular mechanisms and pathway of Inflammation.

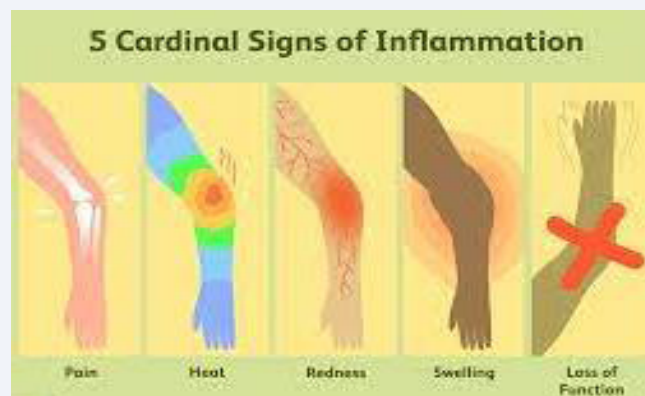


Figure 2 Phases of inflammation and their end result.

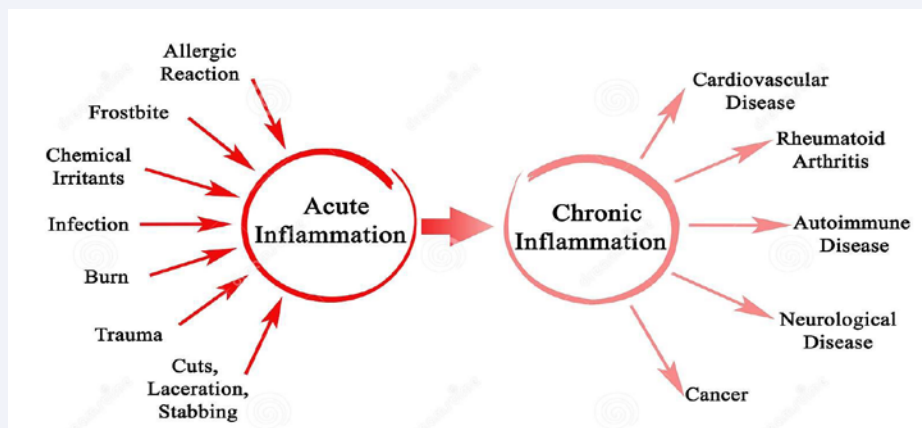


Figure 3 Graphic representation of inputs for Acute inflammation and then acute inflammation becomes chronic inflammation wgat sort of diseases can develop. Image Source: Inside Out Health And Wellness.

Chronic inflammation. The body's response is the same as with acute inflammation, although there isn't always an injury that needs healing. Instead, the body wrongly signals that there is an issue of some kind, leading to inflammation that is persistent. Chronic inflammation has a more heterogeneous histological appearance than acute inflammation. In general, chronic inflammation is characterized by the presence of macrophages, monocytes, and lymphocytes, with the proliferation of blood vessels and connective tissue (11).

Chronic inflammation is typically less painful than acute inflammation and lasts for a longer amount of time. Chronic inflammation is characterised by the following symptoms that include:

- Tired Appearance
- Unexplained muscle aches and joint pain
- Stomach issues including constipation or diarrhea
- Gaining weight
- Skin rashes

Pathogenesis

Chronic inflammation is the root cause of so many diseases. The origin of all pain is due to inflammation and the inflammatory response. Pathogens (bacteria, viruses or fungi), external injuries (scrapes or damage through foreign objects), effects of chemicals or radiation, etc. are the causative factors of inflammation the initial inflammation phase consists of three subphases: acute, subacute, and chronic (or proliferative). The special cells that take part in inflammation are called inflammatory cells and they are part of the body's immune system. The acute phase typically lasts 1–3 days and is characterized by the five classic clinical signs: heat, redness, swelling, pain, and loss of function. Inflammation results from activation of the immune system in response to a broad range of different stimuli. Shifts in the inflammatory response from short- to long-lived can cause a breakdown of immune tolerance and lead to major alterations in all tissues and organs, as well as normal cellular physiology, which can increase the risk for various non-communicable diseases in both young and older individuals. When living with chronic inflammation, animal body's inflammatory response can eventually start damaging healthy cells, tissues, and organs. Over time, this can lead to DNA damage, tissue death, and internal scarring. Indeed, chronic inflammatory diseases are the most significant cause of death in the world today, with more than 50 percent of all deaths being attributable to inflammation-related diseases (12-14)

Treatment of Inflammation

A better understanding of inflammatory response pathways and molecular mechanisms will undoubtedly contribute to improved prevention and treatment of inflammatory diseases (15).

- Inflammation is common usually considered a symptom of a greater animal health condition. It is important to identify chronic inflammation early on to prevent long-term damage to the body.
- In domesticated and pet animals doctor will have to suspect inflammation by himself. .

Medications for an inflammatory disease may include:

Corticosteroids. This is a type of drug that releases an anti-inflammatory hormone that works to offset tissue inflammation. It is usually prescribed in lung infections.

Immuno -suppressants. This is a type of drug that works to decrease immune system's response to perceived threats.

Biologics. It is sort of new introduction. This type of drug is made from living organisms that are engineered to target the cells in the body that control inflammatory response.

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