# ANTI-INFLAMMATORY THERAPEUTICS

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## 1 INTRODUCTION

### 1.1 Definitions of Inflammation

Inflammation is the physiological response of the body to injury. In this sense, it serves as a defense mechanism. It is a process typical of vascular tissues, whereby fluid and leukocytes accumulate at the site of injury. The process normally leads to recovery from injury and to healing. However, if targeted destruction and assisted repair are not properly phased, inflammation can lead to persistent tissue damage [1].

*To inflame* means to "set fire." The word comes from *enflamme* in Middle English, *enflamm* in French, and *enflammare* in Latin [2]. In AD 30, Aulus Cornelius Celsus, in his work *De re medica*, recognized what is now known as the four cardinal signs of inflammation: "*rubor et tumor cum calore et dolor*" ("redness and swelling with heat and pain"). Later, a fifth sign, "*functio laesa*" ("disturbed function") was added by Rudolf Virchow, in his *Cellular Pathology* published in 1858. If an organ is inflamed, it does not function as it should. However, beneficial attributes of inflammation were also recognized by the Scottish surgeon-scientist John Hunter. In his 1793 work *Blood, Inflammation, and Gunshot Wounds*, he noted that inflammation is not a disease but rather a "salutary reaction" [3].

For inflammatory diseases, there are clinical needs for anti-inflammatories and analgesics. Simple definitions for these drugs are available. Analgesics are drugs that relieve pain. Anti-inflammatories are drugs used to reduce inflammation—the redness, heat, swelling, and increased blood flow found in infections and in many chronic noninfective diseases such as rheumatoid arthritis and gout.

### 1.2 Importance of Inflammation and Inflammatory Diseases

Inflammation is indispensable to the survival of organisms. Patients with genetic deficiencies in components of the inflammatory process, such as leukocyte adhesion deficiency, have an increased risk of life-threatening infections.

Inflammation serves to rid the body of the source of injury and repair the injured site. However, in situations where such resolution is not possible, for example, during persistent infections, inflammation lingers on and becomes chronic. Whereas acute inflammation only lasts for days, chronic inflammation can last for months and years. Chronic inflammation may be viewed as "frustrated repair." Complete removal of the irritant is essential for repair to progress to completion. Therefore, chronic inflammation is an immune response initiated by an irritant, the persistent antigen [2].

Chronic inflammation contributes to diseases. The connection is more clearly demonstrated in certain diseases. Chronic inflammation has been implicated in arthritis, atherosclerosis, and cancer. In the case for cancer, cellular products of chronic inflammation induce deoxyribonucleic acid (DNA) modifications

*Pharmaceutical Sciences Encyclopedia: Drug Discovery, Development, and Manufacturing*
Edited by Shayne C. Gad