It has been absolute honor to serve as a guest editor for this special issue of Current Pharmaceutical Design. Inflammation is the common pathological basis for age-related diseases such as cancer, neurodegenerative diseases, cardiovascular diseases, and diabetes. Life expectancy is estimated to dramatically increase in the upcoming decades, and despite it should be a great accomplishment for our societies, the increase of longevity is a significant challenge for the global economy because this increase leads to an enhance in the incidence of age-related diseases. There is great interest by pharmaceutical/biotechnology industries to focus on drug development strategies for inflammatory-related pathologies. Nowadays, anti-inflammatory therapeutics market is the major part of global pharmaceutical industries and is expected to grow. The pharmaceutical industries are benefiting of academic inflammation research, and are adopting novel approaches in drug designing as key strategies to gain additional market share. In fact, according with Allied Market Research report, the global anti-inflammatory market is expected to garner $106.1 billion by 2020. However, still the challenge is to design new anti-inflammatory drug with lesser side effects.

This special issue will cover several inflammatory research areas. For example, a growing number of researchers have discovered various signaling pathways that are associated with the initiation and progression of inflammation. An excellent manuscript by Yeung and Colleagues [1] focus on classical inflammatory pathways: p38 MAPK, IL-6/JAK/STAT3 and PI3K; and a non-classical inflammatory pathway, the Hippo. The molecular mechanisms, associated pathways, selected drugs of these signaling pathways and limitations and potential risks of anti-inflammatory drugs will be summarized. The central nervous system may be the target of several chronic inflammatory-related pathologies where the inflammatory component acts either as a primary cause of the disease or as a secondary outcome of the tissue damage. An outstanding manuscript by Degan and colleagues [2] summarize current data on Alzheimer’s disease, Parkinson’s disease, Huntington’s disease, Amyotrophic Lateral Sclerosis, stroke and traumatic brain diseases and discuss the potential anti-inflammatory therapeutic approaches acting at different levels and stages of the diseases.

Alcohol consumption causes comprehensive liver disorders, designated as Alcoholic Liver Disease (ALD). In an interesting manuscript Lu and Cederbaum [3] summarize the consequences of liver damage, the relationship of CYP2E1/CYP2A5 and ALD development, the mechanisms involved and recent advances, some unpublished data of cytochrome P450 enzymes dysregulation in inflammatory disease states. Mucositis or inflammation of the mucosa that occurs throughout the alimentary tract from the mouth to anus, is a side effect associated with the use of chemotherapy. Mahendran and colleagues [4] in an excellent review focus the pathobiology of chemotherapy-induced oral and gastrointestinal mucositis and recent research examining the role of agents with anti-inflammatory activity in treatment and prevention of the condition. The skin is the largest organ in the human body which function is to protect the body from external hazards. Skin inflammation leads to skin aging that can eventually promote cellular damage and the development of cancer. An interesting manuscript by Kim and Lee [5] summarize some proteins and signaling pathways involving in skin inflammation, which can be modulated by phytochemicals with the purpose to attenuate skin inflammation.

Considerable progress has been made in the understanding of inflammatory mechanisms which may open new avenues for preparation of novel anti-inflammatory drugs. Medicinal plants are promising sources for preparation of such novel drugs. Taking into consideration the anti-inflammatory activities of a large group of medicinal plants, Kazemi and colleagues [6] remarkably describe recent advances in progress in understanding the molecular basis of inflammation, and presents the most important medicinal plants with anti-inflammatory activity. Melatonin is an indolamine synthesized and secreted by the pineal gland and other extrapineal sources including immune system cells, brain, skin and the gastrointestinal tract. Carrascal and colleagues [7] present very timely manuscript evaluating the use of melatonin in the control of inflammation underlying the Alzheimer, Amiotrophic lateral, Multiple Sclerosis, Huntington’s disease and ulcerative colitis. The authors propose that these actions of melatonin are mediated through their receptors but also with their direct antioxidant action and melatonin’s ability to break the vicious cycle of ROS-inflammation.

The use of nanomedicine, nanoscale structures for drug delivery, exhibits a really high therapeutic potential in the field of neuroinflammation therapy. In an excellent manuscript Cayero-Otero and colleagues [8] analyzes a wide variety of compounds as possible candidates to cross the Blood-Brain Barrier (BBB) and reach the brain in sufficient concentration to be able to exert its effect. The authors also describe PLGA nanoparticles as one of the most versatile drug delivery nanosystems, and other strategies, as direct intranasal administration (nose-to-brain), novel viral vectors and novel implanted catheters. Computational biology approaches could be useful to design novel drugs for inflammation treatment. Virtual screening involves applying computational methods to discover new ligands for biological structures from the formation of large libraries composed of a large number of compounds. In an interesting manuscript Scotti and colleagues [9] illustrate different studies employing a variety of virtual screening approaches to find molecules that have actions on important, diverse targets implicated in inflammatory diseases.

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