Interleukin-1 beta

- Analysis of the Expression Patterns of Tumor Necrosis Factor Alpha Signaling Pathways and Regulatory MicroRNAs in Astrocytic Tumors
- Pharmacological evaluation of non-nucleotide purine derivatives as P2X7 antagonists for the treatment of neuroinflammation in traumatic brain injury
- HMGB1 mediates inflammation response of epileptogenicity in tuberous sclerosis complex-related epilepsy
- Network Analysis of Multidimensional Symptoms and Inflammatory Biomarkers in Chinese Patients with Glioma
- Neuroprotective Effect of PBCA Nanoparticles Delivering pEGFP-BDNF in a Mouse Model of Intracerebral Hemorrhage
- Endolysosomal processing of neuron-derived signaling lipids regulates autophagy and lipid droplet degradation in astrocytes
- CEBPD is a pivotal factor for the activation of NLRP3 inflammasome in traumatic brain injury
- In Vitro Validation of Pulsed Electromagnetic Field (PEMF) as an Effective Countermeasure Against Inflammatory-Mediated Intervertebral Disc Degeneration

Interleukin-1 beta (IL-1β) is a cytokine, which is a type of signaling molecule that plays a crucial role in the immune system's inflammatory response. It is produced primarily by activated macrophages and other immune cells in response to infection, injury, or other stimuli.

IL-1β is a key mediator of inflammation and has diverse effects on various cells and tissues throughout the body. Some of its functions include:

Proinflammatory Response: IL-1β stimulates the expression of other proinflammatory cytokines and chemokines, contributing to the recruitment and activation of immune cells to the site of infection or injury.

Fever Induction: IL-1β can act on the hypothalamus in the brain, leading to the production of prostaglandins that raise body temperature, resulting in fever. This fever response helps the body combat infections by creating an environment less conducive to the growth of pathogens.

Activation of Endothelial Cells: IL-1β promotes the expression of adhesion molecules on endothelial cells lining blood vessels, facilitating the recruitment of immune cells from the bloodstream to sites of inflammation.

Stimulation of T Cell Activation: IL-1β plays a role in activating T lymphocytes, a type of white blood cell involved in adaptive immune responses. It enhances T cell proliferation and cytokine production, contributing to the amplification of the immune response.

Tissue Remodeling and Repair: In addition to its proinflammatory effects, IL-1β also contributes to tissue repair and remodeling processes by stimulating the production of matrix metalloproteinases (MMPs) and other factors involved in tissue remodeling and wound healing.

While IL-1β plays a critical role in host defense against pathogens and tissue repair, dysregulated or excessive production of IL-1β can contribute to chronic inflammatory conditions, autoimmune diseases, and other inflammatory disorders. Therapeutic interventions targeting IL-1β signaling pathways have been developed for the treatment of certain inflammatory conditions, such as rheumatoid arthritis, inflammatory bowel disease, and autoinflammatory syndromes.

Interleukin 1 beta (IL1β) also known as '“leukocytic pyrogen”', “'leukocytic endogenous mediator'”, “'mononuclear cell factor'”, “'lymphocyte activating factor'” and other names, is a cytokine protein that in humans is encoded by the IL1B gene.

There are two genes for Interleukin 1 (IL-1): IL-1 alpha and IL-1 beta (this gene). IL-1β precursor is cleaved by cytosolic caspase 1 (interleukin 1 beta convertase) to form mature IL-1β.

The fever-producing property of human leukocytic pyrogen (Interleukin 1) was purified by Dinarello in 1977 (PNAS) with a specific activity of 10-20 nanograms/kg. In 1979, Dinarello reported that purified human leukocytic pyrogen was the same molecule that was described by Igal Gery in 1972.

He named it lymphocyte-activating factor (LAF) because it was a lymphocyte mitogen. It was not until 1984 that interleukin 1 was discovered to consist of two distinct proteins, now called interleukin-1 alpha and interleukin-1 beta.

IL-1β is a member of the interleukin 1 family of cytokines. This cytokine is produced by activated macrophages as a proprotein, which is proteolytically processed to its active form by caspase 1 (CASP1/ICE). This cytokine is an important mediator of the inflammatory response, and is involved in a variety of cellular activities, including cell proliferation, differentiation, and apoptosis. The induction of cyclooxygenase-2 (PTGS2/COX2) by this cytokine in the central nervous system (CNS) is found to contribute to inflammatory pain hypersensitivity. This gene and eight other interleukin 1 family genes form a cytokine gene cluster on chromosome 2.

The molecular weight of the proteolytically processed IL1B is 17.5 kDa. IL1B has the following amino acid sequence:

APVRSLNCTL RDSQQKSLVM SGPYELKALH LQGQDMEQQV VFSMSFVQGE ESNDKIPVAL GLKEKNLYLS CVLKDDKPTL QLESVDPKNY PKKKMEKRFV FNKIEINNKL EFESAQFPNW YISTSQAENM PVFLGGTKGG QDITDFTMQF VSS The physiological activity determined from the dose dependent proliferation of murine D10S cells is 2.5 x 108 to 7.1 x 108 units/mg.

Increased production of IL-1B causes a number of different autoinflammatory syndromes, most notably the monogenic conditions referred to as CAPS, due to mutations in the inflammasome receptor NLRP3 which triggers processing of IL-1B.

Intestinal Dysbiosis has been observed to induce Osteomyelitis through a IL-1β dependent manner.

Canakinumab is a human monoclonal antibody targeted at IL-1B, and approved in many countries for treatment of cryopyrin-associated periodic syndromes.