

Inflammation mediators, alarmins

Inflammation mediators are substances that regulate the course of an inflammatory reaction.

We rank among them:

- alarmins (DAMPs and PAMPs),
- vasoactive amines (histamine, serotonin),
- eicosanoids (prostaglandins, prostacyclin, thromboxanes, leukotrienes),
- cytokines,
- reactive oxygen and nitrogen species,
- complement,
- coagulation,
- fibrinolytic system,
- kinin system.

Alarmins

Substances that are released first in an inflammatory reaction (signal 0). Their function is primarily to **modulate the immune response**. They are followed by cytokines and then acute phase reactants.

They are more significant for earlier laboratory diagnosis of incipient inflammation than acute phase reactants.

DAMPs (*damage associated molecular patterns*)

Molecules that are **released from damaged cells**, for example, during necrosis or other cell death (in addition to apoptosis - phagocytosis of apoptotic bodies). They are involved in inflammatory reactions even when the microbe is no longer present.

These include **ATP, DNA, RNA** (they do not usually occur extracellularly), **S100 proteins, HMGB1** (an intracellular protein capable of remodeling chromatin, it is usually produced by necrotic cells, macrophages, NK cells and dendritic cells), **adenosine, uric acid**.

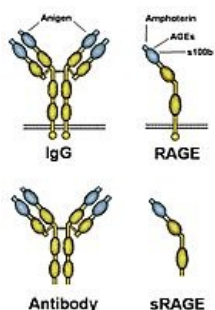
PAMPs (*pathogen associated molecular patterns*)

Substances that are specific to microbes – **dsRNA** a **bacterial DNA**, **lipopolysaccharide**, **lipoteichoic acid**, **peptidoglycan**.

Receptory pro alarminy – PRRs (*pattern recognition receptors*)

Very important receptors for the proper functioning of the immune system. They regulate the **immune response**, **cell death** or **cell differentiation**. These are proteins expressed on the surface of cells of the immune system (neutrophils, monocytes, macrophages, dendritic cells, epithelial cells). They recognize molecules of DAMPs and PAMPs.

Toll-like receptors (TLR)



An extracellular receptor that is able to recognize foreign (potentially dangerous) structures.

They occur mainly on the surface of immune system cells and superficial epithelium. It belongs to the first line of defense against pathogens. Its stimulation produces **cytokines** and **chemokines** (activation of a specific immune response).

RAGE (*receptor for advanced glycation end products*)

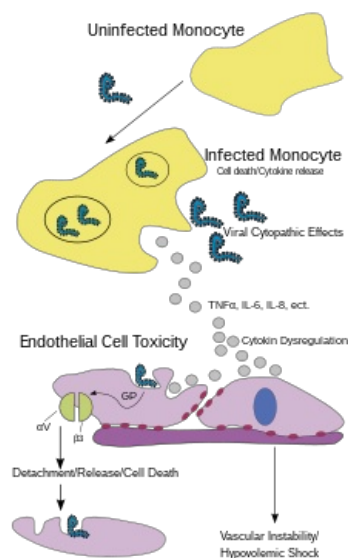
Receptor for advanced glycation end products. It is a multiligand extracellular receptor that is able to bind multiple alarmins. It is involved in a number of pathological conditions - inflammation, Alzheimer's disease, diabetic complications, complications of renal failure and damage to the vascular wall.

Physiologically, it participates in the development of muscles and bones in embryogenesis.

Nod-like receptors (NLRs)

Intracellular cytoplasmic proteins. Upon activation by phagocytosed bacterial peptidoglycans and cellular stress, they initiate an immune response.

Cytokines



It serves to regulate the immune response. They are produced mainly by activated

macrophages and T-helpers after stimulation with immunocomplexes or microbial products. They are also important for the communication of cells of the immune system.

The main functions of cytokines include:

- fever stimulation,
- effect on the synthesis of acute phase reactants (in the liver),
- complement activation, opsonization,
- stimulation of myelopoiesis and release of leukocytes from the bone marrow,
- increase of *heat shock protein* synthesis (chaperones) - influencing the configuration of newly synthesized proteins.

Cytokines in the inflammatory response include **IL-1**, **IL-6**, **TNF- α** and others.

Links

Related articles

- Záněť
- Akutní záněť
- Chronický záněť
- Reaktanty akutní fáze
- Imunitní systém • Makrofágy • Monocyty • Neutrofilní granulocyty

References

- KALOUSOVÁ, Marta. *Záněť* [online]. ©2014. [cit. 7.12.2018]. <<https://ulbld.lf1.cuni.cz/file/1607/zanet-material.pdf>>.