

# Non-specific immunity

**Non-specific immune mechanisms** (also innate, non-adaptive) are innate. This means that all the necessary information is invariably written in the DNA and already present in the zygote. Non-specific immunity responds to the same mechanisms after each encounter with an "antigen", it **has no memory**.

It consists mainly of **components of complement and phagocytes**. It is not aimed at eliminating a specific antigen but it is very **prompt**. The cells are constantly in the blood, so activation is almost instantaneous (minutes to hours) when needed.

Evolutionarily, **it is older** (in all multicellular organisms to varying degrees) than specific immunity. It consists of **cellular and humoral components**.

This group also includes the body's barrier functions, i.e. skin, mucous membranes, etc. (generally structures that prevent the penetration of foreign particles into the body).

## Summary of components of the innate immunity

### Cellular components

- **Phagocytes**,
  - Neutrophils (microphages) - live for a short time, not APC.
  - Monocytes - their tissue form = macrophages - live for a long time,
  - Dendritic cells and other APCs,
  - Eosinophils,
- **Mast cells** (heparinocyte),
- **Basophils**,
- **NK cells**,
- **Thrombocytes**.

### Humoral components

- **Complement** and **acute-phase proteins**,
- **Coagulation** and **fibrinolytic system**
- **Interferons**.

## Cellular component

These mainly include **granulocytes, macrophages** and some **lymphocytes**. Platelets can also be included here, but they play a minor, but not unimportant, role.

### Granulocytes and macrophages

The predominant part of the cellular component of non-specific immunity consists of cells derived from the **myeloid lineage**. These include cells that have a high phagocytic capacity, i.e. **macrophages** and **neutrophilic granulocytes**. Antigen-presenting cells, especially **dendritic cells** (cooperation with T-lymphocytes) and **follicular cells** (presents Ag to B-lymphocytes), cannot be neglected either. This group also includes **eosinophils and basophils**.

### Lymphocytes

The next part is cells from the **lymphoid lineage**. This mainly includes cytotoxic NK cells (*natural killers*). Some immunologists include some B-lymphocytes in this group due to their independence from T-lymphocytes and the possibility of a partial change in their specificity during proliferation. These are B-lymphocytes that recognize carbohydrate antigens.

## Humoral component

### Acute-phase proteins

This is a group of proteins whose levels rise significantly and relatively quickly after the activation of the immune system. Complement components are also included here, they are separated here for clarity.

 For more information see *Acute-phase proteins*.

### Complement

Complement is a set of serum proteins that, when activated, can induce the **lysis** of some cells.

 For more information see Complement.

## Cytokines

Cytokines form a very diverse group of signal peptides, some of which also have a hormonal function. Their production changes significantly with the degree of cell activation. **They mediate communication** between cells of specific and non-specific immunity. We divide them into several subgroups:

- interleukins,
- chemokines,
- interferons.

 For more information see Cytokines, Interleukins, Chemokines, Interferons.

## Principles of non-specific mechanisms

### Identification of pathogenic patterns

Pathogens are identified by the presence of PAMP (Pathogen-Associated Molecular Pattern) - phylogenetically highly conserved structures. Their carriers are only microorganisms and are essential for their survival. Is part of them:

- **bacterial wall** - peptidoglycan, lipoteichoic acid, lipopolysaccharide,
- **bacterial DNA** - a lot of cytosine and guanine, without methylation,
- **dsRNA** - viral.

These patterns are recognized by **Pathogen Pattern Receptor (PPR)** = Pattern Recognition Receptor (PRR) receptors. They are of the following types:

- **secreted** - opsonins (e.g. MBL) complement activation,
- **endocytic** - on phagocytes, they mediate phagocytosis (e.g. MMR (mannose macrophage receptor), MSR (macrophage scavenger receptor) - cleans up bacterial debris),
- **signalling** - they activate a signalling pathway leading to the production of cytokines (e.g. TLR (Toll-like receptor)).

### Identification of endogenous patterns

In connection with apoptosis, **ACAMP** (Apoptotic Cell Associated Molecular Pattern) patterns are exhibited - e.g. phospholipids of the inner layer of the cell membrane. **ACR** (Apoptotic Cell Receptor) receptors are recognized, and rather anti-inflammatory cytokines are produced.

### Antigen presentation

Antigen Presenting Cells (APCs) absorb antigens, process them in lysosomes and present them on **HLA class II molecules**. In this way, the antigens (or antigenic epitopes) are presented together with the costimulatory signals to the T-lymphocytes.

Note If any cell, not just the antigen presenter, is infected with an intracellular parasite, the antigen is presented to **HLA class I**.

## Links

### Related Articles

- Specific immunity
- Immune system
- Macrophages
- Neutrophilic granulocytes
- Complement

### References

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