

# Innate Immune System

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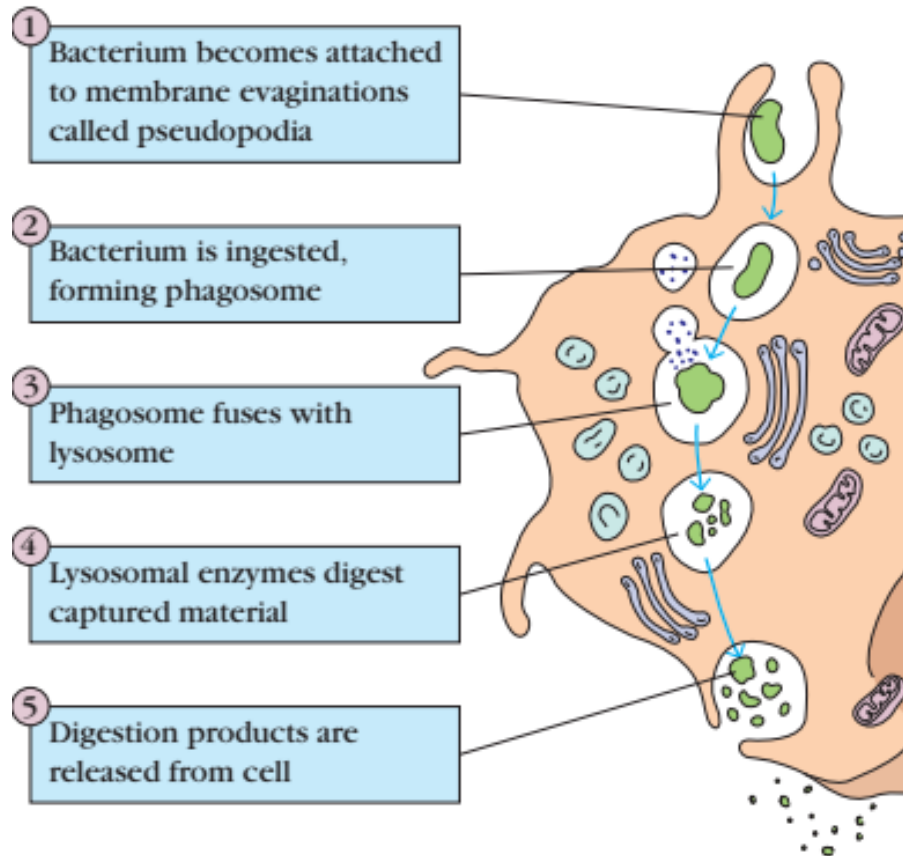
- **The innate immune system is thought to constitute an evolutionary older defense strategy**
- **Innate immune system provides immediate defense against infection, and is found in all classes of plant and animal life.**
- **It is the dominant immune system found in plants, fungi, insects, and in primitive multicellular organisms.**
- **A defining aspect of the innate immune is that it carries no memory of an encounter with a foreign organism.**

## **The major functions of the vertebrate innate immune system include:**

- Recruiting immune cells to sites of infection and inflammation through production of cytokines.**
- Activation of the complement cascade to identify bacteria, activate cells and to promote clearance of dead cells or antibody complexes.**
- The identification and removal of foreign substances present in organs, tissues, the blood and lymph, by specialized white blood cells.**
- Activation of the adaptive immune system through a process known as antigen presentation.**

**TABLE 1-2** Summary of nonspecific host defenses

Type	Mechanism
<i>Anatomic barriers</i>	
Skin	Mechanical barrier retards entry of microbes. Acidic environment (pH 3–5) retards growth of microbes.
Mucous membranes	Normal flora compete with microbes for attachment sites and nutrients. Mucus entraps foreign microorganisms. Cilia propel microorganisms out of body.
<i>Physiologic barriers</i>	
Temperature	Normal body temperature inhibits growth of some pathogens. Fever response inhibits growth of some pathogens.
Low pH	Acidity of stomach contents kills most ingested microorganisms.
Chemical mediators	Lysozyme cleaves bacterial cell wall. Interferon induces antiviral state in uninfected cells. Complement lyses microorganisms or facilitates phagocytosis. Toll-like receptors recognize microbial molecules, signal cell to secrete immunostimulatory cytokines. Collectins disrupt cell wall of pathogen.
<i>Phagocytic/endocytic barriers</i>	Various cells internalize (endocytose) and break down foreign macromolecules. Specialized cells (blood monocytes, neutrophils, tissue macrophages) internalize (phagocytose), kill, and digest whole microorganisms.
<i>Inflammatory barriers</i>	Tissue damage and infection induce leakage of vascular fluid, containing serum proteins with antibacterial activity, and influx of phagocytic cells into the affected area.



# Inflammation

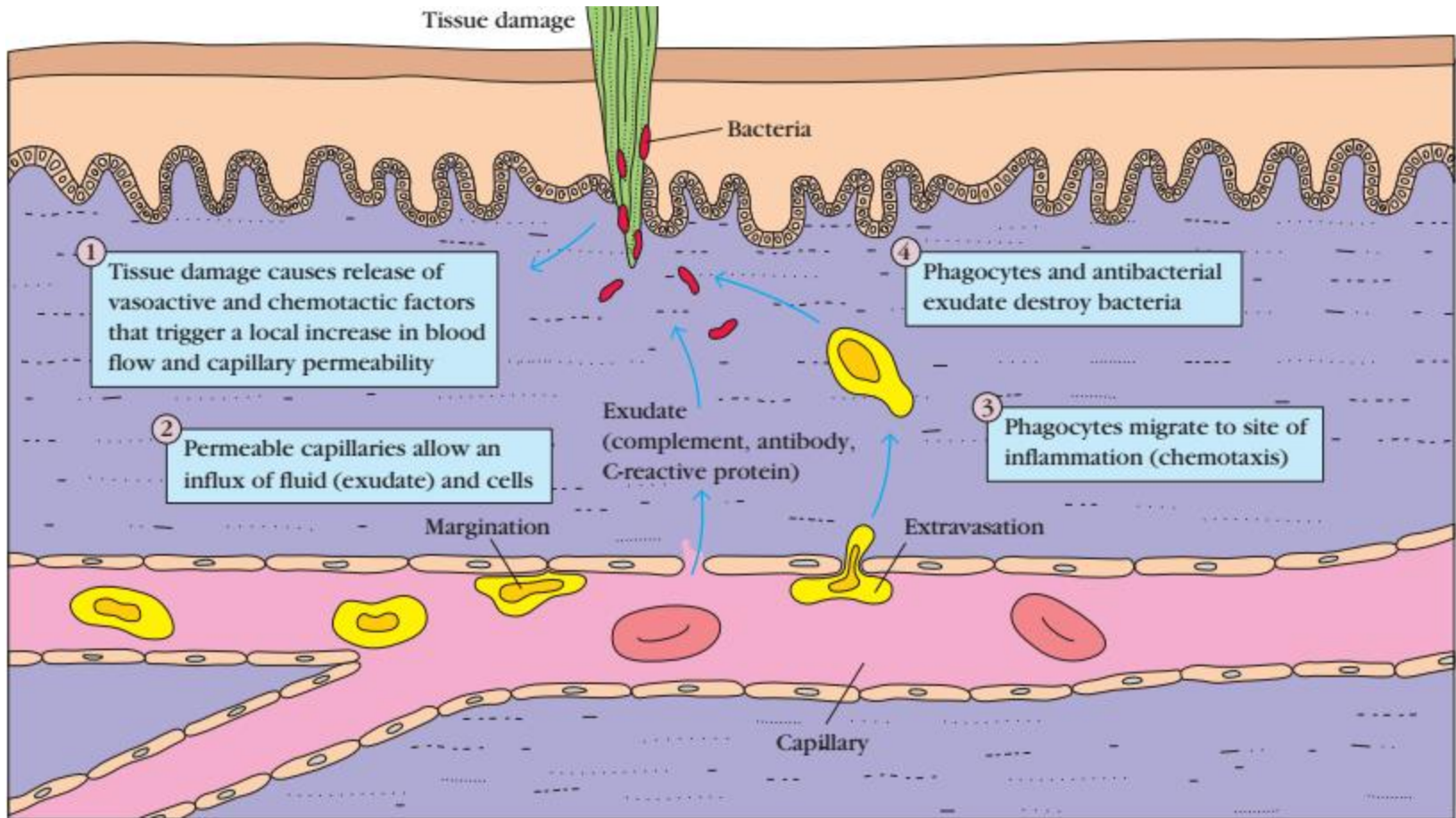
**Many infections, especially from small wounds are eliminated by the combination of complement and recruitment of phagocyte.**

## **Five characteristic signs:**

- **Redness, swelling, heat, pain, loss of function**

## **Causative events:**

- **Vasodilation, increased capillary permeability**
- **Emigration of phagocytes, Chemical mediators.**



## **Cells of innate immune response**

- Cells of the innate system recognize, and respond to, pathogen in a generic way.**
- All white blood cells (WBC) are known as leukocytes and they are major cells of innate and adaptive immune response.**
- Leukocytes are able to move freely and interact and capture cellular debris, foreign particles or invading microorganisms.**
- Most innate immune leukocytes can not divide or reproduce on their own.**



**-The innate leukocytes include: Natural killer cells, mast cells, eosinophils, basophils.**

**- The phagocytic cells include: macrophages, neutrophils and dendritic cells.**

**- These cells function within the immune system by identifying and eliminating pathogens that might cause infection.**

# Innate leukocytes

## Natural Killer Cells

- **Natural killer cells or NK cells are lymphocytes that attack host cells that have been infected by microbes, but do not directly attack invading microbes.**
- **For example, NK cells attack and destroy tumor cells, and virus infected cells, through a process known as missing self**
- **This term describes cells with low levels of a cell surface marker called MHC1**



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# Innate leukocytes

## Mast cells:

- **Mast cells are a type of innate immune cell that resides in the connective tissue and in the mucous membranes.**
- **They are intimately associated with defense against pathogens, wound healing, but are also often associated with allergy and anaphylaxis.**

