

Innate Immune System

Dr. Imran Riaz Malik
Immunology

Innate leukocytes

Mast cells:

- **When activated, mast cells rapidly release characteristic granules, rich in histamine, heparin and several other chemicals.**
- **Histamine dilates blood vessels, causing the characteristic signs of inflammation, and recruits neutrophils and macrophages.**

Innate leukocytes

Basophils and Eosinophils:

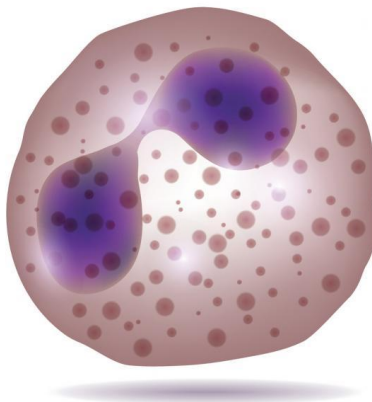
- **These are cells related to the neutrophil.**
- **Basophils releasing histamine are important in defense against parasites, and play a role in allergic reactions (Such as Asthma).**

Innate leukocytes

Basophils and Eosinophils :

- Upon activation, eosinophils secrete a range of highly toxic proteins and free radicals that are highly effective in killing bacteria and parasites.
- They are also responsible for tissue damage occurring during allergic reactions.

EOSINOPHIL



Phagocytes:

- **The word phagocyte literally means eating cell. To engulf a parasite or pathogen, a phagocyte extends portions of its plasma membrane, wrapping the membrane around the particle until it is enveloped.**
- **Once inside the cell, the invading pathogen is contained in an endosome which merges with a lysosome which contains enzymes and acids that kill and digest the particle or organism.**

Phagocytes:

Macrophages

- **Macrophages meaning large eating cell are large phagocytic leukocytes.**
- **The are able to move outside of the vascular system by moving across the cell membrane of capillary vessels and entering the areas between cells in pursuit of invading pathogens.**
- **Macrophages are the most efficient phagocytes and can phagocytes substantial numbers of bacteria or other cells or microbes.**

Phagocytes:

Macrophages

- **The binding of bacterial molecules to receptors on the surface of a macrophages triggers it to engulf and destroy the bacteria through the release of ROS (reactive oxygen species).**
- **Pathogens also stimulate the macrophages to produce chemokines, which summons other cells to the site of infection.**

Phagocytes:

Neutrophils

- **Neutrophils are the most abundant type of phagocyte, normally representing 50 to 60% of the total circulating leukocytes, and are usually the first cells to arrive at the site of infection.**

-

NEUTROPHIL



© Can Stock Photo - csp21060742

Dr. Imran Riaz Malik
Immunology

Phagocytes:

Dendritic cells

- **Dendritic cells are phagocytic cells present in tissues that are in contact with the external environment, mainly the skin(where they are often called Langerhans cells), and the inner mucosal lining of the nose, lung, stomach and intestines.**
- **Dendritic cells are very important in the process of antigen presentation, and serve as a link between the innate and adaptive immune system.**

$\gamma\delta$ T cells:

- **Gamma delta T cells exhibit characteristics that place them at the border between innate and adaptive immunity.**
- **On one hand, gamma delta T cells may be considered as component of adaptive immunity in that they rearrange TCR genes to produce junctional diversity and develop a memory phenotype.**
- **However, , they may also be considered part of the innate immune system where a restricted TCR or NK receptor may be used as a PRR(Pattern Recognition receptor).**