



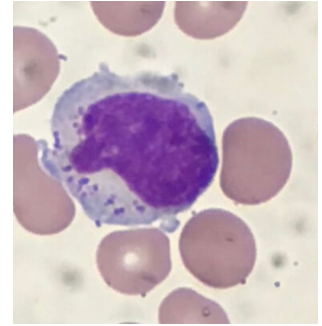
Natural Killer Cells




Learning Objectives


- Natural Killer Cells
- Functions of NK Cells
- Activating receptors of NK Cells
- Inhibitory receptors of NK Cells

Natural Killer Cells



- Natural killer (NK) cells recognize infected and stressed cells and respond by killing these cells and by secreting the macrophage activating cytokine IFN- γ .
- NK cells make up approximately 10% of the lymphocytes in the blood and peripheral lymphoid organs.
- NK cells contain abundant cytoplasmic granules and express some unique surface proteins but do not express immunoglobulins or T cell receptors.
- On activation by infected cells, NK cells empty the contents of their cytoplasmic granules into the extracellular space at the point of contact with the infected cell.
- The granule proteins then enter infected cells and activate enzymes that induce apoptosis.
- With CTLs, NK cells function to eliminate cellular reservoirs of infection and eradicate infections by obligate intracellular microbes, such as viruses.

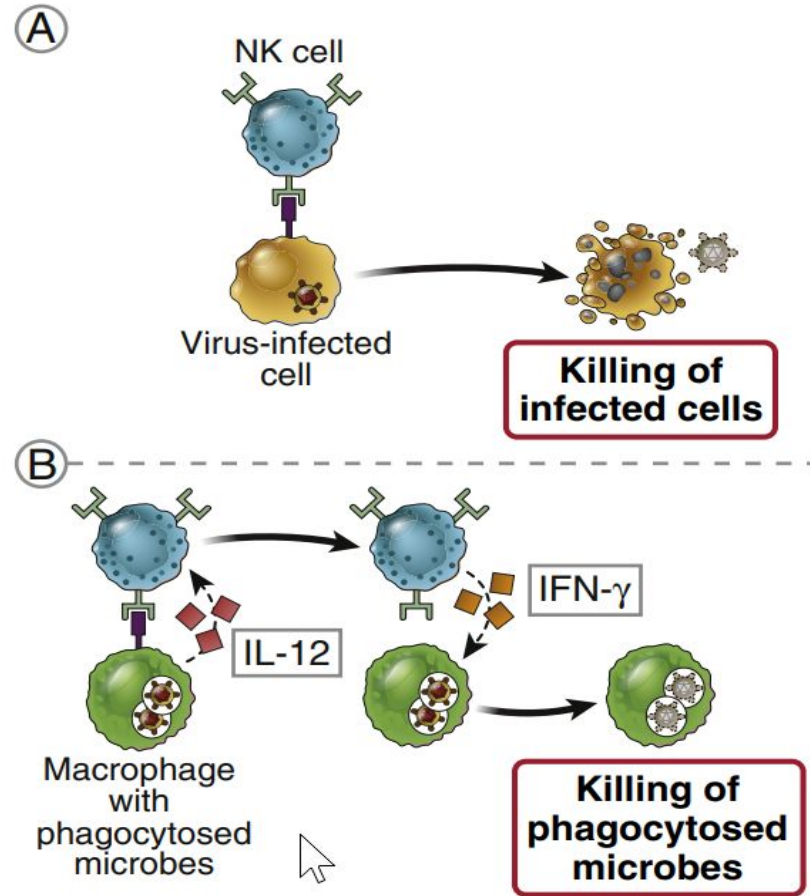
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- The cytotoxic mechanisms of NK cells, which are the same as the mechanisms used by cytotoxic T lymphocytes result in the death of infected cells.
 - Activated NK cells also synthesize and secrete the cytokine interferon- γ .
 - IFN- γ activates macrophages to become more effective at killing phagocytosed microbes.
 - Cytokines secreted by macrophages and dendritic cells that have encountered microbes enhance the ability of NK cells to protect against infections.
 - Three of these NK cell-activating cytokines are interleukin-15 (IL-15), type I interferons (type I IFNs), and interleukin-12 (IL-12).

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- IL-15 is important for the development and maturation of NK cells, and type I IFNs and IL-12 enhance the killing functions of NK cells.
 - NK cells and macrophages are examples of two cell types that function cooperatively to eliminate intracellular microbes:
 - Macrophages ingest microbes and produce IL-12, IL-12 activates NK cells to secrete IFN- γ , and IFN- γ in turn activates the macrophages to kill the ingested microbes.

Function Of NK Cells

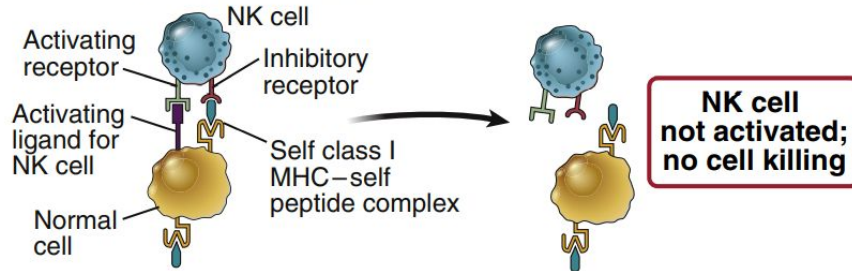
A: NK cells kill host cells infected by intracellular microbes, thus, eliminating reservoirs of infection.

B: NK cells respond to interleukin-12 (IL-12) produced by macrophages and secrete interferon- γ (IFN- γ), which activates the macrophages to kill phagocytosed microbes.

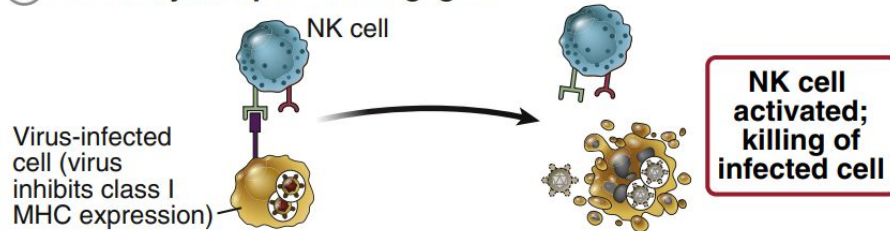


Activating and inhibitory receptors of natural killer (NK) cells.

A Inhibitory receptor engaged



B Inhibitory receptor not engaged





Summary

- NK cells contain abundant cytoplasmic granules and express some unique surface proteins but do not express immunoglobulins or T cell receptors.
- Activated NK cells also synthesize and secrete the cytokine interferon- γ .
- With CTLs, NK cells function to eliminate cellular reservoirs of infection and eradicate infections by obligate intracellular microbes, such as viruses.