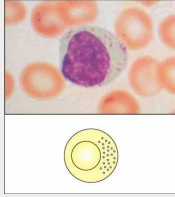


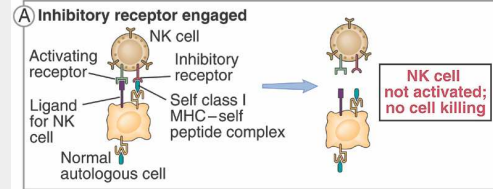
What are NK cells?

- Lymphocytes
 - present in blood and lymphatic system
- Do not recognize specific antigens
- Kill infected cells
 - viruses
 - intracellular bacteria
- Activate macrophages
 - better killing of phagocytosed microbes



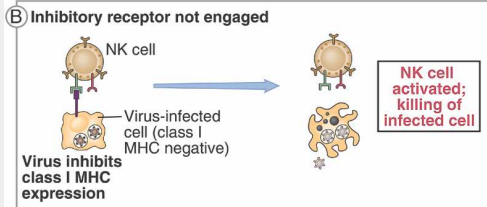
How does an NK cell recognize an infected cell?

- Activating receptors
 - bind normal cell surface molecules
- Inhibitory receptors
 - bind MHC class I
 - ITIMs phosphorylated, PTPs activated
 - signalling molecules dephosphorylated



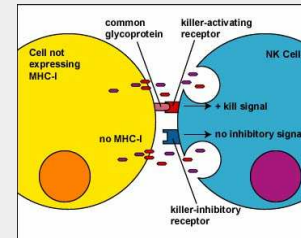
How does an NK cell recognize an infected cell?

- Infected cells often lack MHC I
 - why?



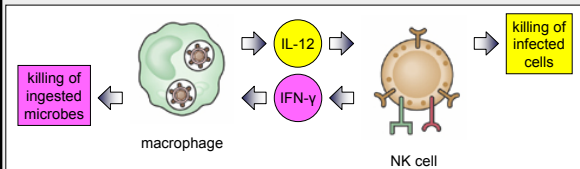
How does an NK cell kill an infected cell?

- Degranulation
 - Toxic molecules
 - Apoptosis



How do NK cells interact with macrophages?

- Macrophage produces cytokine IL-12
 - activates NK cell
- NK cell produces cytokine IFN- γ
 - activates macrophage

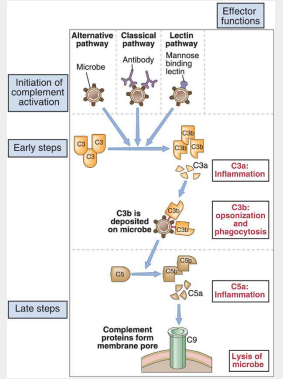


What is complement?

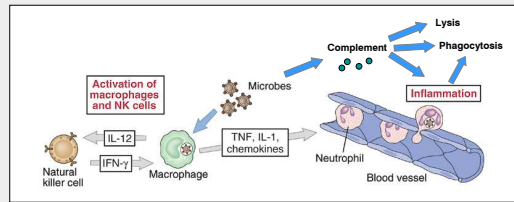
- 9+ plasma proteins
 - blood and tissue fluid
- Activated by proteolysis
- Function in innate immunity
 - Opsonization (C3b)
 - Inflammation (C3a, C5a)
 - Lysis of bacteria (C9)

How is complement activated?

- Classical pathway
 - activated by antibody
- Alternative pathway
 - binding to microbe surface
 - host cells have inhibitors
- Lectin pathway
 - MBL binds mannose



Innate immunity



Phagocytosis
 Recognition by macrophages
 Recruitment of neutrophils
 Activation by NK cells (IFN- γ)
 Opsonization by C3b, MBL, CRP

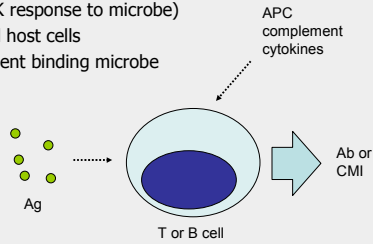
Inflammation
 Recruitment of neutrophils
 Vasodilation (heat, fluid)
 Stimulation of pain receptors

 Killing of infected cells by NK cells
 Lysis of bacteria by complement

Activation of adaptive immunity

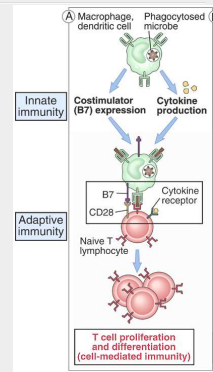
- T and B cells need two signals to respond
 - Antigen (foreign molecule, usually protein)
 - "Microbe-dependent second signal"
 - Microbial component
 - IFN- γ (NK response to microbe)
 - Damaged host cells
 - Complement binding microbe

Why??



Activation of adaptive immunity

- Macrophages & dendritic cells: APCs
 - Respond to microbes (phagocytosis or IFN- γ)
 - produce costimulators (e.g., B7)
 - produce IL-12
 - Activate T cells



Activation of adaptive immunity

- B cells have complement receptors (CR2)
 - Bind Ag with Ag receptor
 - Bind complement with CR2
 - Activated

