Basic Components of the IS #2 6/7/2020

Microbe → body → Innate → ✓
↳ X → Adaptive

Bacteria (intracellular/extracellular)	Virus (intracellular)
↓ enters, phagocytosis	↓
Antigen Presenting Cells (macrophages)	infected cells present the virus
↓ production of cytokines	↓
↓	T lymphocytes
T, B lymphocytes	(adaptive)
↓	
Antibody Production	
(innate, adaptive)	

- Mannose sugar in bacteria's cell wall binds to MBL receptor on the innate immune cells = activation = phagocytosis

- Only innate system's failure can trigger adaptive immune system activation

- Bone marrow is what produces the cells of both immune systems.

Bone marrow

↓

Hematopoietic stem cells

immune cells (Myeloid progenitor), (lymphoid progenitor)

self-renewal

- what determines if it will differentiate into myeloid / lymphoi progenitor cells? The bone marrow's proteins and cytokines which are produced as a result of different microorganisms invading the body.

- Bacterial infection → Bone marrow → hematopoietic → neutrophils

- Myeloid (innate immune cell producers)
- Lymphoid (adaptive immune cell producers)

with the exception of Natural killer cells!!! Produced by lymphoid progenitor cells even though they are innate!!!

Innate

1 / 1

① Neutrophils :

- granulated
- 3-lobed nucleus
- increases in blood clot in case of bacterial infection

② Eosinophils :

- bigger in size
- 2-lobed nucleus
- granulated
- against parasites
- involved in allergic reactions

③ Macrophages :

- monocytes (in blood)
  ↓
  macrophages (in tissue)
- lives in tissues for months
- first cell to fight microorganisms
- phagocytosis → AP to show and activate other immune cells

④ Mast cells :

- basophils (in blood)
  ↓
  mast cell (in tissue)
- involved in allergic reactions

⑤ Natural killers :

- innate
- produced by lymphoid progenitors
- non-specific !!

Adaptive:

① T lymphocytes:

② B lymphocytes:

ⓐ $CD4^+$
- helper

ⓑ $CD8^+$
- cytotoxic
- lysis of virus infected cells
- specific unlike natural killer

- it activated they are called plasma cells and releases antibodies

Antigen Presenters: → T and B

① Dendritic cells:
- takes antigen and shows T, B lymphocytes
- migrates from infection site to T, B lymphocytes to "show" them the antigen
- innate

② Macrophages:
- innate

③ B lymphocytes
- shows T lymphocytes
- adaptive
- specific. each cell is specific to a certain microorganism. one copy is not enough to kill a microbe so it:

① identifies micro using specific receptor ... antigen
② that cell undergoes "clonal selection therapy"

Autoimmune Diseases :

A foreign antigen is replaced by a self protein and identified as a "non-self". It meets its specific B cell, activates it by antigen-receptor binding causing B cell to undergo cloning and attack all cells with the self proteins.

After the cells undergo cloning and attack the invading microbes one of 2 things happen.

B cells (after clearing microbes)

memory cells (or) degradation

Active → forms memory cells due to an attack actually happening

Passive → X memory cells

Placenta → fetus = nature passive

Rabies : affects nervous system, death due to X breathing.
immediately administer vaccine (antibodies against rabies virus). Naturally, it takes 7 days which is too long = death. So we cannot wait.

/ /

Phases of immune response:

① Cognitive phase: antigen ... receptor
② Activation phase: clonal selection theory, proliferation
③ Effector phase: becomes a secretory cell (antibody production)

- hepatitis B vaccine is not given to all. Mostly to people who are dealing with blood (medics etc.)
- given in 3 doses.

1st dose: primary response, very slow response. ↑antibodies
2nd dose: faster response due to memory cells. ↑↑antibodies
3rd dose: ↑↑↑ response, ↑↑↑ antibodies

Strength of dose doesnot affect speed & response. Memory cells' presence does.