

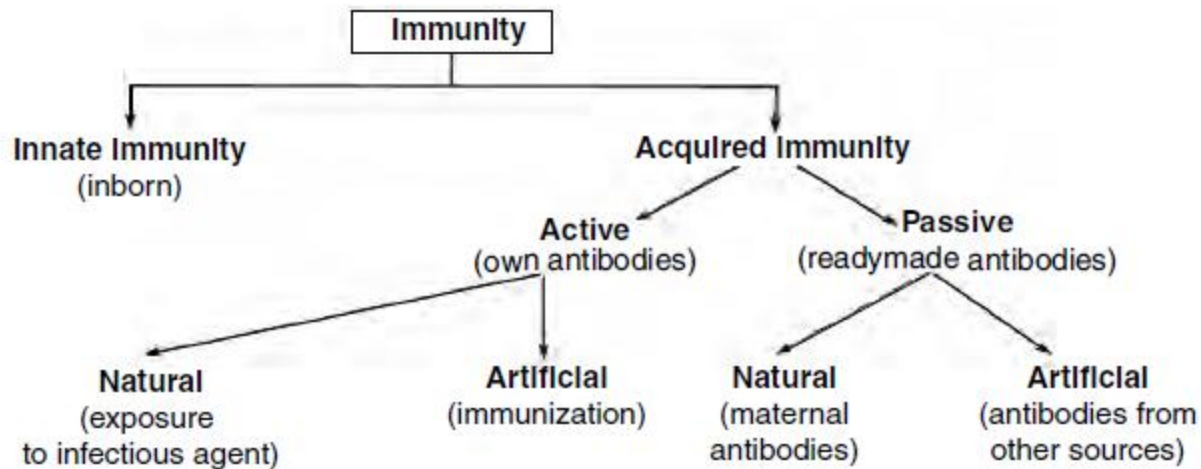
Adaptive immunity

(Acquired / specific immunity)

Microbiology V

Introduction

- The adaptive, or acquired, immune response takes days or even weeks to become established—much longer than the innate response.
- Adaptive immunity is more specific to pathogens and has memory.
- **Adaptive immunity** is an immunity that occurs after exposure to an antigen either from a pathogen or a vaccination.
- This part of the immune system is activated when the innate immune response is insufficient to control an infection.



Types of Adaptive (Acquired) Immunity

Naturally acquired active immunity:

- type of specific immunity a host develops after exposure to foreign substance.

Artificially acquired active immunity (vaccination):

- intentional exposure to a foreign material.

Naturally acquired passive immunity:

- transfer of antibodies, e.g., mother to fetus across placenta, mother to infant in breast milk.

Artificially acquired passive immunity:

- preformed antibodies or lymphocytes produced by one host are introduced into another host

Adaptive immunity:

Three major functions:

1. Recognize nonself

2. Respond to nonself:

- Effector response: eliminates or renders foreign material harmless
- Anamnestic response: upon second encounter with same pathogen immune system mounts a faster and more intense response.

3. Remember nonself

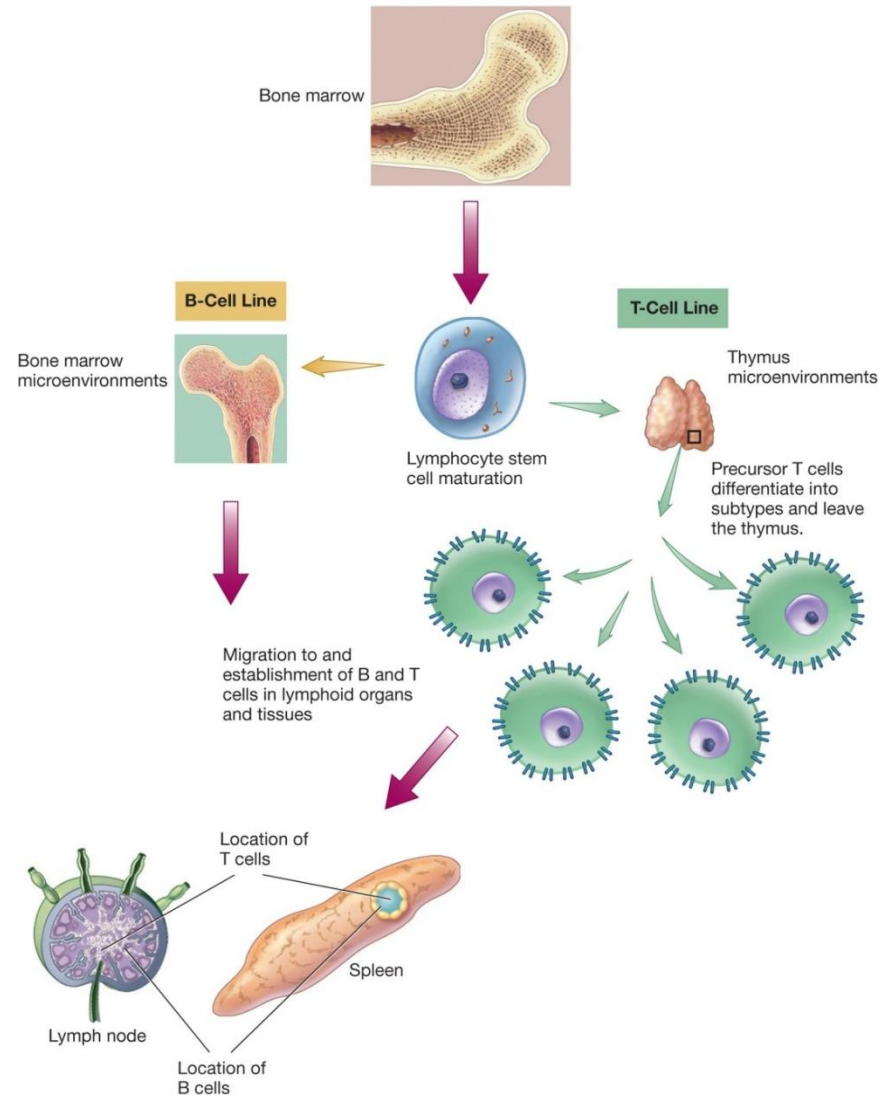
Four Characteristics of Adaptive Immunity

- 1. Discrimination between self and non-self:** usually responds selectively to non-self, producing specific responses against the stimulus.
- 2. Diversity:** generates enormous diversity of molecules.
- 3. Specificity:** can be directed against one specific pathogen or foreign substance among trillions.
- 4. Memory:** response to a second exposure to a pathogen is so fast that there is no noticeable pathogenesis

Acquired Immune System Development:

- B and T cells initially arise in the bone marrow.
- B cells continue to mature there.
- T cells are moved to the thymus for further maturation.
- Both cell types go through extensive screening to avoid self-reactivity.

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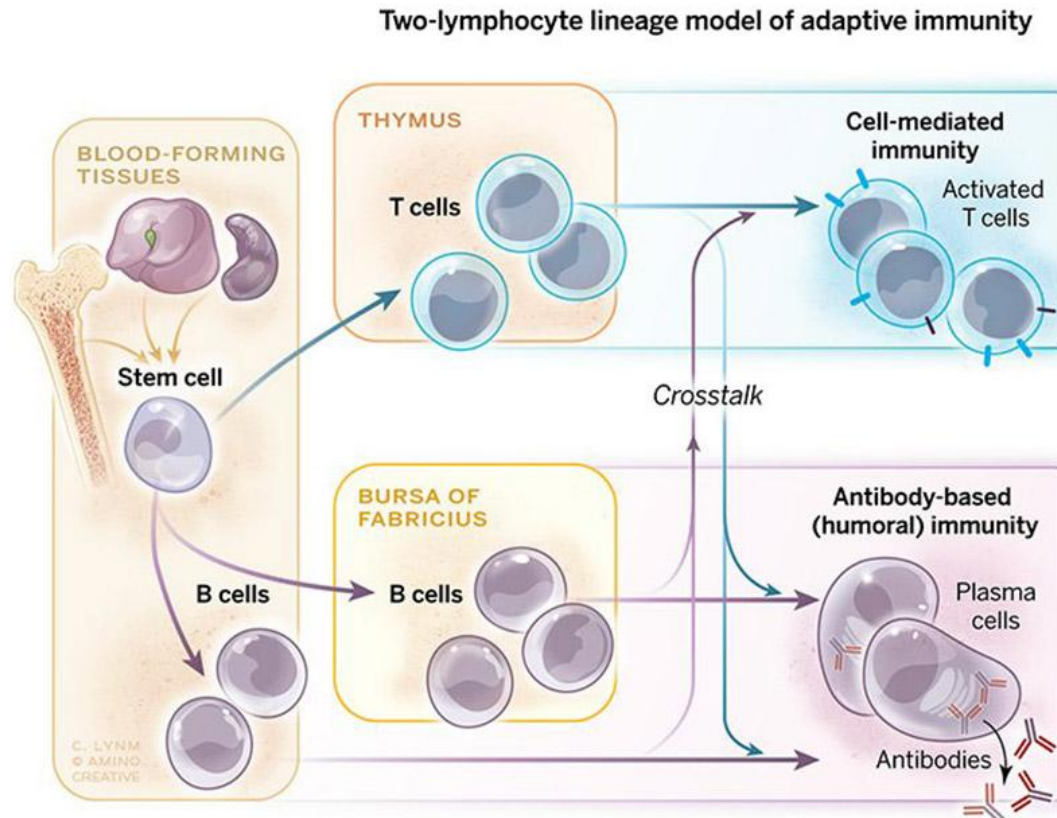
Two main branches of Adaptive Immunity

1. Humoral immunity:

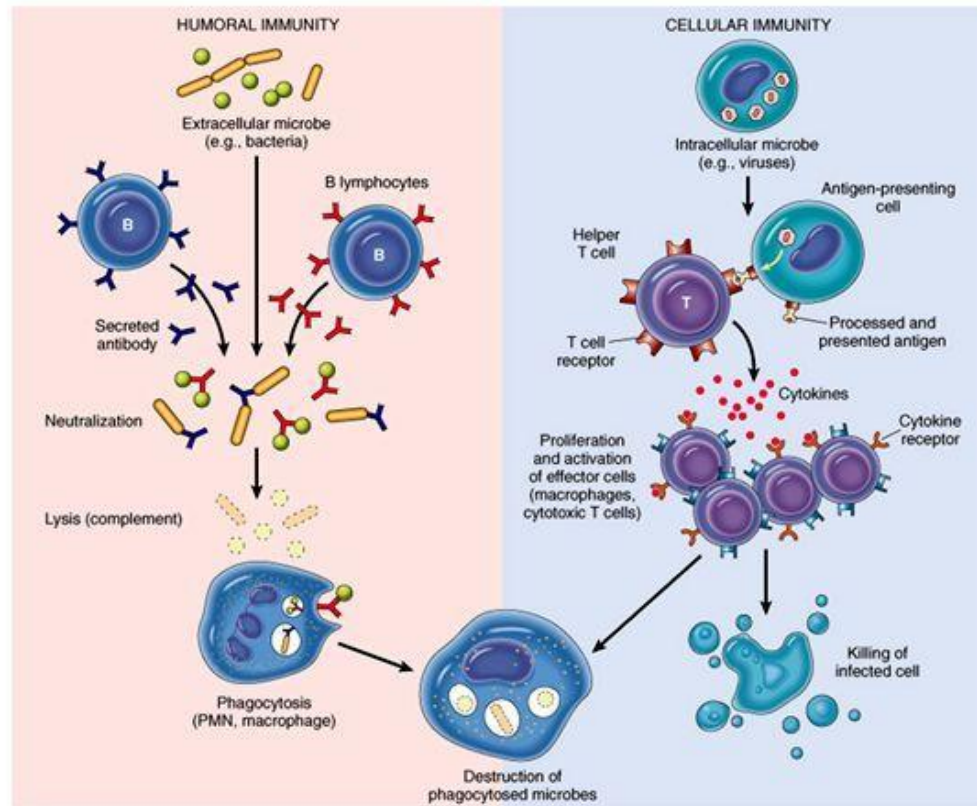
- also called antibody mediated immunity
- based on antibody activity produced by B lymphocytes (B cells)

2. Cellular immunity

- also called cell mediated immunity
- based on action of specific kinds of T lymphocytes (T cells)



Humoral and Cell-mediated Immunity



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Humoral Immunity

Involves B-cell production of antibodies that bind antigens resulting in either:

1. Neutralization
2. lysis (by the complement system), or
3. phagocytosis and destruction

Cell-mediated Immunity

Involves T-cell recognition of abnormal antigens on the surface of host cells (indicating viral infection or tumorigenic change) and the killing of infected cells.