BASICIS OF IMMUNOLOGY

PREPARED BY

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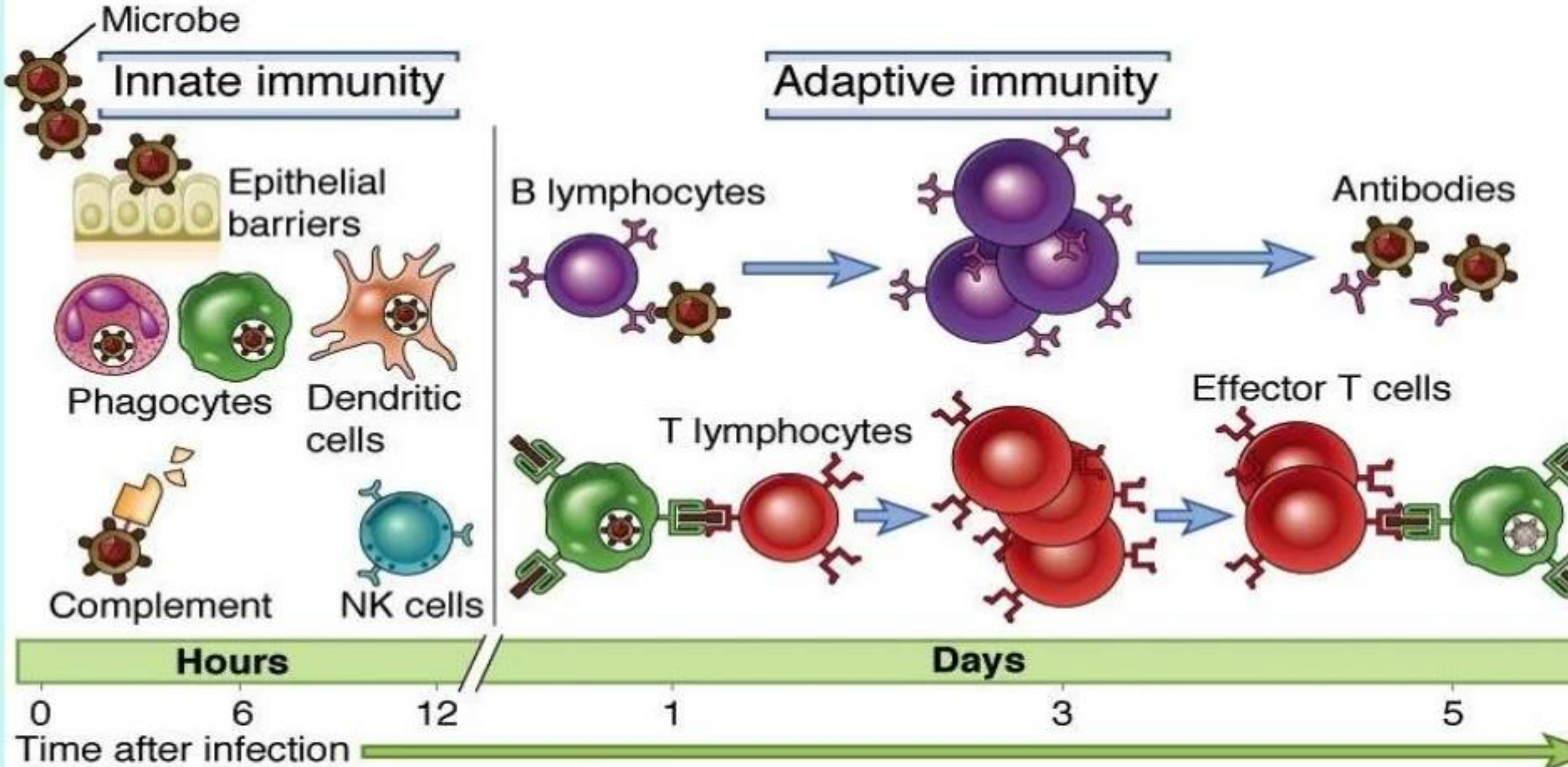
- The nomenclature of Immunology
- Types of immunity (innate and adaptive; active and passive; humoral and cell-mediated)
- Features of immune responses
- The major cells of the immune system

Definitions

- **Immunity:** protection against infections
- **Immune system:** molecules, cells and tissues that mediate responses to foreign substances
- **Antigens:** substances recognized by the cells and molecules of the immune system and to which the system responds

Innate and adaptive immunity

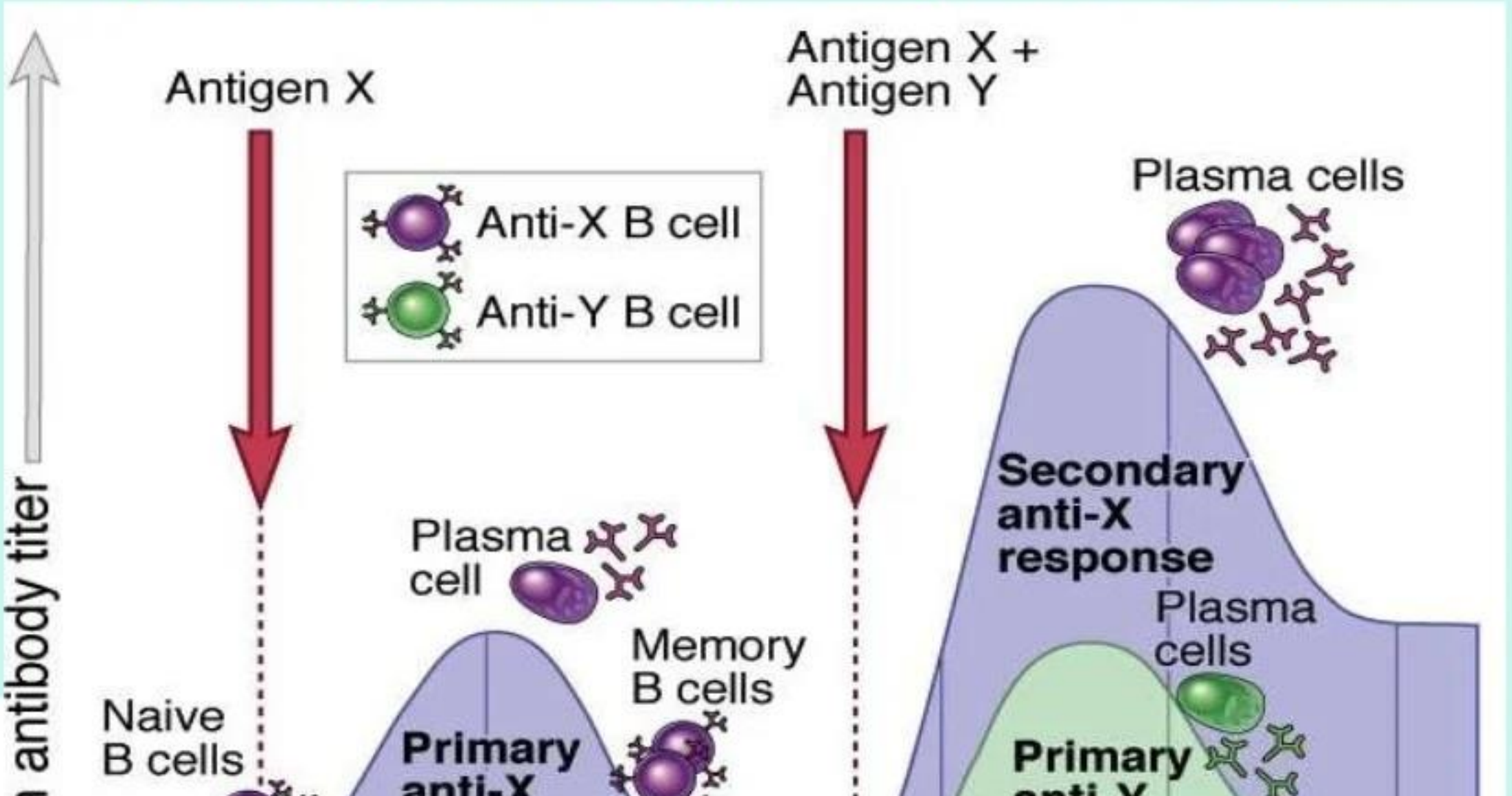


Properties of adaptive immune responses

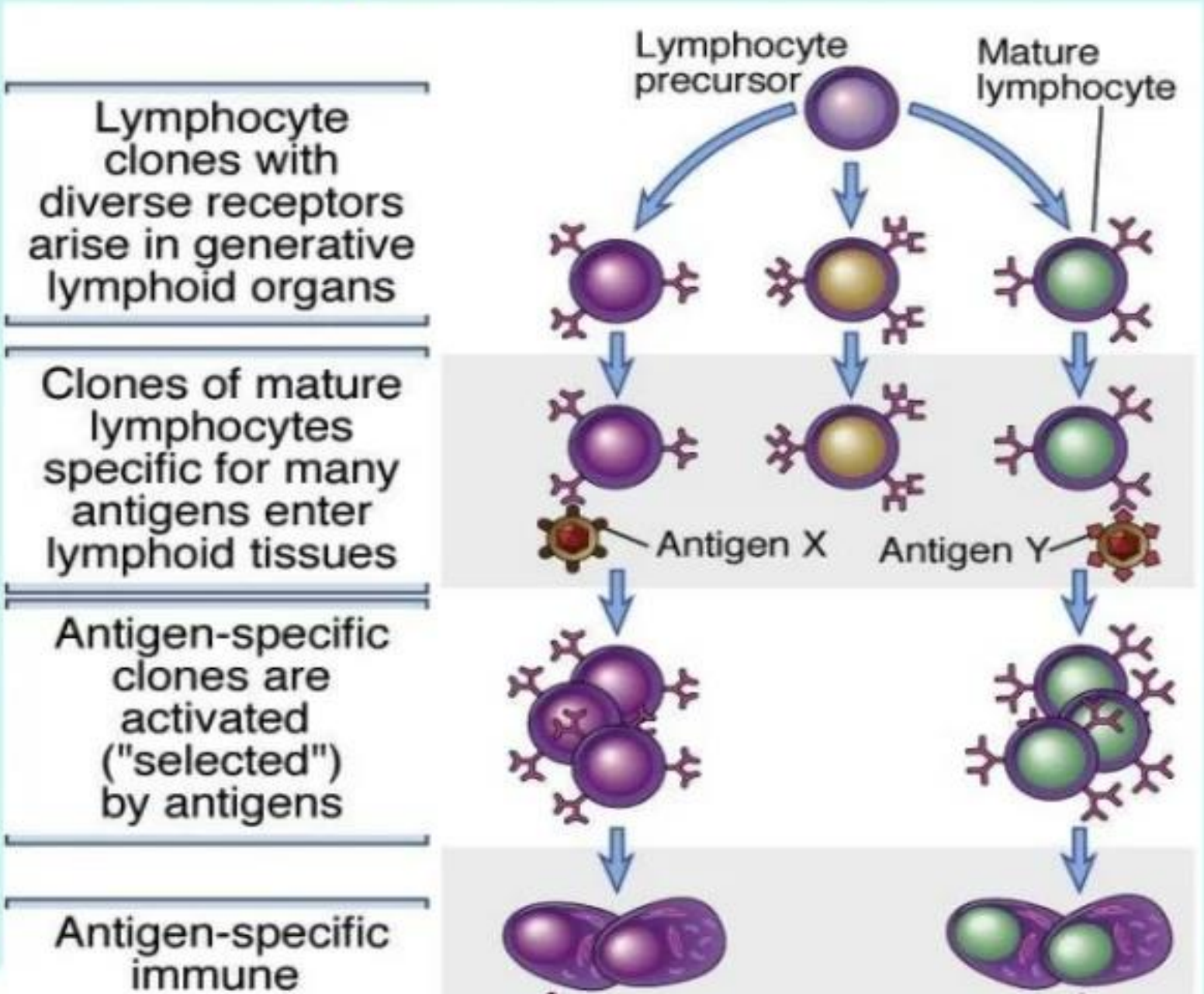
Feature	Functional significance
Specificity	Ensures that distinct antigens elicit specific responses
Diversity	Enables immune system to respond to a large variety of antigens
Memory	Leads to enhanced responses to repeated exposures to the same antigens
Clonal expansion	Increases number of antigen-specific lymphocytes to keep pace with microbes
Specialization	Generates responses that are optimal for defense against different types of microbes
Contraction and homeostasis	Allows immune system to respond to newly encountered antigens
Nonreactivity to self	Prevents injury to the host during responses to foreign antigens

The two features that best distinguish adaptive and innate immunity are specificity and memory

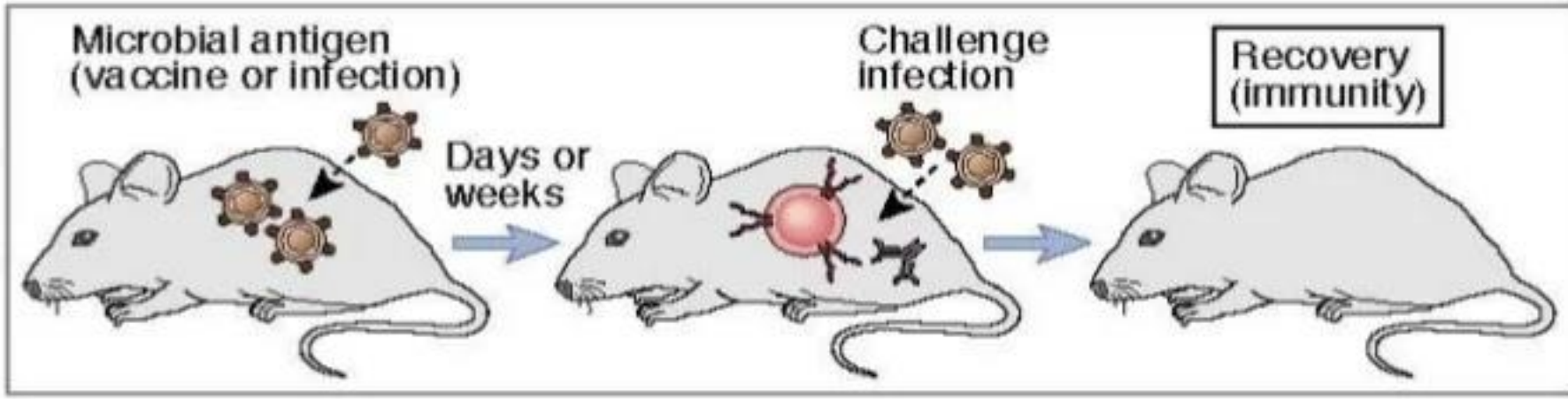
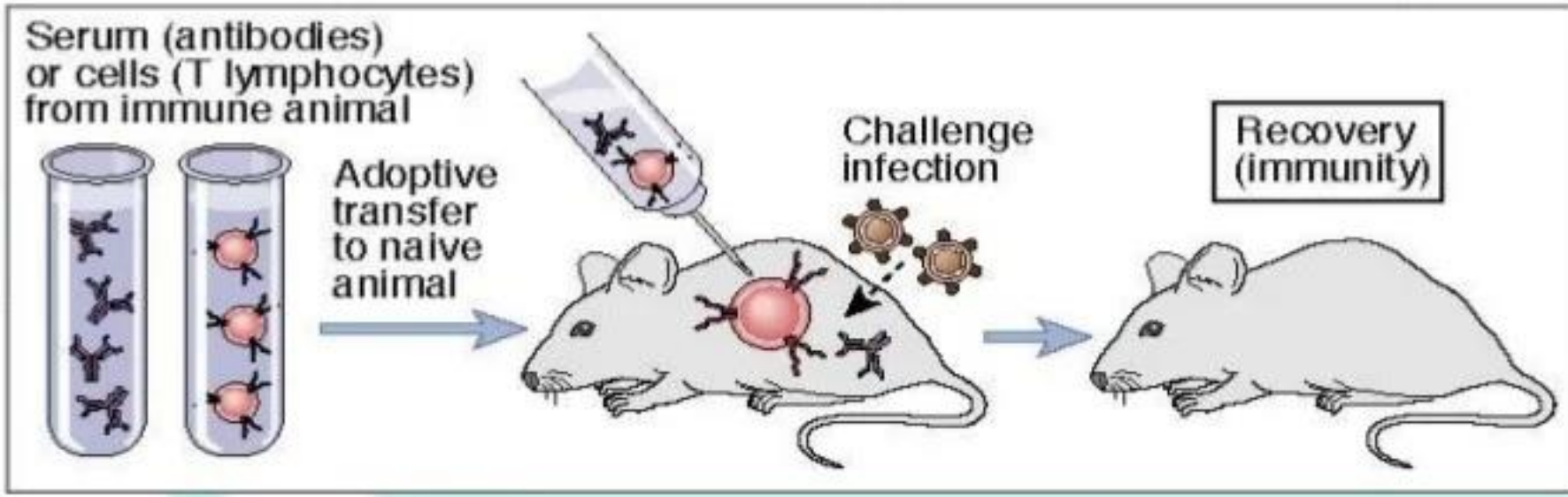
Primary and secondary immune responses illustrate specificity and memory in adaptive immunity



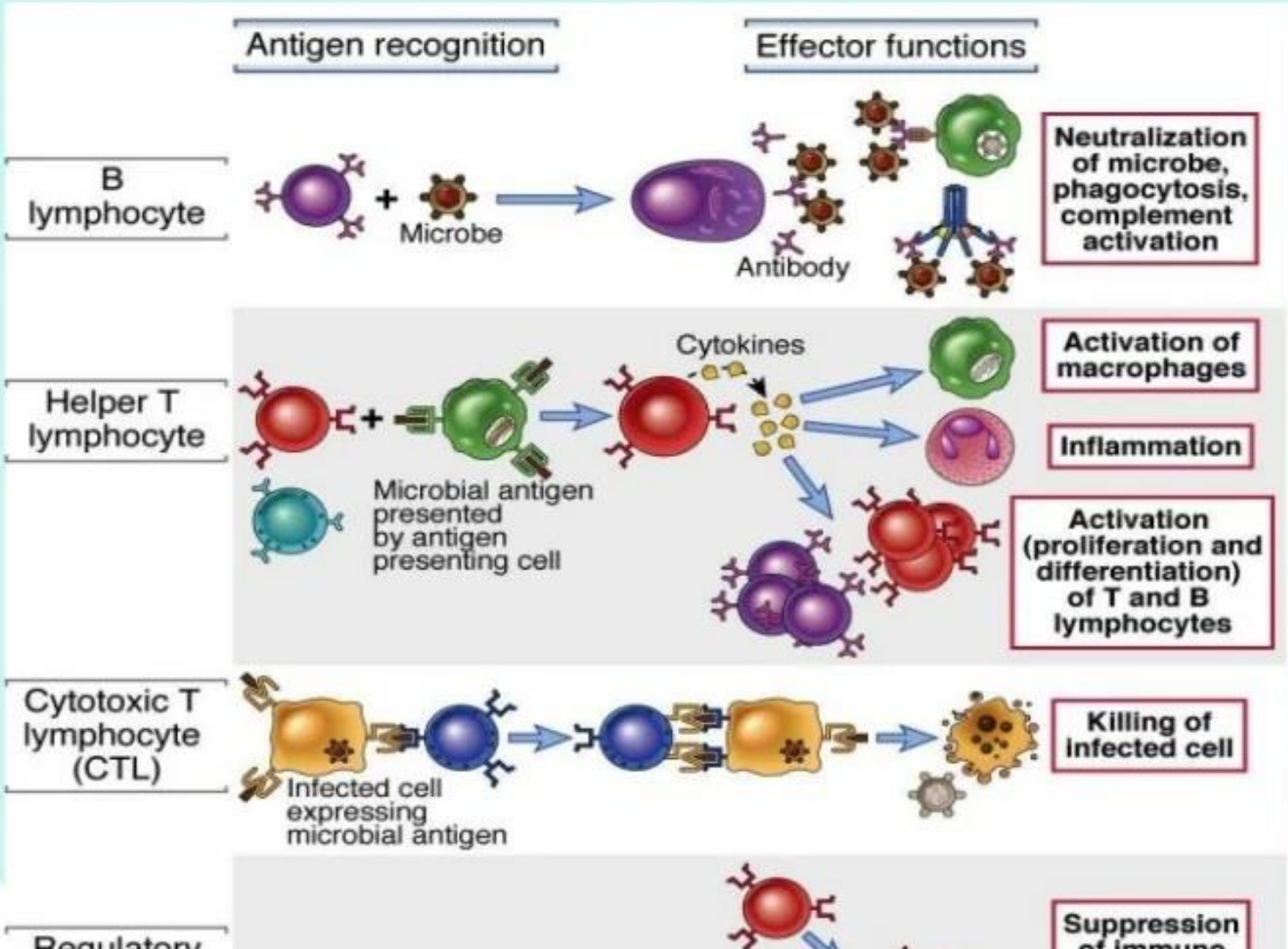
The concept of clonal selection



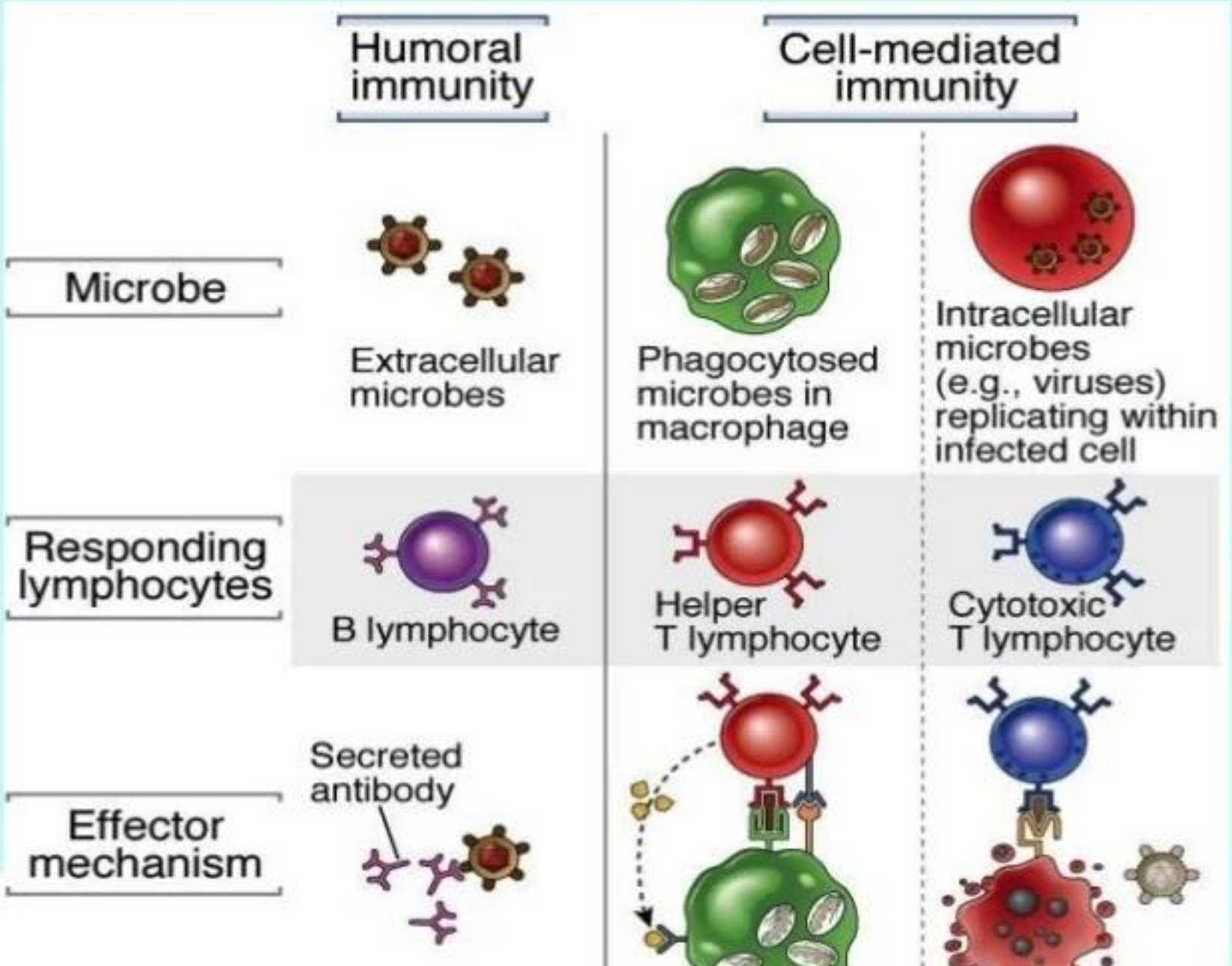
Active and passive immunity

		Specificity	Mem
Active immunity		Yes	Yes
Passive immunity		Yes	No

Classes of lymphocytes

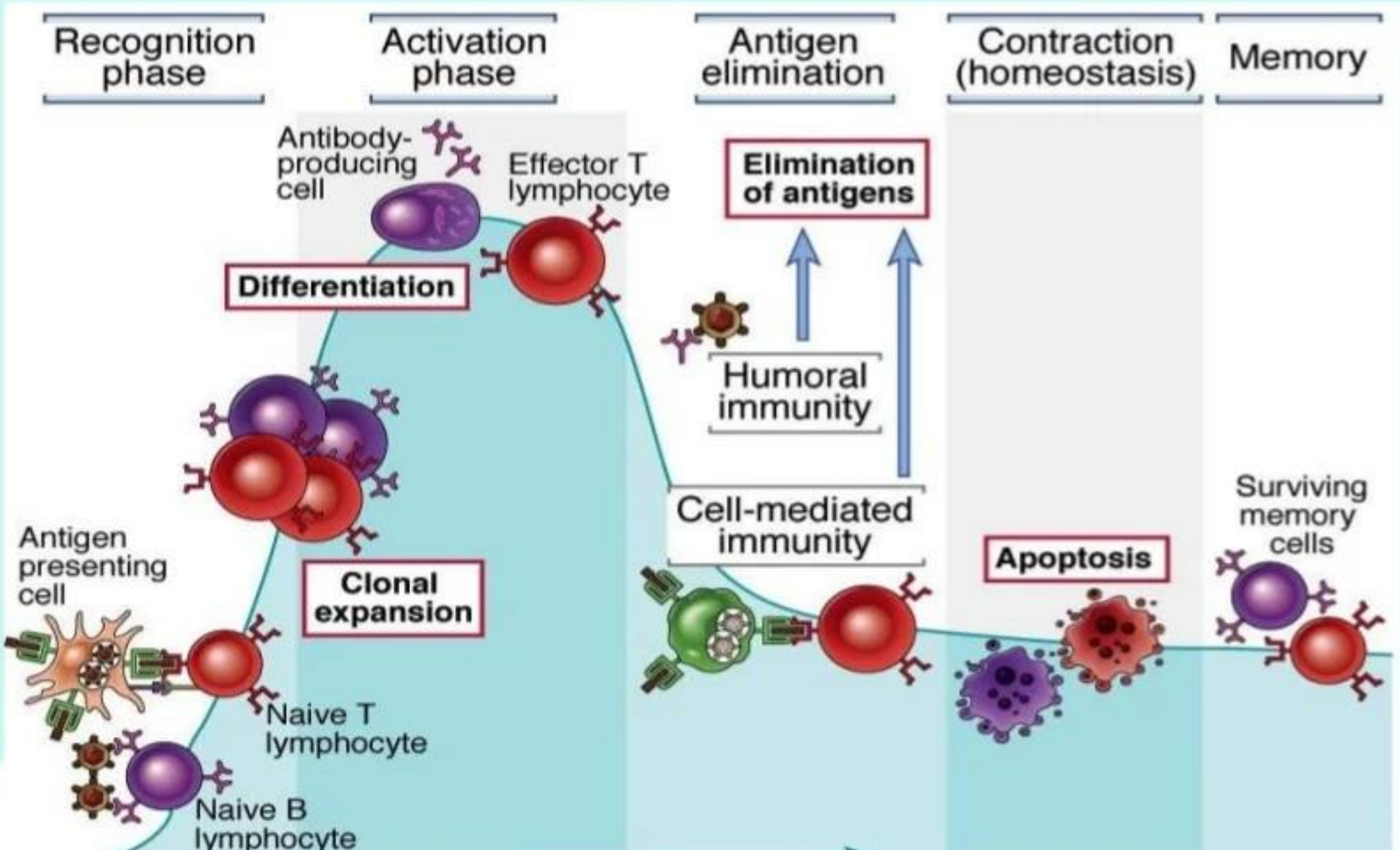


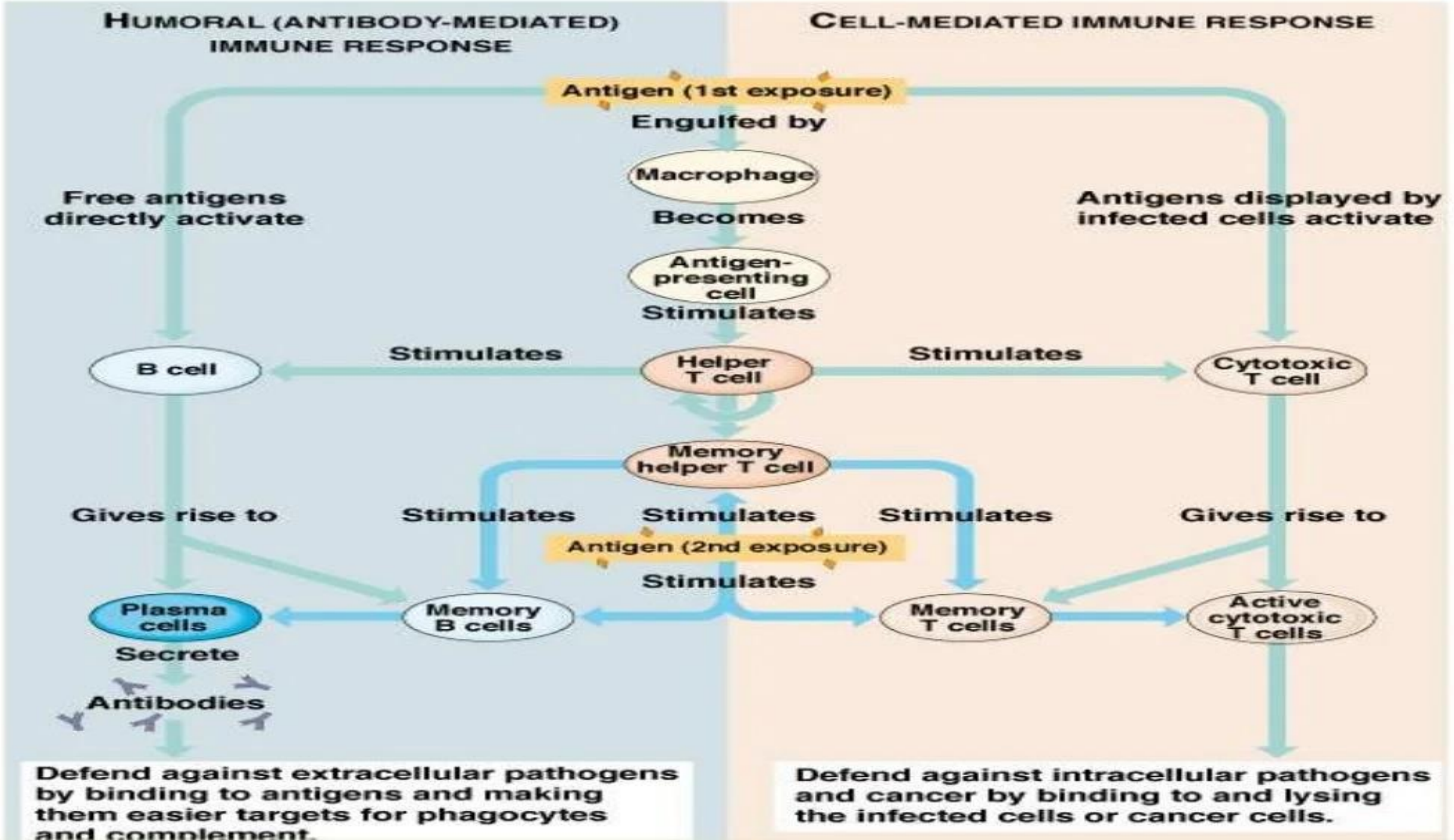
Types of adaptive immunity



Different types of immune responses are mediated by different classes of lymphocytes and defend against different types of microbes

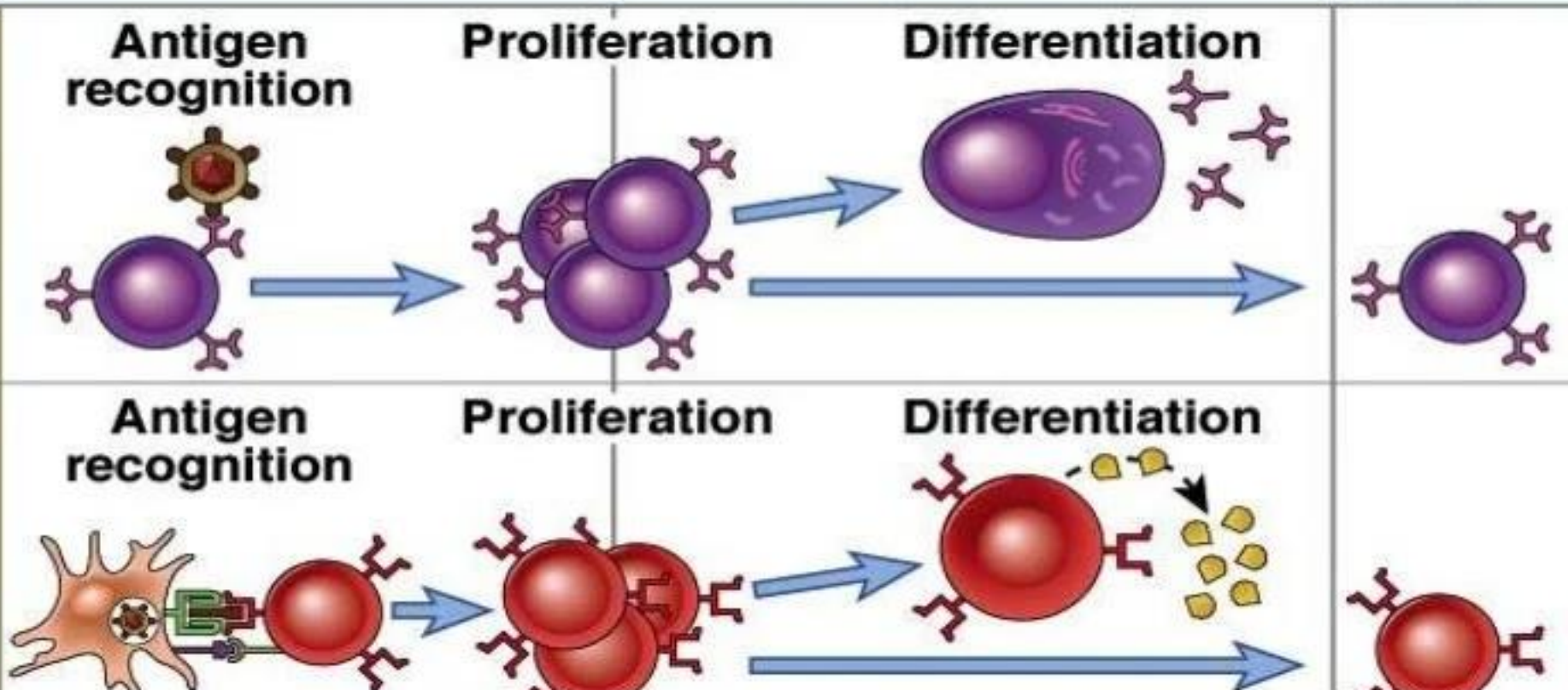
Phases of adaptive immune responses




HUMORAL (ANTIBODY-MEDIATED) IMMUNE RESPONSE
CELL-MEDIATED IMMUNE RESPONSE
Antigen (1st exposure)
Engulfed by
Macrophage
Becomes
Free antigens directly activate
Antigens displayed by infected cells activate
Antigen-presenting cell
Stimulates
B cell
Stimulates
Helper T cell
Stimulates
Cytotoxic T cell
Memory helper T cell
Gives rise to
Stimulates
Stimulates
Stimulates
Gives rise to
Antigen (2nd exposure)
Stimulates
Plasma cells
Memory B cells
Memory T cells
Active cytotoxic T cells
Secrete
Antibodies
Defend against extracellular pathogens by binding to antigens and making them easier targets for phagocytes and complement.
Defend against intracellular pathogens and cancer by binding to and lysing the infected cells or cancer cells.

Stages in the life history of lymphocytes

Cell type	Stage		
	Naive cell	Activated or effector lymphocyte	Memory lymphocyte
B lymphocytes	Antigen recognition	Proliferation	Differentiation
Helper T lymphocytes	Antigen recognition	Proliferation	Differentiation



Naïve, effector and memory lymphocytes

- Naïve lymphocytes
  - Mature lymphocytes that have not previously encountered antigen; function -- antigen recognition
  - Preferential migration to peripheral lymphoid organs (lymph nodes), the sites where antigens are concentrated and immune responses start

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  - **Effector T lymphocytes: cytokine secretion (helper cells), killing of infected cells (CTLs)**
  - **B lymphocytes: antibody-secreting plasma cells**

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  - **Long-lived, functionally silent cells; mount rapid**

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- Memory lymphocytes
  - Long-lived, functionally silent cells; mount rapid responses to antigen challenge (secondary responses)

conclusion

- Immune system is a complex functioning system Acting against various invading pathogens and preventing the diseases – protective
- Helpful in various diagnostic investigations
- Acting against the own body tissues – destructive.

IMMUNE SYSTEM , THUS COULD BE A

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