

# Immunology

## Lec. 2

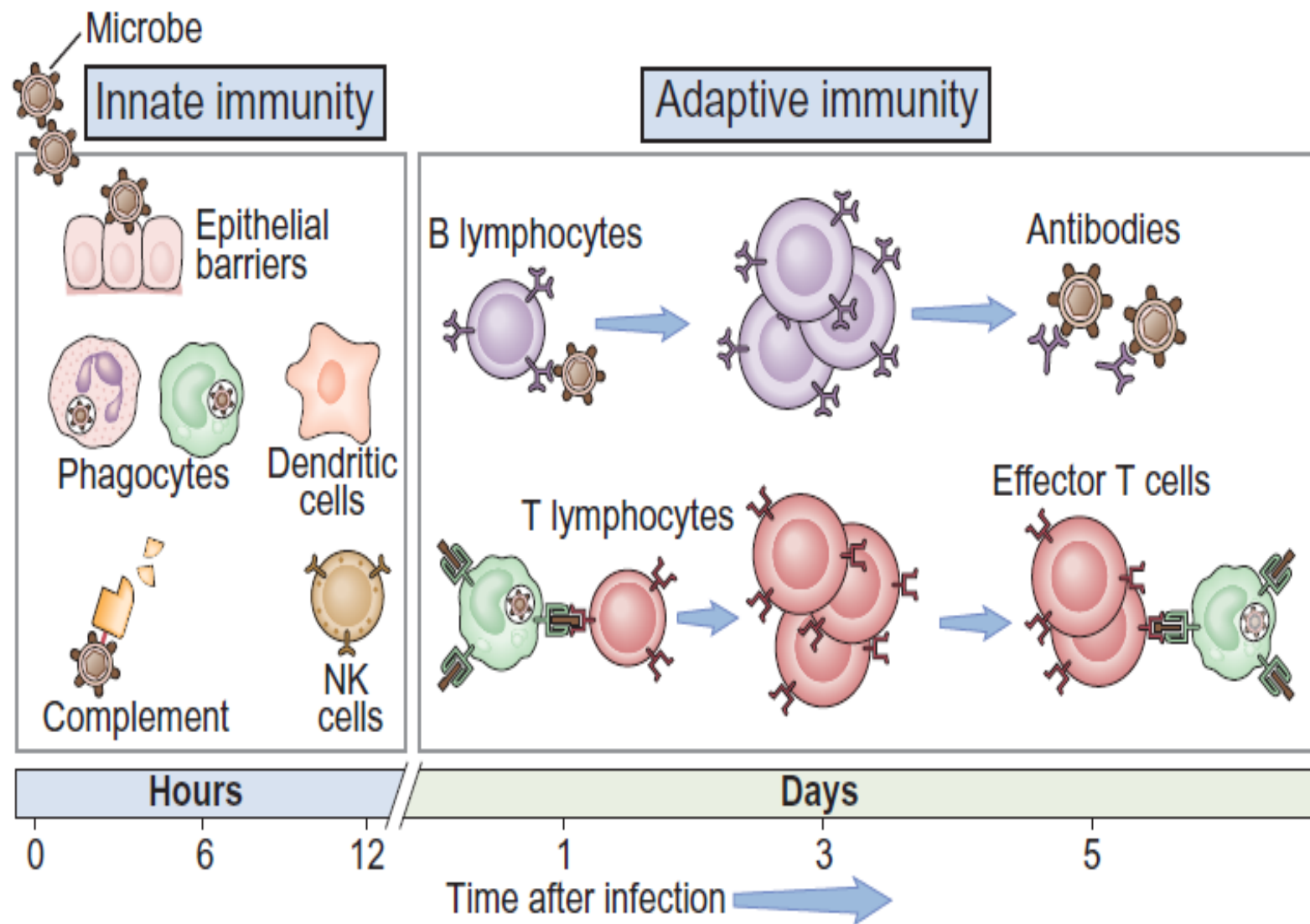
### **Adaptive immunity**

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# Adaptive immunity

- **Adaptive immunity** (also called specific or acquired immunity) is the type of host defense that is stimulated by microbes that invade tissues, that is, it adapts to the presence of microbial invaders.
- **The adaptive immune system consists of lymphocytes and their products, such as antibodies.**

- 1- Whereas the mechanisms of innate immunity recognize structures shared by classes of microbes, the **cells of adaptive immunity**, namely, **lymphocytes**, express receptors that specifically recognize different substances produced by microbes as well as noninfectious molecules. These substances are called **antigens**.
- 2- Adaptive immune responses are triggered only if microbes or their antigens pass through epithelial barriers and are delivered to lymphoid organs where they can be recognized by lymphocytes.
- 3- Adaptive immune responses are specialized to combat different types of infections. For example, antibodies function to eliminate microbes in extracellular fluids, and activated T-lymphocytes eliminate microbes living inside cells.



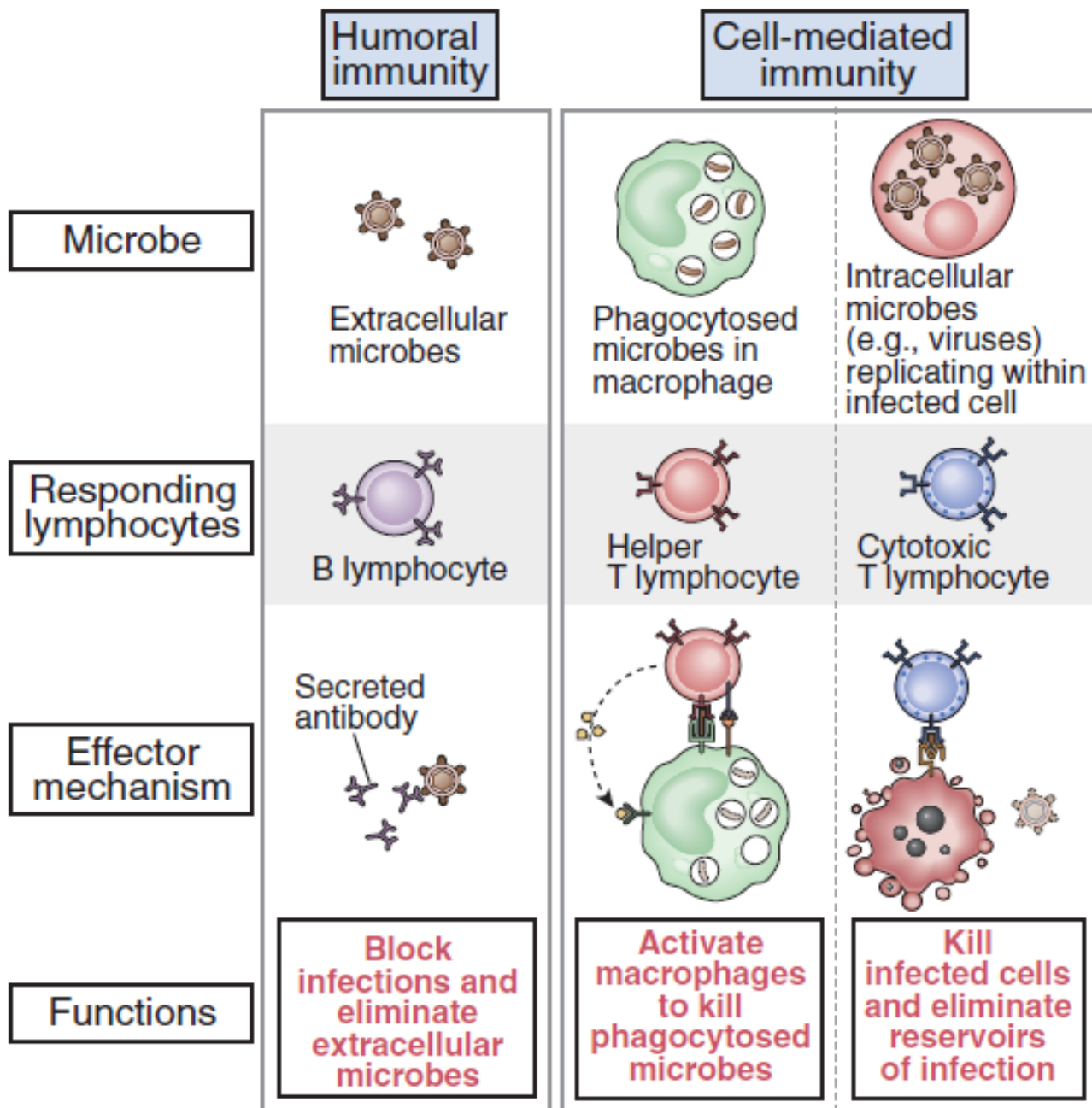
**FIGURE 1-3 The principal mechanisms of innate and adaptive immunity.** The mechanisms of innate immunity provide the initial defense against infections. Some of the mechanisms prevent infections (e.g., epithelial barriers) and others eliminate microbes (e.g., phagocytes, natural killer [NK] cells, the complement system). Adaptive immune responses develop later and are mediated by lymphocytes and their products. Antibodies block infections and eliminate microbes, and T lymphocytes eradicate intracellular microbes. The kinetics of the innate and adaptive immune responses are approximations and may vary in different infections.

## **Types of Adaptive Immunity:- two types of adaptive immunity,**

- 1-humoral immunity and***
- 2-cell-mediated immunity***

**Humoral immunity:-** is mediated by proteins called **antibodies**, which are produced by cells called **B lymphocytes**. Antibodies are secreted into the circulation and mucosal fluids, and they neutralize and eliminate microbes and microbial toxins that are present outside of host cells, in the blood and in the lumens of mucosal organs, such as the gastrointestinal and respiratory tracts.

- Another important difference between B and T lymphocytes is that most T cells recognize only protein antigens, whereas antibodies are able to recognize many different types of **molecules, including proteins, carbohydrates, and lipids.**



**FIGURE 1-4 Types of adaptive immunity.** In humoral immunity, B lymphocytes secrete antibodies that eliminate extracellular microbes. In cell-mediated immunity, T lymphocytes either activate macrophages to destroy phagocytosed microbes or kill infected cells.