



SECTION  
**31.3**

IMMUNE RESPONSES  
**Reinforcement**

**KEY CONCEPT** The immune system has many responses to pathogens and foreign cells.

Inflammation and fever are called nonspecific immune responses because these responses occur the same way for every pathogen.

- **Inflammation** occurs when white blood cells release chemicals that cause blood vessels to become leaky, allowing phagocytes to squeeze out of the circulatory system and toward an infection site.
- Increased body temperatures during a low fever speed up the production and maturation of white blood cells that fight infection.

In specific responses, specialized cells fight specific pathogens. White blood cells can identify pathogens because pathogens have protein markers, called **antigens**, on their surfaces. After a specific immune response occurs, **memory cells** are formed. These cells remember the pathogen, and they are ready to fight immediately if they ever encounter the pathogen again.

- In **cellular immunity**, T cells are the main player. When they encounter specific antigens, they become activated and divide. The activated T cells will destroy the pathogens and the infected cells in the body.
- **Humoral immunity** relies mostly on B cells. When a T cell activates a B cell, the B cell divides and matures. Then the B cell produces antibodies that cause the pathogens to clump, burst or become inactive.

White blood cells will recognize any particle or cell that is not the same as the other cells in the body. If a person gets an organ transplant, the immune system will probably notice that this tissue’s protein markers are different and attack the tissue. **Tissue rejection** occurs with the immune system attacks a transplanted tissue. People who receive organ and tissue transplants usually have to take medications that will weaken their immune system so that their white blood cells do not destroy the donated tissue.

1. How do inflammation and fever help the immune system?

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2. How can white blood cells tell the difference between body cells and pathogens?

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3. What type of white blood cell functions in cellular immunity? Humoral immunity?

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4. Why do white blood cells sometimes cause tissue rejection?

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