

## Adaptive Immune Response

### Read Chapter 23.4

#### Fill in the blanks

1. The lymphocytes are the \_\_\_\_\_ cells and the \_\_\_\_\_ cells.
2. An \_\_\_\_\_ is any molecule on the surface of an infectious organism that can be recognized by an immune cell.
3. There are millions of B cells and T cells with different \_\_\_\_\_ that bind to specific antigens.
4. B cells mature in the \_\_\_\_\_ and T cells mature in the \_\_\_\_\_.
5. Immune tolerance is important for preventing the immune system from attacking food, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
6. Central tolerance occurs in the bone marrow and thymus, peripheral tolerance occurs in the \_\_\_\_\_.
7. Helper T cells cannot directly kill pathogens, they must be activated by an \_\_\_\_\_ cell and then they activate other immune cells.
8. The 3 APCs are \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
9. Phagocytes recognize pathogen surface molecules called \_\_\_\_\_ that bind to pattern recognition receptors on the phagocyte.
10. Antigen-presenting cells engulf pathogens and then use \_\_\_\_\_ to digest them and then present microbe fragments on (MHCI or MHCII) \_\_\_\_\_.
11. \_\_\_\_\_ cells express antigen on MHCI molecules.
12. \_\_\_\_\_ cells bind to antigen presented on MHCI
13. \_\_\_\_\_ T cells kill virus-infected cells and cancer cells.
14. \_\_\_\_\_ T cells activate other immune cells.
15. \_\_\_\_\_ T cells have a CD4 coreceptor.
16. \_\_\_\_\_ T cells have a CD8 coreceptor.
17. The cell-mediated response involves \_\_\_\_\_ cells and the humoral response involves \_\_\_\_\_ cells.

18. When an antigen-presenting cell, such as a macrophage, binds to a helper T cell with the matching receptor, the \_\_\_\_\_ cell secretes IL-1 and the \_\_\_\_\_ cell secretes IL-2.
19. IL-\_\_\_ acts as a paracrine signal and causes helper T cells to produce IL-2.
20. IL-\_\_\_ acts as an \_\_\_\_\_ signal and causes helper T cells to proliferate as well as a paracrine signal causing other immune cells to proliferate.
21. Fill in the blanks with TH1, TH2, T reg cells (TH17 or TH3) (you may use them more than once)
- \_\_\_\_\_ regulatory cells that reduce the immune response
  - \_\_\_\_\_ activate B cells
  - \_\_\_\_\_ tolerate benign molecules such as food
  - \_\_\_\_\_ help prevent immune cells from attacking self cells
  - \_\_\_\_\_ activate cytotoxic T cells
22. Cytotoxic T cells primarily target (intracellular or extracellular) \_\_\_\_\_ pathogens.
23. Cytotoxic T cells kill infected cells using \_\_\_\_\_.
24. B cell receptors are called \_\_\_\_\_.
25. B cells (can or can't) \_\_\_\_\_ bind directly to pathogens.
26. Once activated, B cells differentiate into \_\_\_\_\_ cells that secrete \_\_\_\_\_.
27. When an antibody binds to a pathogen and acts like a label that attracts phagocytic cells, this is called \_\_\_\_\_.
28. Memory cells play an important role in killing organisms we have already been exposed to, called a \_\_\_\_\_ immune response.
29. Cross-reactivity is when immune memory cells recognize (similar or different) \_\_\_\_\_ pathogens compared to previous infections.
30. Pathogens (change or stay the same) \_\_\_\_\_ over time.
31. The hormone \_\_\_\_\_ is a stress hormone that inhibits the immune system.