

The Immune System: Humoral Immunity

1. Antibodies can be found on the plasma membrane of _____ (where they act as antigen receptors) or free in the extracellular fluid, here they are known as _____.
2. Antibodies consist of two types of polypeptide chains:
 - Two _____ chains—located on the inside of the Y-shaped molecule
 - Two _____ chains—located on the outside of the Y-shaped moleculeThe chains are held together by _____ bonds.
3. Each chain has a _____ region which is unique for each antigen and a _____ region which is the same for each antibody in a given class of antibodies.
4. Each arm of the Y-shaped antibody has identical _____ sites. The shape of these sites must match the shape of the _____ on the antigen in order to bind.
5. The stem of the Y-shaped antibody determines how it will interact with other components of the immune system. Complete the following examples given in this topic:
 - Whether the antibody remains _____ to the B cell
 - Whether it activates the _____ system
 - Whether it acts as an _____ to promote phagocytosis
 - Whether it can be joined with other antibodies to form a _____ (pair) or _____ (5 antibodies)
 - Determines the _____ pattern—how it travels through the body
6. Name the five classes of antibodies, each with a distinct type of stem:
 - _____
 - _____
 - _____
 - _____
 - _____
7. Complete the list of four contributions of IgG antibodies:

- Constitutes the _____ of circulating antibodies
- Formed in the late _____ and throughout the _____ immune response
- Provides _____ to the fetus
- Can be transferred from one individual to another (example of _____ immunity)

8. Match the characteristics listed below to the correct antibody. Choose either IgM or IgA.

- These antibodies are found in secretions of tears, sweat, and saliva _____
- First antibodies secreted in response to a new antigen _____
- Retained as monomers on the surface of B cells _____
- Found in the mucosa of the gastrointestinal tract _____
- Found in breast milk _____
- Secreted as pentomers _____

9. IgE is produced as a result of the body's infestation with _____. Which white blood cell is important to combat this infestation? _____

List the two key factors in the production of IgE:

- _____
- _____

10. In modern, industrialized countries, the most common function of IgE is its role in _____ responses. When exposed to an _____ such as pollen, the body makes IgE antibodies.

11. The first exposure to an antigen is called _____. As a result, IgE antibodies are present on _____ and _____. During the second exposure, the allergen causes the release of _____ and other inflammatory mediators.

12. As a result of the actions of the chemical released in question 11, the affected person gets a runny nose (due to _____) and has difficulty breathing (due to _____).

13. _____ are drugs that bind and block histamine receptors, thus alleviating the allergy symptoms.
14. Allergic reactions to peanuts can be very serious, causing a systemic allergic reaction known as _____.
15. IgD antibodies are located on the surface of _____ cells and act as an antigen receptor. They participate in activating the _____ cell.
16. There are four general ways that antibodies work (to remember: PLAN). Fill in the following:
- P—act as opsonins to destroy pathogens by _____
 - L—initiate complement activation resulting in _____ of the pathogen
 - A—cause _____, the clumping of molecules, which enhances phagocytosis
 - N—cause _____, which prevents toxins and viruses from interacting with body cells
17. List the 3 key points for B cell activation:
- B cells respond to _____ antigens.
 - These antigens are concentrated in the _____.
 - B and T cells continually _____ and congregate in the _____
(where the antigens are concentrated).
18. When naïve B cells encounter their specific antigen (usually in the _____ of the lymph node), the antigen is brought into the B cell by _____. The peptide fragments of the antigen are displayed on the surface of the cell bound to _____ proteins.
19. B cells then migrate deeper into the cortex where T cells are found. In most cases, full activation of B cells requires the assistance of _____ cells. These are known as “T cell-_____ antigens.”
20. If the T cell recognizes the antigenic fragment bound to the _____ protein on the B cell, the T cell binds to the B cell and _____ are released from the T cell. The exchange of signals between the B and T cells is called _____.

21. _____ cells are not needed for certain antigens such as polysaccharides. These antigens are known as “T cell-_____ antigens.” These are generally (stronger or weaker) responses.
22. When the antigen has selected an appropriate B cell, the B cell will produce effector cells. Some B cells will move deeper into the _____ and begin to secrete _____ antibodies, while others move to the germinal centers.
23. Name the three events (summarized below) that happen in the germinal centers to the offspring of the original, activated B cell:
- _____; results in antibodies that are highly selective for the antigen
 - _____; results in the cells producing IgG, IgA or IgE antibodies
 - _____; results in cells becoming plasma cells or memory cells
24. Humoral immunity can be acquired either actively or passively. Define each and give an example of the naturally and artificially acquired forms.

Active Immunity: _____

• Naturally acquired: _____

• Artificially acquired: _____

Passive Immunity: _____

• Naturally acquired: _____

• Artificially acquired: _____