The Immune System: Common Characteristics of B and T Lymphocytes

1. Shared features of B and T lymphocyte function include:
   • _______________________________________
   • _______________________________________
   • _______________________________________
   • _______________________________________

2. Lymphocytes must distinguish between normally occurring internal antigens called _______________ and those external to the body. The ability to distinguish between the pathogens depends on the _______________ of the lymphocyte antigen receptors.

3. Specificity of B and T cells depends on their ability to recognize _______________. They have the ability to do this because their surface is covered with 10,000 to 100,000 _______________ receptors. All of these receptors on a specific B cell are identical; thus, the cells bind optimally with only one _______________.

4. The antigen receptor on a B cell is an immunoglobulin, which is Y-shaped and basically a membrane bound ____________.

5. The T cell receptor recognizes antigen fragments housed in cell membrane proteins called “________________________________” (_____) proteins.

6. The immune system can develop receptors for a specific antigen before that antigen enters the body. Lymphocytes make a wide variety of receptors, and when an antigen binds and activates one of these receptors, the cell divides, making many ________. This process is called__________________________.

7. Our bodies make approximately _______________ different types of lymphocyte antigen receptors. With only 25,000 different genes in our body, how can so many antigen receptors be made?
   • ____________________________________________

8. Receptors have two regions. The _____________ region is the same for all antigen receptors, while the _____________ region is specific for an antigen.
9. The ______________ and __________ are primary lymphoid organs because the B and T cells originate and/or mature in these organs. To become immunocompetent, B and T cells must accomplish two things:

• ______________________________________
• ______________________________________

10. Immature T cells migrate to the thymus. In the outermost cortex they form new ______________

They then migrate to the __________ to test these new receptors.

11. T cells recognize antigens by binding to ______ proteins on an antigen presenting cell such as a dendritic cell. This process is known as __________ selection. If T cells fail to recognize this protein, they die by a process known as __________.

12. If a T cell recognizes this protein (the one mentioned above), it is then tested for recognition of ______________ the body’s own antigens. This process is known as ______________ selection. Immature T cells that do not recognize the body’s own antigens are called ______________ and allowed to mature.

13. If lymphocytes attack the body’s own cells, this will result in a/an ______________ disease.

14. Below is a list of diseases that result when the immune system attacks the body’s own cells. State what cells the immune system is attacking in each disease.

• Grave’s Disease: ______________
• Type I diabetes: ______________
• Multiple sclerosis: ______________
• Hemolytic anemia: ______________

15. These diseases may occur as a result of what three events mentioned in this Topic?

• ________________________________
• ________________________________
• ________________________________
• ________________________________
16. _______ lymphocytes are lymphocytes that have not encountered their one specific antigen. What is the best method for the lymphocyte to find its antigen?
   • _______________________

17. The T cell becomes activated when it encounters its antigen. The T cell then undergoes repeated cell division known as ___________________________. During this process, two basic types of cells are produced:
   • _____________ cells, which attack the antigen-presenting cell
   • _____________ cells, which remain to be reactivated if the antigen is ever encountered again

18. When an antigen activates a B cell, the cloned _________________ (effector cells) secrete antibodies in about 7 days. This is known as the ______________ immune response.

19. When exposed to the same antigen again, the _____________ B cells generate a _____________ immune response. This response is generated (faster or slower) and produces a _____________ number of effector cells.

20. The purpose of _________________________ is to generate memory cells, thus protecting us without the risk of getting sick.