

Study Guide Chapter 21 (3 of 3)
The Lymphatic and Immune System

33. What characteristics distinguish immunity from nonspecific resistance?
34. Immunity was first “recognized” as early as 500 BC. In the mid-1900’s it was recognized that there are two types of immunity: cellular immunity and humoral immunity.
- a. What is humoral immunity effective against?
 - b. Why do we say that humoral immunity only works against the “extracellular” stage of the infection?
 - c. What is cellular immunity effective against?
 - d. Can pathogens “hide” from cellular immunity?
 - e. Why do we say that cellular and humal immunity can work against the same infection but in different ways?
35. In question one you looked at one way of classifying your immune system. What is another way to classify your immune system using four different categories?
- a. What does “active immunity” imply?
36. An antigen is anything that triggers an immune response.
- a. Are antigens large or small?
 - b. What do we mean by “self” and “non-self”?
 - c. What is an epitope?
 - d. What is a hapten?

Lymphocytes and macrophage are the major cells of the immune system. We have already studied macrophage and natural killer cells (a type of lymphocytes). Now we need to look at two lymphocytes called T-cells and B-cells.

37. T-cells’ life cycle consists of three stages: birth, training and deployment.
- a. Where are T-cells born?
 - b. Where do T-cells become immunocompetent?
 - c. What happens to the T-cells to make it immunocompetent?
 - d. Thymic reticular cells “test” T-cells to see if they are capable of becoming functional immunocompetent T-cells.
 - i. What is negative selection? What are the two forms?
 - ii. What percent of T-cells actually become functional immunocopotent T-cells?
 - iii. What is positive selection? Where do these cells go?

38. B-cells are produced in the red bone marrow and stay there to become immunocompetent. Like T-cells, they need to pass a test to become functional B-cells.
- What do self-tolerant B-cells produce on their plasma membranes?
39. As a general rule, T-cells can not recognize antigen by themselves. They need the help of antigen-presenting cells.
- What are some of the cells that function as APCs?
 - What is a major histocompatibility complex?
 - What is a MHC protein? Where are they produced and where do they go?
 - If the MHC protein is the hot dog bun, what is the hot dog?
 - Who is going to eat the “bun and hot dog”?
 - What molecule is used to signal that the meal was eaten?

There are three classes of T-cells (cytotoxic T-cells, helper T-cells, and memory T-cells). These cell lines work together to provide cellular immunity. You need to understand the process in terms of three different stages: **recognize, react and remember**.

40. You already know about MHC proteins. Now we need to introduce two types of MHC proteins (type I and type II).
- What type of cells have type I MHC proteins?
 - If the hot dog bun picks up a self antigen in the cytoplasm and presents it on the cell's plasma membrane, what happens?
 - If the hot dog bun picks up a virus protein or cancer type protein in the cell's cytoplasm and presents it on the cell's plasma membrane, what happens?
 - Key Idea: What type of cell recognizes MHC I proteins?**
 - What type of cells have type II MHC proteins?
 - What do MHC II proteins display on their cell's membrane?
 - Key Idea: What type of cell recognizes MHC II proteins?**
41. What is clonal selection?
42. Helper T-cells perform a “central” role in the overall immune response. After a helper T-cell recognizes an antigen-MHC II complex, it releases interleukins, a signal molecule.
- What three events are triggered by the release of interleukin by the helper T-cell?
 - If you do not have healthy helper T-cells, can you respond to foreign pathogens?
43. What is the primary role of cytotoxic T-cells? What is a lethal hit?

44. What are memory T-cells? What “type” of T-cells become memory T-cells?

B-cells provide a more indirect method of defense than the T-cells. B-cells are going to “tag” the toxin, host cell, or foreign cell in such a way so that other defensive mechanisms can eliminate the problem. However, humoral immunity like cellular immunity takes place in three stages: recognition, attack and memory.

45. What do B-cells have on their plasma membranes?

- a. What is the role of receptor-mediated endocytosis?
- b. What is the role of MHC II protein?
- c. What is the role of helper T-cells?
- d. What happens in clonal selection?
- e. What happens in differentiation?
- f. What happens in the attack stage?
 - i. What do we call the molecule that attacks the antigen?
 - ii. How many of these molecules does one cell make in one second over what period of time?

46. What are the five different classes of antibodies?

- a. Which antibodies are used as the B-cell surface receptors?
- b. Which antibody can cross the placenta and provide natural passive immunity to a newborn?
- c. Which antibody can be acquired in breast milk to provide the newborn natural passive immunity for the first 2 or 3 days of breast feeding?
- d. What are the four mechanisms used by antibodies to render the antigen harmless?
- e. Do the antibodies directly destroy an antigen?

47. When B-cells are first exposed to an antigen it is called the primary response.

- a. How long does it take before you see the first antibodies after being exposed to an antigen for the first time?
- b. How is a secondary response different and what type of cell allows for this to happen?

48. What is hypersensitivity?

49. What are allergies? Give examples of common allergens:

50. One classification system recognizes four kinds of hypersensitivity.

- a. What are the four different types of hypersensitivity?
- b. How are these hypersensitivities characterized and give an example of each type?