Immunology, BIOL 537
Spring 1998
Exam # 1

Name ____________________________

I. Multiple Choice (3 points each) [30 points]

1. Which of the following statements is (are) TRUE concerning innate immunity?
   A. Macrophages play an important part of the innate immune response.
   B. Factors, such of interferon, play an important role in innate responses.
   C. The inflammatory response plays an important role in removal of toxins and cellular debris.
   D. Acute-phase proteins are part of the innate immune response.
   E. All of these statements are TRUE concerning innate immunity.
   F. One of these statements is FALSE (which__________).

2. Which of the following statements is (are) TRUE concerning B lymphocytes?
   A. Each specific B cell is able to produce only one class of antibodies.
   B. Each specific B cell is able to produce an antibody specific for only one epitope.
   C. A “naive” B cell will have only one antibody class on its cell surface.
   D. Most antibody producing cells are circulating around in the blood.
   E. All of these statements of TRUE concerning B lymphocytes.

3. Which of the following statements is (are) TRUE concerning T lymphocytes?
   A. They can recognize free-soluble antigen in its native form.
   B. They migrate to the same areas as B cells in the secondary lymph organs.
   C. They have on their cell surface MHC Class I antigens.
   D. Mature T lymphocytes have both CD4 and CD8 antigens on their cell surface.
   E. More than one of these statements are TRUE (which__________).

4. Which of the following statements is FALSE?
   A. Pre-T cells lack CD4, CD8 and CD3 antigens.
   B. Mature, but naive B cells have both IgD and IgM on their cell surface.
   C. Dendritic and Langerhans cells have high levels of MHC class II antigens on their cell surfaces.
   D. Macrophages have receptors for MHC class I and II proteins on their surface.

5. Which of the following is (are) TRUE concerning thymic education?
   A. Cells that recognize self antigen and self MHC are positively selected.
   B. Cells that recognize foreign antigen and self MHC are positively selected.
   C. Cells that recognize self antigen and non-self MHC are negatively selected.
   D. Cells that recognize foreign antigen and self MHC are negatively selected.
   E. All of these statements are TRUE.
   F. More than one of these statements are TRUE (which ____________).
6. Which of the following statements is (are) FALSE?
   A. Antibodies are unable to bind to antigens when they have been processed by APC’s.
   B. Antibodies are able to enter cells across the plasma membrane and kill antigens inside of cells.
   C. Antibody producing cells are not found in the circulation.
   D. Antibodies are found in the plasma portion of the blood and can be transfer to other individuals by transfer of serum.
   E. More than one of these statements is FALSE (which ones ________________).

7. Which of the following statements is FALSE concerning inbred strains of mice?
   A. In order to obtain an inbred strain one must back cross the F₁ offspring with one of the parental strains and do this for 20 generations.
   B. Inbred strains are identical to each other at all genetic loci.
   C. One inbred mouse strain may react differently to antigenic challenge than another inbred strain.
   D. Each animal within a specific inbred mouse strain has the same self MHC molecules and the same cellular antigens.

8. Which of the following statements is (are) FALSE?
   A. When a virus is introduced into an animal system there is usually both a cellular and humoral response to that pathogen.
   B. When a bacteria is introduced into an animal system there is usually only a cellular response that will be involved in clearing the bacterial pathogen.
   C. When pollen is introduced into an animal system only a humoral response will be involved in clearing the foreign antigen.
   D. Blood transfusion reactions are mediated by antibody responses.

9. Which of the following statements is (are) FALSE?
   A. Tolerance of B cells to self antigens is acquired in the bone marrow.
   B. Tolerance can occur by a process called clonal deletion.
   C. Apoptosis is a process by which T cell tolerance occurs by active suppression due to cytokine production and release.
   D. Tolerance of B cells occurs by both a process of positive selection and then negative selection.
   E. More than one of these statements are FALSE (which ________________).

10. Which of the following is FALSE regarding the activation of T lymphocytes?
    A. T cells must interact with an antigen presenting cell that has high levels of MHC class II protein.
    B. T cells must recognize and bind to both foreign antigen and self MHC class II molecules.
    C. T cells must bind to native, soluble, antigen and bind to antibodies against MHC class II antigens in order to synthesize and release IL-2.
    D. Activated T cells are not restricted to the spleen and lymph nodes, but may circulate.
II. Fill-In (1 point each) [25 points]

11. The term ____________ refers to the antigenic determinants of protein molecules.

12. _______________ is the term that refers to programmed cell death.

13. The _____ arises on a T cell as the cell migrates from the cortex of the thymus to the medulla, and is specific for foreign antigen.

14. _______________ is the term that is used to describe the ability of macrophages to engulf and digest foreign particles.

15. The term _______________ refers to transplants of organs that occur between non-identical individuals of the same species.

16. _______________ is the term used to designate transplants between identical individuals of the same species.

17. One type of granulocytic white blood cell that is highly phagocytic is the ________________.

18. The blood cell that is the precursor for all the types of blood cells is called the ____________ stem cell.

19. The antibody class that is able to cross the placental barrier is ________.

20. The antibody class that is present on mature B cells is ________.

21. The term that refers to the state of immune non-responsiveness is ________________.

22-23. There are two cell types that are highly related but are found in different environments in the body: ___________ is a cell type that is circulating while the ______________ is tissue “fixed”.

24. Clonal expansion of B cells after antigen stimulation occurs in the ______________ of the spleen.

25. Within the microenvironment of the bone marrow specific cytokines, called ______ ________ ________ ________ influence the direction of maturation in which the cells develop.

26. The term CAM stands for ___________ ___________ ____________.

27. The thymic ______________ contains only the highly educated, mature T lymphocytes.

28-29. The T_cytotoxic lymphocyte has the CD____ protein and it is able to bind to MHC class ____ on APC’s.
30. In order to become activated in response to IL-2, the T cell needs to have on its cell surface an _________________.

31. A mouse that has a specific gene mutated so that its protein is not present at all is called a ________________ mouse.

32-33. The condition in which both the humoral and cellular immune responses are dysfunctional in animals is called ________________, and is due to a dysfunctional ________________.

34. Western blots test for the presence and amount of ______________ using antibodies to label the nitrocellulose.

35. A ______________ blot is able to measure and quantitate mRNA levels in cells.

III. Short Answer:

36. From the answers given in question #8 (multiple choice question) discuss why you thought each one was either TRUE or FALSE. (2 points for each A-D) [8 points]

37. List the 4 differences between what/how a B cell/antibody recognizes on an antigen and what/how a T cell recognizes antigen. (8 points)
38. Define and discuss Four (4) of the following: (if you answer all five the last one will be counted as a BONUS) [3 points each] [12 points].

A. Tolerance (what it is and how it is created)--

B. Negative selection--

C. Positive selection--

D. Erythroblastosis fetalis--

E. Explain in immunological terms why there is a Universal Blood Donor and a Universal Recipient--