Immunology Practice Questions

Introductory Medical Microbiology And Immunology (The University of British Columbia)

MICB 202 – 2011W

Immunology Review Questions - Topics 1 and 2.

1. What are the functions of Pattern Recognition Receptors (PRRs)?

2. Person A was born with a genetic defect that results in an inability to produce complement component C3. Person B was born with a different genetic defect and is unable to produce complement component C5. Who would have a more difficulty in eliminating a bacterial infection? Why?

3. You surgically remove the thymus from both a newborn mouse and an adult mouse. What effects would this have on the newborn mouse, and what effects would this have on the adult mouse? Explain the differences or similarities.

Immunology Review Questions - Topic 3.

4. What are three major differences between class I MHC molecules and class II MHC molecules?

5. Why is it important that T cells undergo positive and negative selection during their development? What type of selection do B cells undergo during their development? What are the roles of positive and/or negative selection in each maturation pathway?

6. For a T cell to be activated, two "signals" are required. What is signal #1? What is signal #2? Why is it important to require two signals to activate the T cell? What happens if the T cell only receives one signal?

7. The innate and adaptive immune systems work together to maximize the protection against infection by pathogens. What are some of the interactions between the proteins/cells of the innate and adaptive immune systems?

Immunology Review Questions - Topic 4.

8. How does the human body defend itself against extracellular bacterial infections? Describe more than one defense mechanism. Indicate whether each mechanism is part of the innate immune responses or the adaptive immune responses.

9. Why is cell-mediated immunity required in the case of intracellular bacterial infections? What cell types are involved in this response? Why is humoral immunity insufficient in eliminating the infection?

10. Are cell-mediated immune responses the only type of immune responses occurring during a viral infection? If not, what other immune responses would be occurring, and what would be their function?

11. When it is more appropriate to develop a humoral or antibody-mediated response? When it is more appropriate to develop a cell-mediated response?

12. What type of response(s) do you develop when you are immunized with inactivated poliovirus vaccine? Explain. In this vaccine, the virus particles are treated with formaldehyde, and the viruses are not capable of infecting cells.

Immunology Review Questions - Topic 5.

13. Provide a definition of hypersensitivity and what are two subclasses that exist in the human body? How are they alike? How are they different? (think about effector mechanisms, cell types, speed of action etc)

14. Explain the proposed mechanism behind allergy shots. How are they thought to reduce the severity of allergic symptoms?

15. Explain the basis for MHC based graft rejection? Identify the specific selection process and what it does as well as where it occurs and when.

Immunology Review Questions - Topic 6.

16. In a particular immunodeficiency disease, patients' B-cells are unable to express MHC class II. MHC expression in all other cells is normal. In terms of the immune-system cells and their activation in response to a thymus-dependent antigen, what would be the consequences of this disorder? Be as specific as possible.

17 Any one of the genetic changes listed below could produce immunodeficiency. For each one, indicate whether the immunodeficiency would likely be very severe or less severe and whether the individual would have difficulty responding to intracellular pathogens, extracellular pathogens or both.

    a) A mutation that results in the inability to make complement component C3.
    b) A mutation that results in the failure of T cells and B cells to develop TCRs and BCRs respectively.
    c) A mutation that interferes with the interaction between tapasin and MHC class I during peptide loading.

18. X-linked agammaglobulinemia is a hereditary inability to make antibodies. Male patients born with this condition have normal number of T cells but the development of B cells is arrested before the immature B cell stage.

    a) These children are often well for the first six months of life, then seem to have recurrent infections. How would you explain this observation?
    b) What types of pathogens are mostly like to cause recurrent infections in boys born with X-linked agammaglobulinemia?
    c) What would be a suitable treatment option to keep these children healthy and minimize the occurrence of infections?

19. HIV infections results in the decline of a specific subset of cells of the immune system. Why are immune responses severely compromised as a result of the loss of this cell type?

Immunology Review Questions - Topic 7.

20. What advantages do monoclonal antibodies have over polyclonal antibodies preparations, especially with regard to standardization of antibody preparations? What are some of the useful applications of monoclonal antibodies in both medicine and research?

21. Human red blood cells do not express MHC on their surface. Why is it still necessary to "type" the blood prior to transfusing it into the recipient?

22. ELISAs depend on 2 populations of antibodies; a primary antibody to interact with the substance in question, and a different, labeled, "detecting" antibody (called the secondary antibody) that interacts with either the primary antibody or the captured substance. How can we make a secondary antibody that would be directed against our primary antibody? What part of primary antibody would this new antibody most likely bind to? Explain.

23. An ELISA test is conducted to determine if a patient has been exposed to HIV. In such an ELISA, what is used to coat the wells of the ELISA plate? What is being detected in our patient?

24. Draw the following FACS graphs based on the information given.

    a) A population of blood cells using antibodies against the BCR and the TCR as the detecting antibodies.
    b) A population of blood cells from a person suffering from SCID using antibodies against the BCR and the TCR as the detecting antibodies.
    c) A population of blood cells using antibodies against CD3 and Igα/β as the detecting antibodies.
    d) A sample composed of T cells and macrophages using antibodies against CD4 and CD28 as the detecting antibodies.
    e) A sample composed of B cells and macrophages with antibodies against CD40 and MHC class I as the detecting antibodies.