

## Immunology (BE141201)

### Major Test

Date: November 30, 2005

Total Marks: 40

Time: 2 Hours

#### Answer any 8 questions

1. a) State if the following statement is correct and justify your answer. 2

"An antigen recognized by a particular IgG1 is also recognized by IgG2 but it is not recognized by IgG3".

b) The DNA for an H chain in a B cell making IgG1 antibody for diphtheria toxin has the following structure: 5' -V<sub>17</sub>D<sub>5</sub>J<sub>2</sub>C<sub>γ</sub>4 - 3'. How many individual rearrangements were required to go from the embryonic DNA to this B cell DNA if it passes through IgG<sub>2</sub>? Show the order in which different modules rearrange to make the final product. 3

2. Complete the table below by predicting the effects of a complete deficiency of each of the complement proteins listed at the top of the chart on the activities shown in the left hand column. Use the notation N = no inhibition; P = partial inhibition; C = complete inhibition. 5

	C1	C3	C4	C5	C9	Factor B	C11NH
Activation of alternative C3 convertase							
Activation of classical C3 convertase							
Activation of alternative C5 convertase							
Activation of classical C5 convertase							

3. Influenza virus is an enveloped virus that infects primarily respiratory epithelial cells,

P.T.O.

but during the course of the infection respiratory tract dendritic cells also become infected and carry the virus to nearby lymphoid tissue, where they present it to lymphocytes. Describe how the virus would be processed and presented by these infected dendritic cells. To what cells would they present the antigens? Optimally, how long will be the peptide antigen that is presented by such cells and what is the significance of the length of such peptides? 5

4. What are the significant differences between T-cell and B-cell epitopes? 5

5. You have obtained a preparation of purified albumin from normal bovine serum. To determine whether any other serum proteins remain in the preparation what assay procedure (method of choice) you would use? 5

i) For the method of choice, what antigen would you use to prepare the antiserum needed to detect the impurities in the BSA preparation?

ii) Assuming that the BSA preparation is pure, draw the immunoelectrophoretic pattern you would expect if the assay was performed with bovine serum in one well, the BSA sample in the second well, and the antiserum you prepared in (a) in the trough between the wells.

6. Diagrammatically represent the proposed pathways for T-cell development in the thymus. 5

7. Describe the antigen dependent and independent phases in the B-cell development. 5

8. a) What are the advantages and disadvantages of using attenuated organisms as vaccines? 2

b) You have developed a synthetic peptide vaccine representing an immunodominant T-cell epitope for strain A mice. When the vaccine is tested in strain B mice, no T-cell response occurs. What is the most likely explanation for this finding? How could you test this hypothesis? 3

9 a) Write about cytokine antagonists. 2

b) Briefly describe the similarities and differences among cytokines, growth factors, and hormones. 3

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