

**Term Test 1: MICR422                      September 28, 2001**

You have 45 minutes to complete this test. Except where specified, you should answer in complete sentences and/or essay format. Diagrams are acceptable additions to essays, however are NOT a substitute for a coherent, written answer. Try and keep your answers confined to the space provided, but you may use the back of the page if necessary. The TOTAL marks for each question, 1-6, are shown in the margins.

5 marks

1. **Indicate to which branch (es) of the immune system the following statements apply, using H for the humoral branch and CM for the cell-mediated branch. Some statements may apply to both branches.**

- a).   H,CM   Involves T helper cells.  
 b).   CM   Involves CD8+ T cells  
 c).   H   Involves secreted antibody  
 d).   CM   Kills virus-infected self-cells  
 e).   CM   Kills tumor cells.

5 marks

2. **Match the cell types most commonly associated with each of the following surface molecules. Some molecules may be present on more than one cell type, or not on any.**

**Cell Type:**

Class I MHC-Restricted T cell	CD3, CD8, (MHC Class I)
B cell	CD19 CD21 (MHC Class I, MHC Class II)
Tissue Macrophage	MHC Class I, MHC Class II

**Surface Molecules:** CD3, CD4, CD8, CD19, CD21, CD28, MHC-Class I, MHC-Class II.

5 marks

3. For each type of cell indicated (a-m), select the most appropriate description (1-9) listed below. Each description may be used once, or not at all .

**Cell Types:**

a. Myeloid Stem Cells	8
b Kupffer Cells	2
c. Langerhans Cells	9
d. M Cells	1
e. Bone-marrow stromal cells	6

- Specialized epithelial cells found in MALT
- Macrophages found in the liver
- Circulating blood cells that differentiate into macrophages in the tissues
- Dendritic cells found exclusively in afferent lymph and lymph nodes
- Blood-borne, circulating dendritic cells
- Secrete colony-stimulating factors (CSFs)
- Give rise to thymocytes
- Give rise to red blood cells
- Dendritic cells found in the epidermis and mucous membranes

10 marks

4. For each of the following statements, indicate whether it is true only of B-cell epitopes (B), only of T-cell epitopes (T) or both types of epitopes (BT) within a large antigen.

- T They always consist of a linear sequence of amino acid residues
- T They generally are located in the interior of a protein antigen.
- B They generally are located on the surface of a protein antigen.
- B They lose their immunogenicity when a protein antigen is denatured by heat.
- T Immunodominant epitopes are determined in part by the MHC molecules expressed by an individual.
- B,T Multiple different epitopes may occur in the same antigen.

g) B\_\_\_\_\_ Their immunogenicity may depend on the three-dimensional structure of the antigen.

h) B, T\_\_\_\_\_ The immune response to them may be enhanced by co-administration of Freund's complete adjuvant.

5. Give a SHORT, 1 sentence definition of each of the following terms.

10 marks

**Adjuvant:** \_\_\_\_\_ nonspecifically upregulates the immune response to immunogen

\_\_\_\_\_

**Agreptope:** \_\_\_\_\_ part of a peptide that binds to MHC molecules

\_\_\_\_\_

**Immunogen:** \_\_\_\_\_ stimulates an immune response

\_\_\_\_\_

**Hapten:** \_\_\_\_\_ binds to antibody, does not stimulate an immune response on its own

\_\_\_\_\_

\_\_\_\_\_

Name: \_\_\_\_\_

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**Hematopoietic Stem Cell: gives rise to all cells of the blood**\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

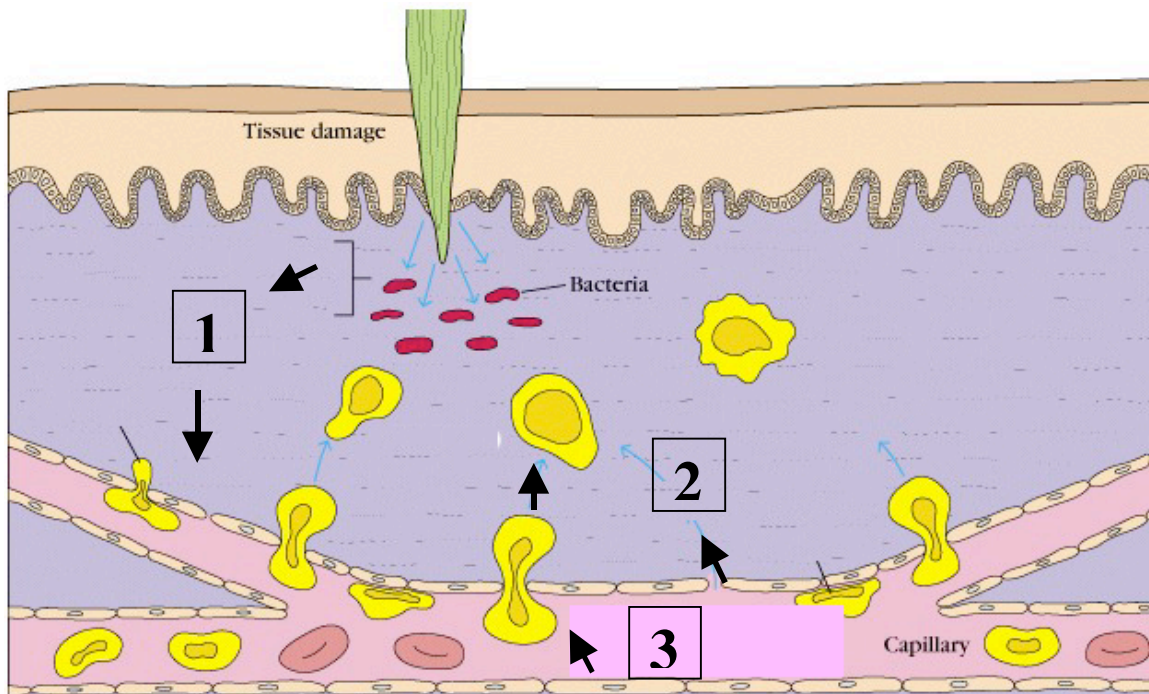
15 marks

6. Choose ONE of the following 3 topics, and write a brief (1-2 page) answer in essay format. Diagrams are permissible, but will not be accepted as a substitute for a well-written response. (15 marks).

A. Compare and contrast the four types of antigen binding molecules used by the immune system – antibodies; T cell receptors, class I MHC molecules, and class II molecules-in terms of the following characteristics:

- Specificity for antigen
- Cellular expression
- Types of antigen recognized
- Source of the antigen.

B. With reference to the below diagram, describe the soluble, vascular, and cellular changes which initiate the inflammatory response in terms of the five cardinal signs of inflammation. You should use appropriate terms to describe the important processes and factors involved in 1) immediate effects of the inflamed tissue on the blood vessel 2) changes in fluid balance by the blood vessel and 3) the response of peripheral blood leukocytes. Give examples of relevant cytokines/chemokines/chemoattractants where appropriate.



C. With reference to the below diagram, describe the process whereby lymphocytes leave the blood and enter the lymph node during lymphocyte recirculation. Name the 4 families of adhesion receptors, describe their role at each of the numbered stages, and give an example of an appropriate receptor/ligand pair at each stage of migration.

