2015

BIOCHEMISTRY

Paper – BCT – 401

(Immunology)

Full Marks – 25

The figures in the margin indicate full marks

Candidates are required to give their answers in their own words as far as practicable

Group – A

Answer ***any three*** questions

1. *(a)* Design an experiment to demonstrate that hapten-primed and carrier-primed cells are separate population.

(b) Explain why the deficiencies in any of the early components of the classical pathway (C1, C2 and C4) predispose an individual to systemic lupus lupus erythematosus (SLE).

(c) When IL - 2 is secreted by one T cell in a peripheral lymphoid organ, do all the B cells in the vicinity proliferate in response to the IL - 2 or some of them? Explain. $2\frac{1}{2}+1\frac{1}{2}+1$

2. Explain whether each of the following statements is true or false : 1×5

(a) RBC can express both MHC I and MHC II molecules.

(b) Self reactive B cells can be rescued from negative selection by editing F_C domain.

(c) The concentration of hapten can be determined by Ouchterlony method.

(d) A monoclonal antibody specific for B_2 - microglobulin can be used to detect both class I MHC K and D molecules on the surface of cells.

(e) V_K gene segments sometimes join to C_λ gene segments.

3. *(a)* What are the roles of HLA – DO and HLA – DM molecules in process of antigen presentation by MHC II molecule?

(b) Why does VDJ recombination give additional diversity in TCR gene than in BCR gene? Explain.

(c) Passively administered horse antitetanus serum to an individual cause serum sickness suggest how could you prepare an antibody (antitetanus) that would not produce serum sickness. $2+1\frac{1}{2}+1\frac{1}{2}$

4. For each incomplete statement below, select the phrase(s) that correctly completes the statement (more than one choice may be correct) : 1×5

(a) Atopic dermatitis is

(i) Type II hypersensitivity

(ii) Type IV hypersensitivity

(iii) Type I hypersensitivity

(iv) Type IV hypersensitivity

(v) Mediated by T_{DTH} cells.

(b) The mechanism that permits Ig to be synthesized in either a membrane bound or secreted form is :

(i) recombination and DNA rearrangement

(ii) differential RNA processing

(iii) class switching

(iv) codominant impression

(v) allelic exclusion.

(c) C1 exhibitor regulates complement system as it has the following biochemical properties :

(i) it is a confactor for cleavage of C3 by factor I

(ii) it affects the classical pathway

(iii) it is a serine proteases inhibitor

(iv) it causes Clr_2s_2 to dissociate from C12

(v) it is a cofactor for cleavage of C4b by factor I.

(d) Somatic hypermutation of Ig genes accounts for

(i) allelic exclusion

(ii) class switching from IgM to IgG

(iii) affinity maturation

(iv) class switching from IgM to IgE

(v) alternative RNA processing.

(e) B cell becomes immuno competent

(i) following productive rearrangement of V_H chain and V_L chain gene legments in germline DNA

(ii) following productive rearrangement of variable – region heavy chain gene segments in germline DNA

(iii) during affinity maturation

(iv) following class switching

(v) before allelic exclusion.

5. For each of the following immunization scenarios, indicate whether anti-immunoglobulin antibodies would be formed to isotypic, allotypic or idotypic determinants : 1×5

(a) Anti-DNP antibodies produced in BALB/c mouse are injected into a C57BL/6 mouse.

(b) Anti-DNP antibodies produced in a rabbit are injected into a goat.

(c) Anti-BSA antibodies produced in a BALB/c mouse are injected into same mouse.

(d) Anti-BSA monoclonal antibodies from BALB/c mouse are injected into another BALB/c mouse.

(e) Anti-BSA antibodies in a BALB/c mouse are injected into a rabbit.

6. *(a)* How does C36 act as major opsonin?

(b) Draw a schematic diagram of S-IgA and label each of the parts and domain.

(c) Write down the steps involved in Indirect ELISA. 1+2+2

Group – B

Answer ***any two*** questions

7. *(a)* Blocking the Co-stimulatory ligands B7-1 (CD80) and B7-2 (CD86) inhibit tolerance rather than promoting it. — Explain.

(b) Briefly describe how TLR signaling activates NF – RB. $2\frac{1}{2}+2\frac{1}{2}$

8. Explain why each of the following statements is false :

(a) Infection has no role in the rate of hematopoiesis

(b) All rymphoid cells have antigen specific receptors on their membrane. $2\frac{1}{2}+2\frac{1}{2}$

9. *(a)* Briefly explain the statement —

"The development of T_H1 and T_H2 subsets is determined by the cytokine environment.

(b) Predict the functional consequence(s) for the immune system in knockout mice lacking the $\beta 2$ integrin subunit. 3+2

10. Write short notes on : $2\frac{1}{2}+2\frac{1}{2}$

(a) Antibody dependent cell-mediated cytotoxicity (ADCC)

(b) Anti-retroviral treatment.