University of Zambia
School of Health Sciences
Department of Biomedical Sciences
Immunology (BMS 3325) Test 1

Date: 31st May, 2019   **Time: 1 hr 30 minutes**

— important source of IF-g.

Section A: Answer all three questions

1. a). List three(3) functions of Th1 cells and three (3) of Th2 cells [6 marks]

   b). Mention three sources of Interferon gamma [3 marks] T cells, NK cells

   c). Mention one (1) function of Interferon gamma [1 mark] antiviral, activation of macro

2. Explain two ways in which the innate immune system links to the adaptive immune system [5 marks each]

3. State true or false for the function of each immunoglobulin in the table below [10 marks]

Function	IgM	IgG1	IgA	IgE
Neutralisation	+	↑++	↑	-
Opsonisation	-	↑+++	+	-
Sensitisation for killing by NK cells	-	↑++	-	-
Sensitisation of Mast cells	-	+	-	↑
Activation of complement system	↑	++	↑	-

Section B: Answer question one (1) and **either** question two (2) or three (3).

1. You own a biotech company specialised in vaccine production. The Lusaka province minister has given you a task to develop a vaccine for a problematic viral disease that affects political party cadres only.

   a. Explain five characteristics of a good antigen you would wish to consider when selecting your antigen [**15 marks**]

   b. In case your would be vaccine needs an adjuvant, explain two reasons for adding an adjuvant to your vaccine candidate [**5 marks**]

2. Describe five (5) functions of complement proteins. In your description, mention the key proteins that carry out the functions [**20 marks**]

3. Based on your sound knowledge of immune function and macrophage activities, discuss four (4) immune related consequences of depleted macrophage populations in your body [**20 marks**]

SECTION B: Answer ANY two (2) Questions

1. State the principles and applications of the following immunological methods:

   a) Flow Cytometry [5 marks]

   b) ELISPOT assay [5 marks]

   c) Compliment fixation test [5 marks]

   d) Cytotoxic T lymphocyte (CTL) assay [5 marks]

2. (a) Describe Class I antigen processing and how peptides get transported to the surface of the cell [12 marks]

   (b) What is the immunological relevance of cross-presentation? [2 marks]

   (c) Briefly explain how viruses such as the herpes simplex virus (HSV), adenovirus and cytomegalovirus (CMV) may use their viral evasins to block Class I antigen processing

   [6 marks]

3. Discuss the possible protective mechanisms of binding antibodies to antigens [20 marks]

The End, Best wishes!

Section B: Answer three (3) out of the four questions. Each question weighs 20 marks

1. CD4 effector T cells can be divided into different functional subsets among which include T regulatory cells. Describe in detail three mechanisms that T regulatory cells use to control adaptive immune responses [20 marks]

2. Macrophages are primary targets for many haemorrhagic fever viruses. Discuss the possible innate and adaptive immunological consequences of defective macrophages [20 Marks]

✓ 3. Discuss in detail the four main bacterial evasins and how they are able to evade both innate and adaptive immune responses [20 marks]

4. What is the tuberculin test? Discuss the main principle behind the tuberculin test and explain why this test may not be ideal for screening in developing countries [20 marks]

End of Examination

Tuberculin (PPD) Skin test

Section A: Answer all questions. Each question weighs 10 marks

1. What is fluorescence-activated flow cytometry (FACS). Explain how it might be used for diagnosing a specific T cell deficiency. Be certain to give details of the test, identify the molecules being measured and discuss the limitations to be considered when interpreting the results [10 marks].

2. Briefly explain how viruses such as the herpes simplex virus (HSV), adenovirus and cytomegalovirus (CMV) may use their viral evasins to block Class I antigen processing [10 marks].

3. You are given intestinal washings from a 6 months old baby to quantify the levels of various antibodies
   a) Which antibody will have the highest levels? [2 marks]
   b) Describe the characteristics and functions of the antibody you have mentioned in 3a [8 marks]

4. What are primary immunodeficiencies? Using a named example, point in haematopoesis where these abnormalities may occur and the resultant downstream effect [10 marks]