

The People's Democratic Republic of Algeria
Ministry of Higher Education and Scientific Research
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TD02 correction – Molecular & Cellular Immunology

Exercise 1: True or False Statements

1. **True.** The document states dendritic cells are "sentinels" and are crucial for activating the adaptive immune response by presenting antigens to T cells.
2. **False.** Macrophages present antigen fragments on their surface to T cells (specifically helper T cells, CD4+), not just to B cells.
3. **True.** The document explicitly states that B cells "act as antigen-presenting cells (APCs)" and present processed antigens via MHC-II to helper T cells.
4. **False.** While all nucleated cells present intracellular antigens via MHC-I (mainly to CD8+ T cells), "professional APCs" like dendritic cells, macrophages, and B cells are specialized for activating CD4+ T cells via MHC-II and possess co-stimulatory molecules.
5. **False.** The primary role of an APC is to capture, process, and present antigens to T lymphocytes to activate the adaptive immune response. Antibody production is the primary function of plasma cells, which are derived from B cells.

Exercise 2: Multiple Choice Questions

1. c) To capture, process, and present antigens to T lymphocytes.
2. c) Dendritic Cell
3. b) MHC-II
4. c) CCR7 (The document states CCR7 is "an essential receptor for the migration of dendritic cells to the lymph nodes").
5. c) The B Cell Receptor (BCR) (The document notes that B cells capture antigens via their specific BCR, unlike other APCs that capture a wider range of antigens).

Exercise 3: Matching

- 1 - B
- 2 - C
- 3 - A

Exercise 4: Fill in the Blanks

1. **Dendritic cells**
2. **Phagocytosis**
3. **B lymphocytes, MHC-II**
4. **CCR7**
5. **CD80/CD86, costimulation**

Exercise 5: Compare and Contrast

Complete the table to compare the three main professional APCs.

Characteristic	Dendritic Cell	Macrophage	B Lymphocyte
Primary role in antigen presentation	Activates naïve T cells; bridges innate & adaptive immunity	Presents antigens during infection; clears pathogens & debris	Presents antigens to helper T cells to get help for antibody production
Main MHC molecule used for T-cell activation	MHC-II (for CD4+ T cells)	MHC-II	MHC-II
Key mechanism of antigen capture	Phagocytosis, pinocytosis, receptor-mediated endocytosis	Phagocytosis	Specific receptor-mediated endocytosis via BCR
Presence of co-stimulatory molecules (e.g., CD80/86)	Yes (upon activation)	Yes (upon activation)	Yes (upon activation)
Migration to lymph nodes after antigen capture	Yes (key feature)	No (resident in tissues)	Can traffic to lymph nodes