

The People's Democratic Republic of Algeria
Ministry of Higher Education and Scientific Research
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TD0 correction – Molecular & Cellular Immunology

Exercise 1: Definitions

1. Innate Immunity: Innate immunity is the body's first line of defense against pathogens. It is present from birth and does not require prior exposure to the infectious agent. It includes physical barriers (skin, mucous membranes), chemical barriers (enzymes, acids) and immune cells (phagocytes, NK cells). It is not specific to a particular antigen.

2. Adaptive immunity: Adaptive immunity develops after exposure to a pathogen. It is slower to build up than innate immunity, but is pathogen-specific and retains immune memory (B-cells and T-memories) for faster responses to future infections.

3. Antigen: An antigen is a substance foreign to the body, usually a protein, which is capable of triggering an immune response. Antigens can come from bacteria, viruses, fungi, or other foreign substances.

4. Humoral response: The humoral response is the part of adaptive immunity that concerns the production of antibodies by B lymphocytes. These antibodies circulate in the blood and extracellular fluids to neutralize pathogens.

5. Cellular response: The cellular response is the part of adaptive immunity that involves the action of T cells. Cytotoxic T cells destroy infected cells, while helper T cells stimulate other immune cells.

Exercise 2: Barriers to innate immunity

1. Tears: Chemical barrier (contains lysozyme, an enzyme that destroys the walls of bacteria)
2. Gastric acidity: Chemical barrier (hydrochloric acid in the stomach kills many microorganisms)
3. Skin: Physical barrier (prevents the penetration of microorganisms)
4. Macrophages: Cell barrier (these phagocytic cells ingest and digest pathogens)
5. Neutrophils: Cell barrier (these are phagocytic cells that play an important role in defending against bacterial infections).

Exercise 3: Antibodies and Functions

1. Antibodies are produced by activated B lymphocytes (plasma cells).
2. They specifically recognize and bind to Ag.
3. The primary antibody involved in the primary immune response is IgM.
4. The antibodies participate in the elimination of pathogens by neutralization, opsonization, and complement activation.

Exercise 4: Complete the following text

Immature T-lymphocytes (pre-T-lymphocytes), generated in the bone marrow, travel to the

thymus.

In the cortex of the latter, the pre-LTs acquire a T receptor, as well as two other receptors: CD4 and CD8. Then they come into contact with cortical epithelial cells that present them with class I and class II molecules. LTs that neither recognizes either of the two MHC molecules dies by Apoptosis large proportion of LTs die as a result (positive selection).

The surviving LTs head into the medulla, where cells present them with SOI Ag. LTs that recognize these Ag with too much affinity are destroyed (negative selection).

Surviving LTs (less than 1%!) lose their CD4 or CD8 receptor: cells that react with MHC class I retain the CD8 molecule and lose CD4. Conversely, cells that bind to MHC class II lose their CD8.

Mature LTs pass into the bloodstream and move to secondary lymphoid organs where they may meet possible Ag.