Immunology English Practical Session 2 Correction

Exercise 1

Our **immune system** is composed of various cells called white blood cells or **leukocytes**. Among these cells, some are involved in specific immune reactions: the **lymphocytes**. There are two types: **B lymphocytes** produce **antibodies**; **T lymphocytes** destroy **antigens**. **Phagocytosis** is performed by different cells, the **macrophages**. It is an **emergency**, non-specific reaction. While essential, the immune defenses can also be responsible for **allergies** or **organ transplant rejection**.

Exercise 2

Phagocytosis belongs to **innate immunity**.

Steps of phagocytosis:

- **Adhesion**: Recognition of the antigen and attachment to the macrophage membrane.
- **Ingestion**: Internalization of the antigen by extension of pseudopodia and formation of the phagosome.
- **Digestion**: Fusion of the phagosome with lysosomes to form the phagolysosome, where the antigen is digested by lysosomal contents (digestive enzymes, free radicals).
- **Rejection**: The antigen remnants are expelled outside the cell, and some epitopes may be presented on the surface of the phagocytic cells.

Exercise 3

Figure 1:

- **Innate immunity (Non-specific)**: Rapid, non-specific, broad-spectrum.
- **Acquired immunity (Specific)**: Delayed, specific.

Figure 2:

- **Humoral immune response** (B lymphocytes)
- **Cellular immune response** (T lymphocytes)

Figure 3:

- **Bone marrow**: Production and maturation of B lymphocytes + production of T lymphocytes.
- **Thymus**: Maturation of T lymphocytes.

- **Peripheral (secondary) lymphoid organs**:
    - Spleen
    - Lymph nodes
    - Mucosa-associated lymphoid tissue (MALT)
    - Gut-associated lymphoid tissue (GALT)
    - Skin-associated lymphoid tissue (SALT)

These organs are sites where mature lymphocytes concentrate and make their first contact with antigens through **antigen-presenting cells (APCs)**.

Exercise 4

The swelling of lymph nodes may be due to the formation of a hernia, which is a protrusion of an organ from its original location. Lymph nodes also tend to swell in case of infection in nearby areas. This leads to an adaptive immune response in the affected nodes, triggering **multiplication and differentiation of lymphocytes**, which causes the swelling.

Exercise 5

	Result Interpretation
1	Absence of the thymus eliminates the maturation step of T lymphocytes (LT), preventing the activation of the adaptive cell-mediated immune response, normally established by T lymphocytes against grafted skin (recognized as non-self).
2	Absence of mature T lymphocytes disrupts T-B cell cooperation responsible for class switching of antibodies produced by B lymphocytes. This explains the presence of only some antibodies.
3	Absence of the bursa of Fabricius does not affect the adaptive cell-mediated response by T lymphocytes, leading to graft rejection.
4	Absence of the bursa eliminates the adaptive humoral response by B lymphocytes, so no antibodies are produced.

Bursa of Fabricius: A small gland (epithelial outgrowth of lymphoid tissue) found in the cloaca of birds. Like bone marrow in mammals, it plays an important role in forming the immune system during embryonic development and in the maturation of B lymphocytes.

Exercise 6

Agglutination occurs when complexes form between antigens and antibodies, produced following cooperation between B and T lymphocytes.

Irradiation destroys the central organ where lymphocyte maturation occurs. In this case, it is the **thymus** that is destroyed.

- **Injection of T lymphocytes alone into an irradiated mouse**: No agglutination, because B lymphocytes (which produce antibodies) are absent.
- **Injection of B lymphocytes alone**: No agglutination, because without T lymphocytes, B cells cannot proliferate or differentiate into plasma cells.
- **Injection of both B and T lymphocytes**: Cooperation between both types occurs, antibodies are produced, resulting in **agglutination**.
