

CHAPTER – 2 Social Pharmacy

Topic: IMMUNITY

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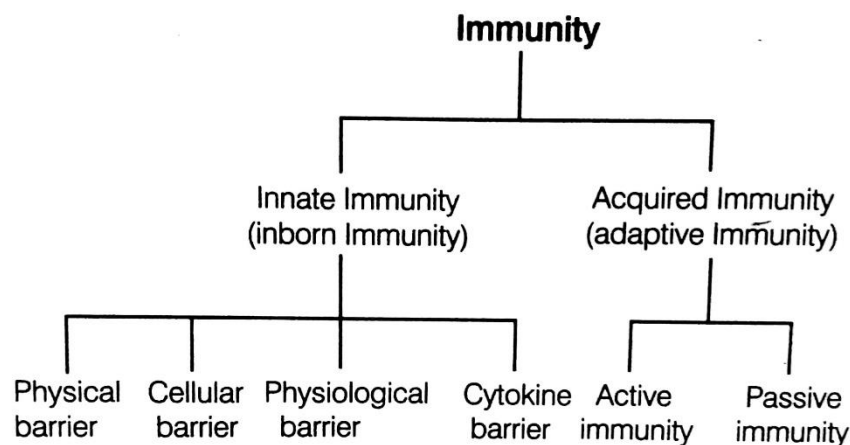
INTRODUCTION

Immunology is a branch of biomedical science that covers the study of all aspects of the immune system in all organisms. It deals with: the physiological functioning of the immune system in states of both health and diseases; malfunctions of the immune system in immunological disorder (autoimmune diseases, hypersensitivities, immune deficiency, transplant rejection); the physical, chemical and physiological characteristics of the components of the immune system in vitro, in situ, and in vivo.

Immunity is defined as the ability of immune system to produce the immune response against the disease-causing organisms like bacteria, virus, fungus, and other foreign agent.

Types of Immunity—Immunity is of two types.

- a) Innate Immunity.
- b) Acquired Immunity.



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INNATE IMMUNITY

Innate immunity is non-specific type of defense, that is present at the time of birth. This is accomplished by providing different types of barriers to the entry of the foreign agents into our body.

Innate immunity consists of four types of barriers. These are —

1. **Physical barriers:** -- Skin on our body is the main barrier which prevents entry of the micro-organisms. Mucus coating of the epithelium lining is also provide the barrier and also prevents the microbes entering in our body. It is present in respiratory, gastrointestinal andurogenital tracts.

2. **Physiological barriers:** — Due to the physiological activity of secreting substances of our body create a barrier that is, acid in the stomach, saliva in the mouth; tears from eyes—all prevent microbial growth.
3. **Cellular barriers:** — Certain type of leukocytes (WBC) of our body like polymorpho-nuclear leukocytes (PMNL-neutrophils) and monocytes and natural killer (type of lymphocytes) in the blood as well as macrophages in tissues can phagocytose and destroy microbes.
4. **Cytokine barriers:** — Virus infected cells secrete proteins called interferon's which protect non-infected cells from further viral infection.

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ACQUIRED IMMUNITY

Acquired immunity—It is the pathogen specific immunity which is characterized by memory. This means that our body when it encounters a pathogen for the first time produces a response called primary response which is of low intensity. Subsequent encounter with the same pathogen elicits a highly intensified secondary or anamnestic response.

The primary and secondary immune responses are carried out with the help of two special types of lymphocytes present in our blood that is B-lymphocytes and T-lymphocytes. The B-lymphocytes produce an army of proteins in response to pathogens into our blood to fight with them. These proteins are called antibodies. The T-cells themselves do not secrete antibodies but help B cells produce them. Different types of antibodies are produced in our body. **IgA, IgM, IgE, IgG, IgD** are some of them.

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TYPES OF ACQUIRED IMMUNITY

- A. **Active Acquired Immunity:** — When a host is exposed to antigens, which may be in the form of living or dead microbes or other proteins, antibodies are produced in the host body. This type of immunity is called active immunity. Injecting the microbes deliberately during immunization or infectious organisms gaining access into body during natural infection induce active immunity.
- B. **Passive Acquired Immunity:** — When ready-made antibodies are directly given to protect the body against foreign agents, it is called passive immunity. Example-- During the insects bite, colostrums milk (IgA).
- C.

2.5

TWO TYPES OF OUR ACQUIRED IMMUNE RESPONSE PRESENT IN OUR BODY

1. **Antibody mediated immune response**—These antibodies are found in the blood, the response is also called as humoral immune response.
2. **Cell Mediated Immunity (CMI)**—The T-lymphocytes mediate CMI. Very often, when some human organs like heart, eye, liver, kidney fail to function.
 - The body is able to differentiate ‘self’ and ‘nonself’ and the cell-mediated immune response is responsible for the graft rejection.

2.6

VACCINATION & IMMUNIZATION

- The principle of immunization or vaccination is based on the property of ‘memory’ of the immune system.
- In vaccination, a preparation of antigenic proteins of pathogen or inactivated/weakened pathogen (vaccine) is introduced into the body.
- The antibodies produced in the body against these antigens would neutralize the pathogenic agents during actual infection.
- The vaccines also generate memory – B and T- cells that recognize the pathogen quickly on subsequent exposure and overwhelm the invaders with a massive production of antibodies.

2.7

IMMUNE SYSTEM IN THE BODY

The human immune system consists of lymphoid organs, tissues, cells and soluble molecules like antibodies

Lymphoid organs—These are the organs where origin and/or maturation and proliferation of lymphocytes occur.

The primary lymphoid organs are bone marrow and thymus where immature lymphocytes differentiate into antigen-sensitive lymphocytes.

- Both bone-marrow and thymus provide micro- environments for the development and maturation of T-lymphocytes.
- The bone marrow is the main lymphoid organ where all blood cells including lymphocytes are produced.
- After maturation the lymphocytes migrate to secondary lymphoid organs like spleen, lymph nodes, tonsils, Payer’s patches of small intestine and appendix.

The secondary lymphoid organs provide the sites for interaction of lymphocytes with the antigen, which then proliferate to become effectors cells.

- The spleen is a large bean shaped organ. It mainly contains lymphocytes and phagocytes. It acts as a filter of the blood by trapping blood-borne microorganisms. Spleen also has a large reservoir of erythrocytes.
- The lymph nodes are small solid structures located at different points along the lymphatic system.
- Lymph nodes serve to trap the micro-organisms or other antigens, which happen to get into the lymph and tissue fluid.
- Antigens trapped in the lymph nodes are responsible for the activation of lymphocytes present there and cause the immune response.
- There is lymphoid tissue also located within the lining of the major tracts (respiratory, digestive and urogenital tracts) called mucosa associated lymphoid tissue (MALT). It constitutes about 50 per cent of the lymphoid tissue in human body.