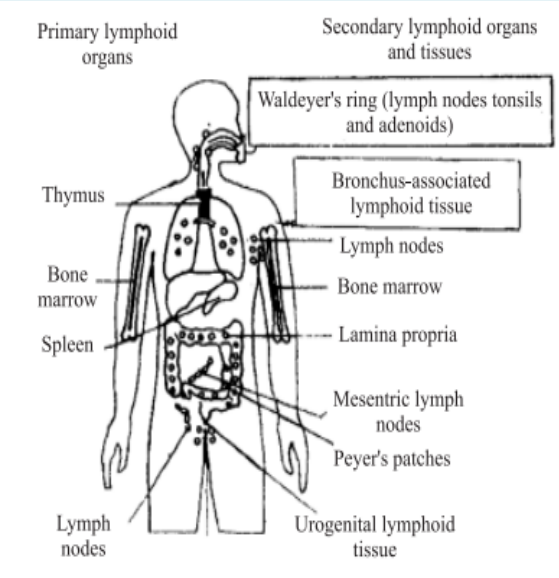
LESSON-31
IMMUNOBIOLOGY: AN INTRODUCTION

We all get infections, but some of us fall sick more frequently than others. This is related to the immune system. Proper functioning of immune system protects us from the infections.

- ✓ There are various types of defence mechanisms in our body. Immunity defends us against infections.
- ✓ Immune system is a complex network of cells, tissues and soluble factors working in close co-ordination.
- ✓ **Immunity** is broadly defined as "the capacity of the body to recognize materials as foreign to itself and to neutralize, eliminate or metabolize them with or without injury to its own tissues".
- ✓ **Immunobiology** is the study of organization and functioning of immune system. Immune system provides 'immunity' (protection against diseases).
- ✓ Edward Jenner (1749-1823) is considered to be the '**Father of modern immunobiology'**.
- ✓ **Immunological defence** is the most important defence mechanism. It provides protection against various infective agents e.g. virus, bacteria, fungi and parasites and also against the development of a tumour. It serves three main functions:
  1. Defence against microorganisms.
  2. Recognition and destruction of mutant cells (Surveillance).
  3. Removal of damaged or non functional cells to maintain normal state (Homeostasis).

Tissues and Organs involved in the Immune System

- Central lymphoid organs or primary lymphoid tissue. Example: Thymus and bone marrow.
- Peripheral lymphoid organs or secondary lymphoid tissue. Examples spleen, Peyer's patches, tonsils, lymph nodes and mucosa-associated lymphoid tissue (MALT),



Cells of Immune System

Lymphocytes (Lymphoid cells)

Stem cells mean undifferentiated cells which can undergo unlimited division and can give rise to one or several different cell types.

- Lymphocytes are the major cell types responsible for performing immune functions. About 10^{12} lymphocytes constitute the mature lymphoid system in humans.

  (i) B-cells or B-lymphocytes

  (ii) T-cells or T-lymphocytes

  - **B-Cells (B-lymphocytes) Main functions of B-cells**

  1. Initiate antibody-mediated immune response.
  2. Transform into plasma cells which secrete antibodies.

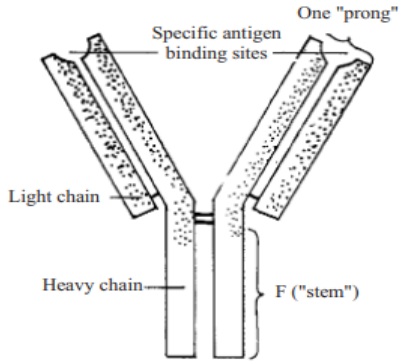
  - **Main functions of T-cells**

  (i) Regulate immune response.

  (ii) Mediate cell-mediated immune (CMI) response. (iii) Induce B-cells to produce antibody

  - T-cells are functionally classified into three categories (TH, TC, TS)

- An **antigen** is any foreign molecule that can trigger a specific immune response.
- **Antibody** is a protein molecule produced in animals in response to an antigen. Antibodies belong to the category of proteins called immunoglobulin.
- Antibodies (immunoglobulins) are of five types, of which 1gG is found in the highest concentration.



ANTIBODY STRUCTURE

TYPES OF IMMUNE RESPONSES

- Broadly, immune responses can be classified into two categories: Non-specific immune responses and specific immune responses.
- Non-specific immune responses are those which non-selectively protect against foreign substances or cells without having to recognize their specific identities.
- Specific immune responses (adaptive immune response) depend upon the immunological recognition of the substances or cells to be attacked. Specific immune responses are again of two

TYPES OF IMMUNITY

There are two main types of immunity:

(i) Natural or innate (i.e. genetic, from birth)

A healthy individual is generally immune to potentially harmful microorganisms by a number of very effective mechanisms. These mechanisms are termed *innate or natural* immunity.

(ii) Acquired (i.e. developed during life time). It is the immunity mediated by lymphocytes and characterized by antigen specificity and memory.

ACTIVE IMMUNIZATION (VACCINATION)

The objective of vaccination is to introduce the attenuated germs into the body.

There are three types of vaccines – (i) killed organisms as vaccines, (ii) live attenuated organisms as vaccines, and (iii) toxoid vaccines.

Test Yourself

1. Draw a schematic diagram of the structure of antibody.
2. List out main functions of T-cells.
3. Give one main difference between passively acquired immunity and actively acquired immunity.