# CELLS OF IMMUNE SYSTEM

**1.In immune system. Explain the interaction of cellular and humoral immune response.**

(Already given in Adaptive immunity section) Here we are going to represent a brief summary on these two mode of immunity (*special zone- generation, interaction and outcome*)

**CELL MEDIATED IMMUNITY**

This type of immune response is especially important in host defense against intracellular bacteria and protozoa. The cell mediated response generate in the following sequential way—

a)T-cell recognize antigen presented on self cells.

b)They became activated to form T-helper cells ($T_H$) and T-cytotoxic ($T_C$) cells.

c)With the help of APCs and MHC , T cells become more activated and secret cytokines.

d)Cytokines secreted by $T_H$ cells help to activate various T-effector cells responsible for cell mediated responses. e.g; IL-2 secreted by $T_H$ cells stimulate proliferation and differentiation of the $T_C$ cells.

e)This Process generates CTL (cytotoxic T lymphocytes), which mediate membrane damage to the altered self-cell leading to the cell-lysis, as well as populations of memory $T_H$ and $T_C$ cells.

**HUMORAL IMMUNITY**

a)Mature antigen committed B-lymphocytes released from the bone marrow to circulate in the blood or lymph or reside in various lymphoid organs.

b)Interaction of the mature B-cell with antigens furthers its activation and further proliferation and differentiation.

c)Some of the bound antigens are internalized by receptor-mediated endocytosis.

d)After processing the antigen, the B-cell presents the resulting antigenic peptides together with a class II MHC molecules on its membrane.

e)A $T_H$ cell binds to the MHC complex.

f)$T_H$ cell then secretes a number of cytokines that stimulate various stages of B-cell division and differentiation.

g)Activated B-cell undergoes a series of cell divisions (over approximately a 5 day period) differentiating into a population of both antibody secreting plasma cells and memory cells.

**2.Activation of both cell mediated and humoral immune responses depend on $T_H$ cells –justify the statement.**

The generation of both humoral and cell mediated immune responses depends on the activation of $T_H$ cells because of the following processes:

i)Antigen binding receptors on $T_H$ cells interacts with antigenic peptide— class II MHC complexes on APCs.

ii)This interaction generates a signal that, together with necessary co stimulatory response or signal, leads to activation and proliferation of the $T_H$ cells.

iii)The clonally expanded population of antigen specific $T_H$ cells can now play a role in the activation of B and T-lymphocytes that generate the humoral and cell-mediated responses, respectively.

**3.a)What is epitope? b)Give examples of immune components related to recognition of antigen.**

a)Epitopes are the immunologically active regions on a complex antigen, the regions that actually bind to B-cell or T-cell receptors.

b)Related but distinct cell membrane molecules are responsible for antigen recognition by the immune system. They are—

i)Membrane bound antibodies on B-cells, ii)T-cell receptors, iii)Class I MHC molecules present on all nucleated cells, iv)Class II MHC molecules present on antigen presenting cells.