



FACULTY OF ENGINEERING & TECHNOLOGY

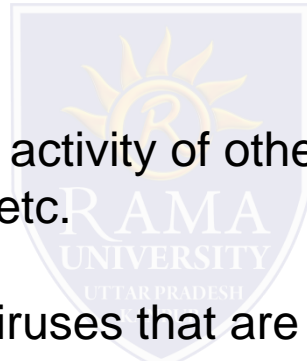
UNIT-I

Topic:- Cell-mediated immunity.



Cell Mediated Immunity

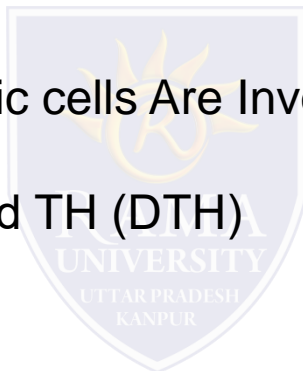
- Involves specialized set of lymphocytes called T cells that recognize foreign antigens on the surface of cells, organisms, or tissues:
 - Two types of T cells are present:
 - Helper T cells
 - Cytotoxic T cells
 - T cells regulate proliferation and activity of other cells of the immune system: B cells, macrophages, neutrophils, etc.
 - Defense against: Bacteria and viruses that are inside host cells and are inaccessible to antibodies and also to Fungi, protozoa, and helminthes also to Cancer cells and Transplanted tissues.



CELL MEDIATED IMMUNE RESPONSES

Primary Function Of Cell Mediated Response:-

- Eliminate Intracellular Pathogens
- Eliminate Tumor Cells
- Both Ag Specific And Non-specific cells Are Involved
- Ag Specific: CD8+ Cells (TC) And TH (DTH)
- Non-specific: Neutrophils, NK
- Both Specific And Non-specific Require Cytokines
- Humoral And Cell Mediated Do Collaborate



CMI may play a role in some harmful conditions:

- Hypersensitivity reactions type IV (contact dermatitis)
- Graft rejection
- Autoimmune diseases

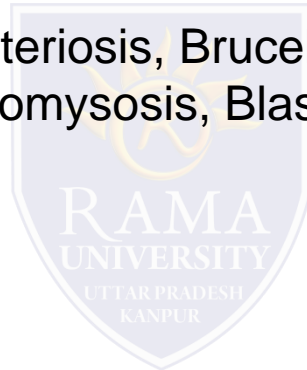
➤ Cell mediated cytotoxicity mediated by:

- T-Cytotoxic cells.
- Natural killer cells.
- Activated macrophages.



CMI HELPS IN

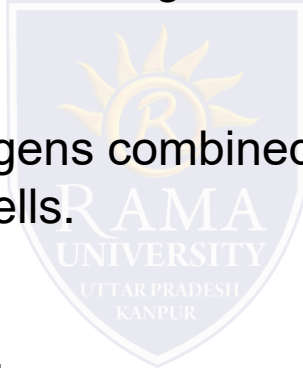
- Delayed hypersensitivity
- Immunity in infections caused by Obligate and facultative intracellular parasites
- E.g. – Tuberculosis, Leprosy , Listeriosis, Brucellosis,
- Fungi – Histoplasmosis, Cocccidiomycosis, Blastomycosis,
- Parasites – Trypanosomiasis
- In transplantation immunity,
- Immunology in Transplantation, malignancy,
- Pathogenesis of Autoimmune diseases
- Cell Mediated Immunity Can Be Divided Into 2 Major Categories
- Effectors lyse target
- 2 groups of cells: CTLs (specific) and NK.
- Effectors which are CD4+ and mediate DTH



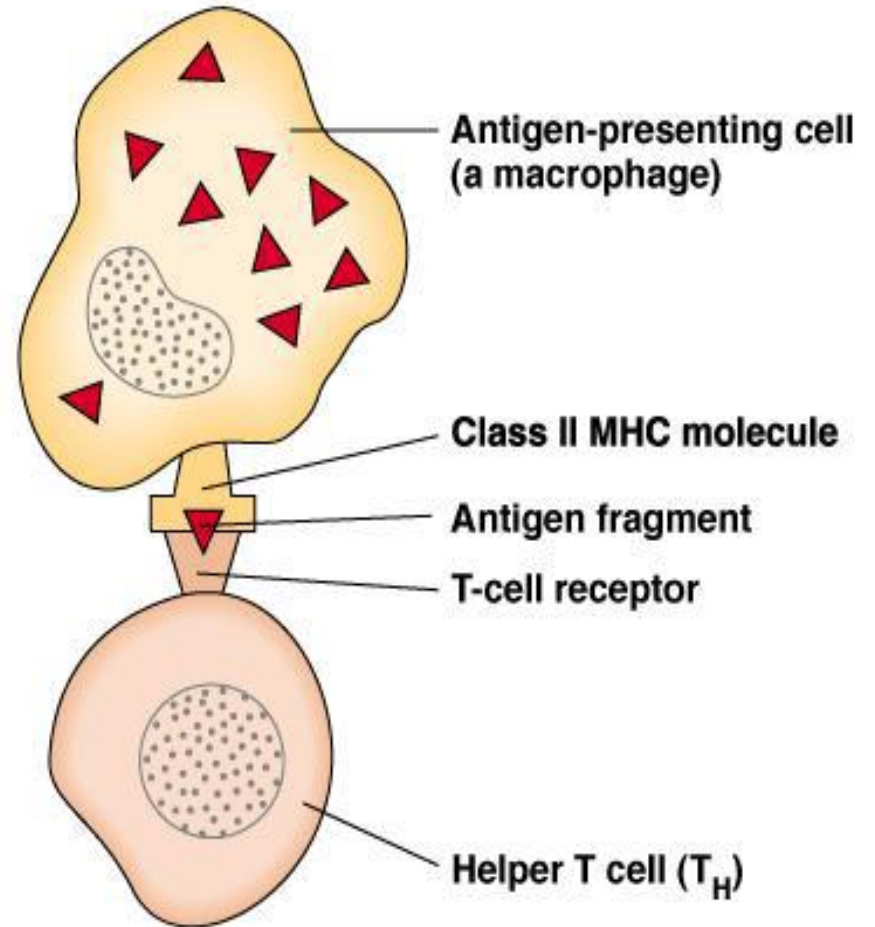
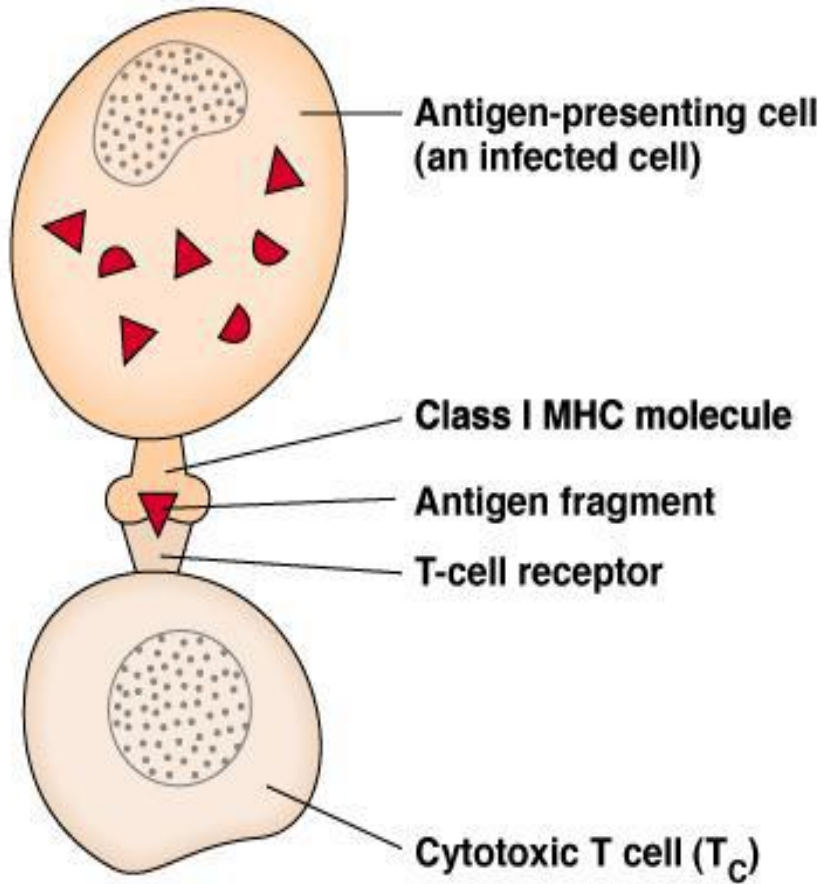
T Cells and Cell Mediated Immunity

Cellular Components of Immunity:

- T cells are key cellular component of immunity.
- T cells have an antigen receptor that recognizes and reacts to a specific antigen (T cell receptor).
- T cell receptor only recognize antigens combined with major histocompatibility (MHC) proteins on the surface of cells.
 - MHC Class I: Found on all cells.
 - MHC Class II: Found on phagocytes.
- Clonal selection increases number of T cells.



T CELLS ONLY RECOGNIZE ANTIGEN ASSOCIATED WITH MHC MOLECULES ON CELL SURFACES



(a)

(b)

HOW CTLs KILL

• Phases In CTL Killing

- Conjugate formation.
- LFA-1 (CTL) binds ICAMs (Target).
- LFA-1 changes to high avidity if Ag Is Recognized.
- Activated LFA-1 persists for 5-10 mins.
- Membrane attack.
- Requires Ca^{2+} and energy
- Granules release Perforins (65 kDa) and Granzymes (serine proteases) at the junctional space.
- Perforins polymerize forming cylindrical pores (5-20 nm), Ca^{2+} is needed.
- Granzymes enter target cell.
- Granzyme B can enter thru mannose-6-phosphate receptor in a vesicle.
- DNA fragmentation.
- CTL dissociation.
- Target cell destruction.
- Apoptotic death within a few hours.

