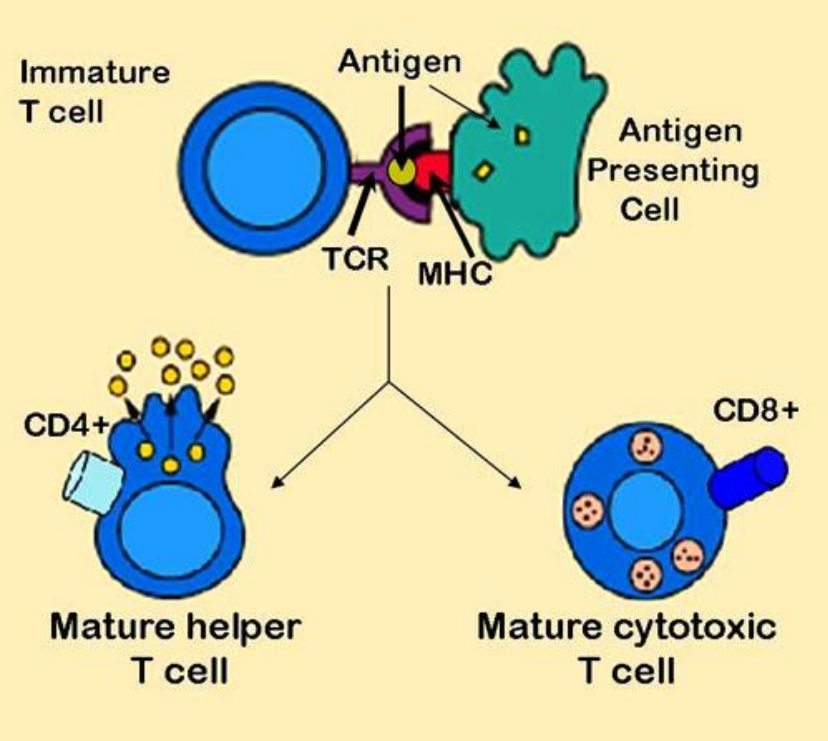
Antigen Processing and Presentation

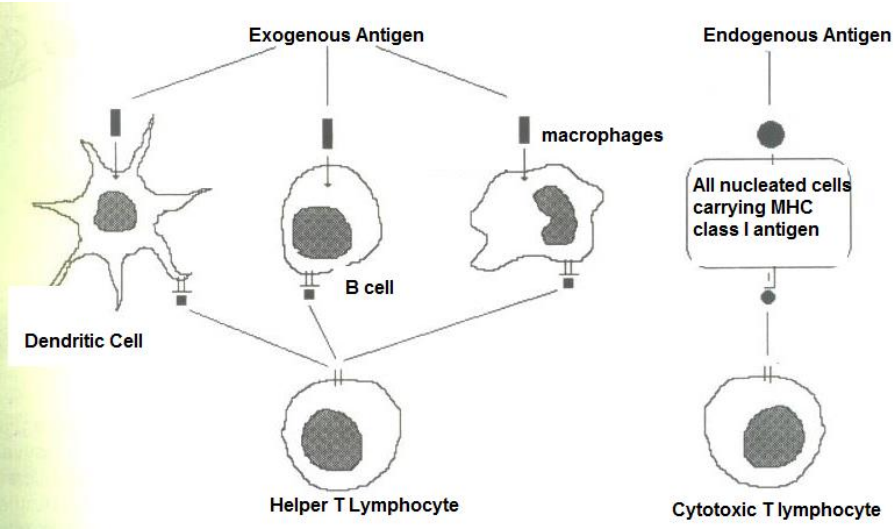
- The aim of the present invention is to reveal antigenic determinants (epitopes) of antigen molecules to stimulate the immune system and to present them to immune system cells (B and T lymphocytes) responsible for specific immunity.

Antigen Processing and Presentation



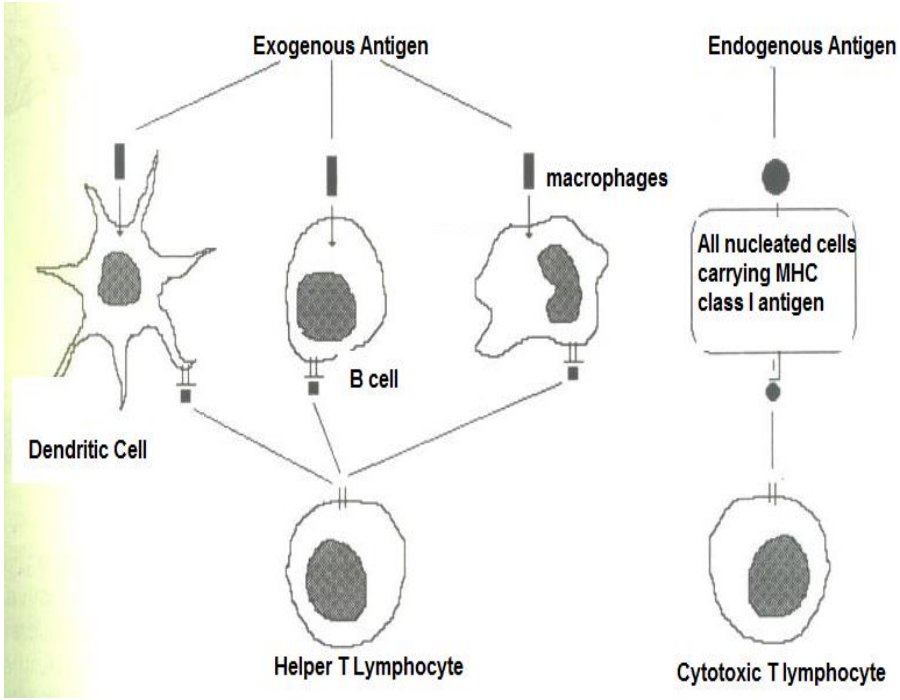
- MHC (Major Histocompatibility Complex): antigen presenting molecule
- MHC class I molecule
- MHC class II molecule

Antigen Processing and Presentation



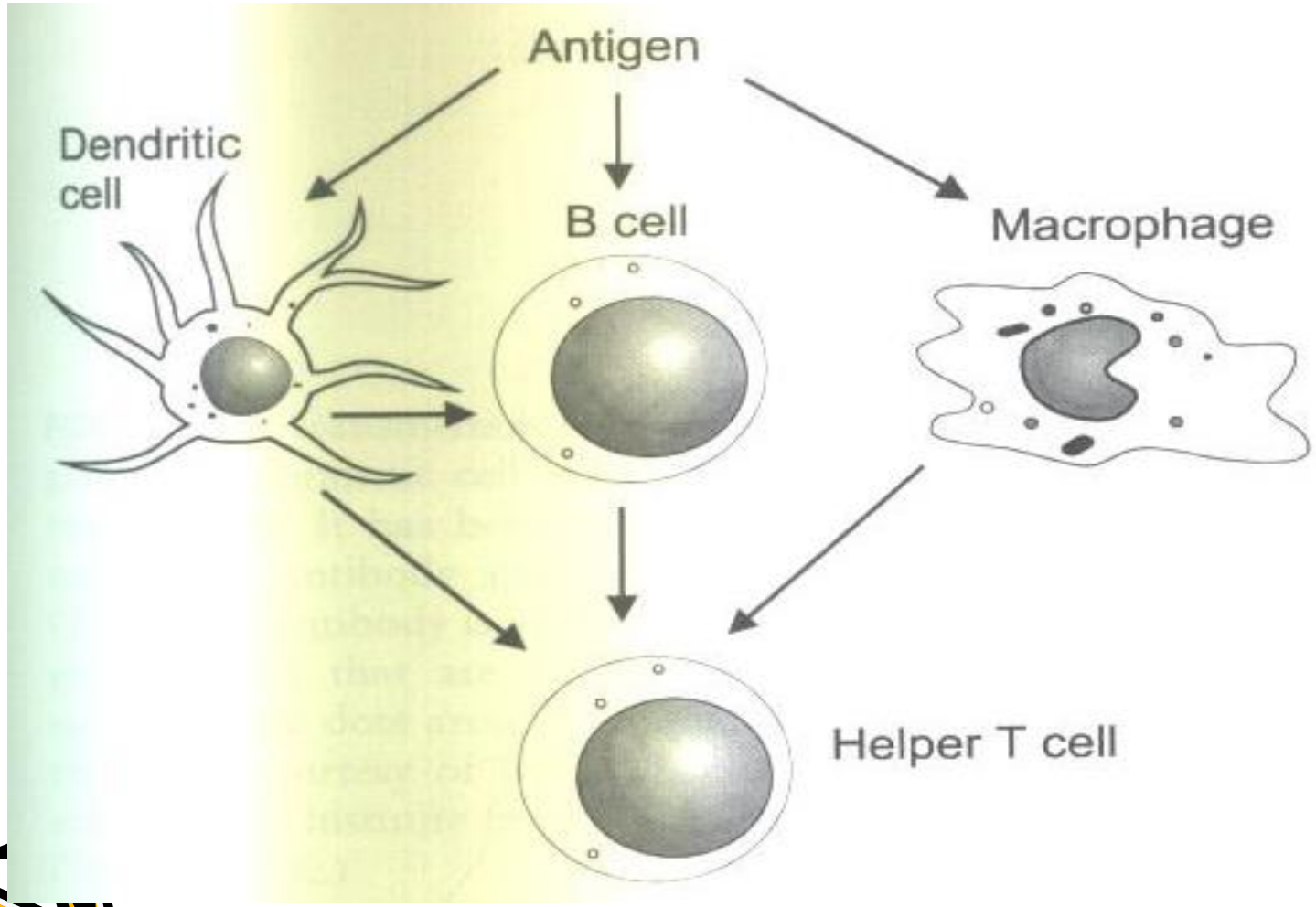
- Proteins: necessarily required to be processed and presented. Other antigens can directly stimulate the immune response

Antigen Processing and Presentation

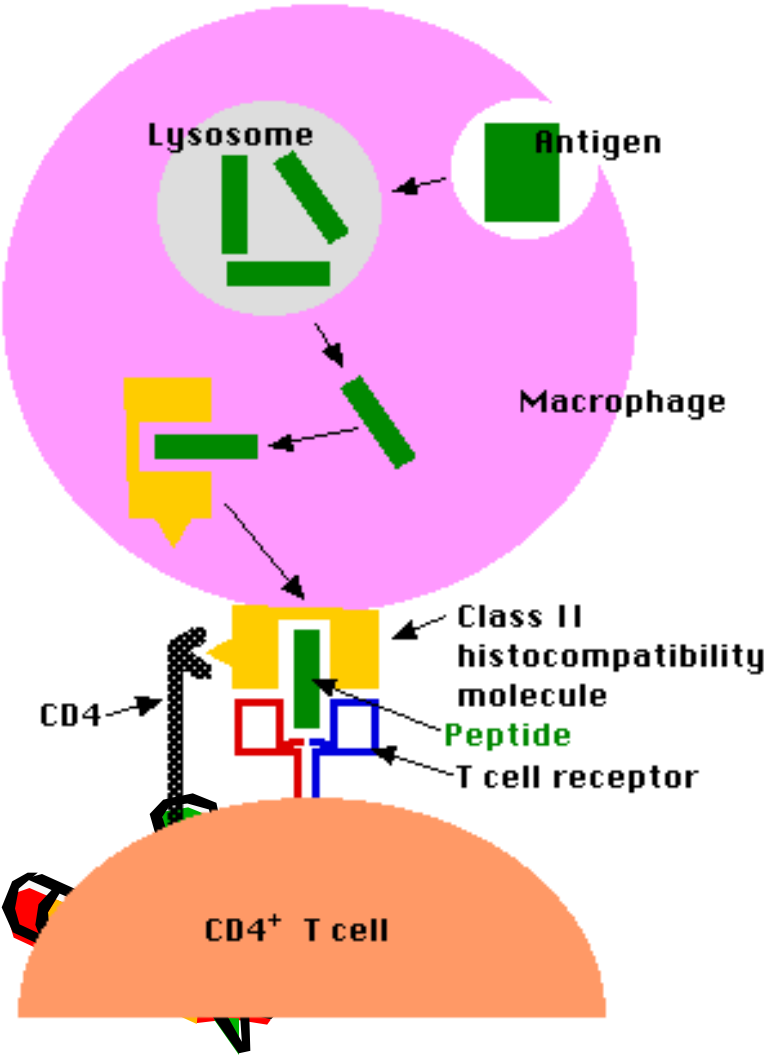


- Exogenous antigens: Antigens (bacteria, foreign proteins) that do not require cells for survival and growth
- Endogenous antigen: Free antigen in cell cytoplasm

Antigen-presenting Cells



Antigen-presenting Cells



- Macrophages:

- Phagocytosis

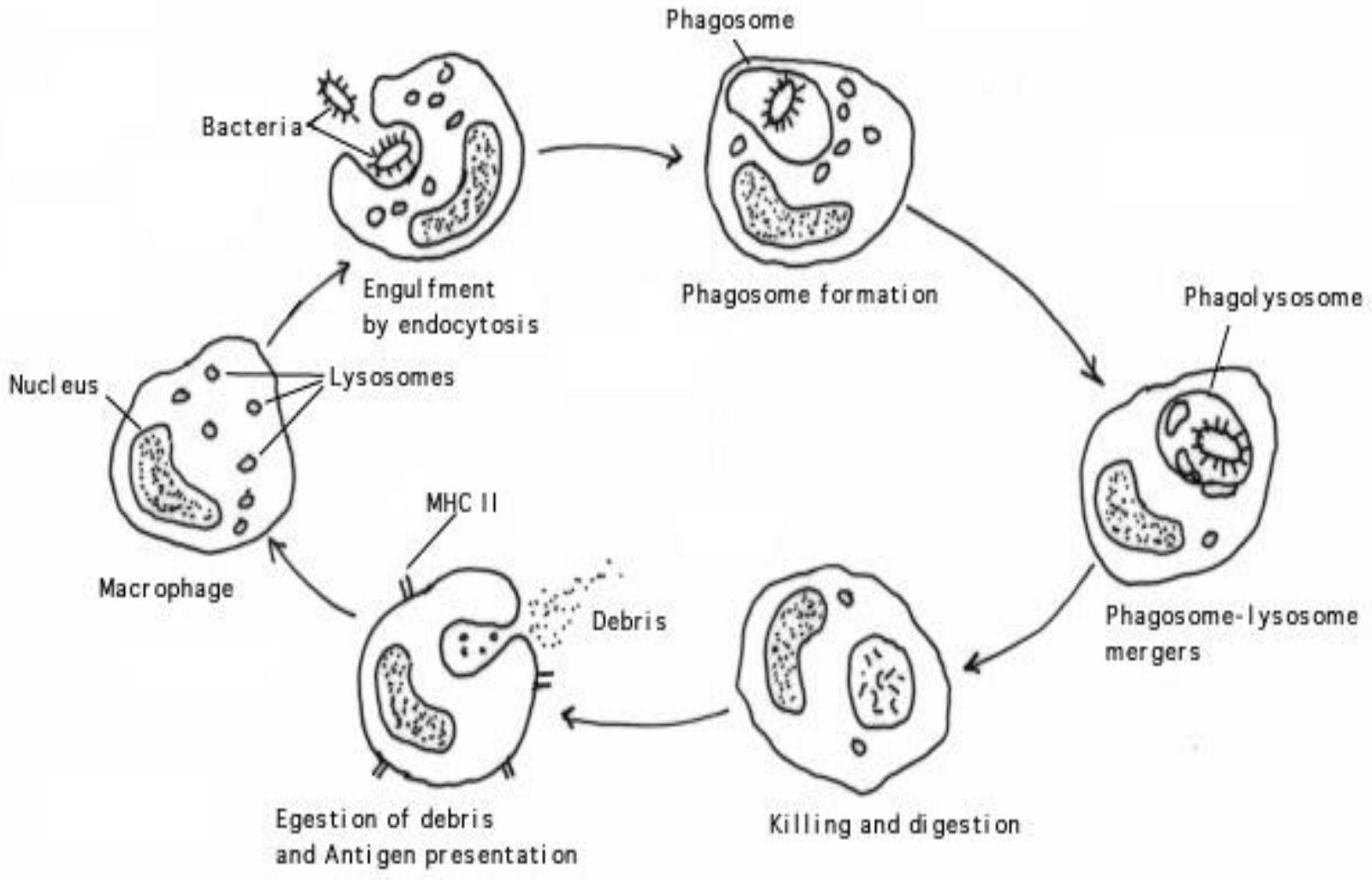
- Antigen processing and presentation

-They process and present the antigen that the host encounter for the first time

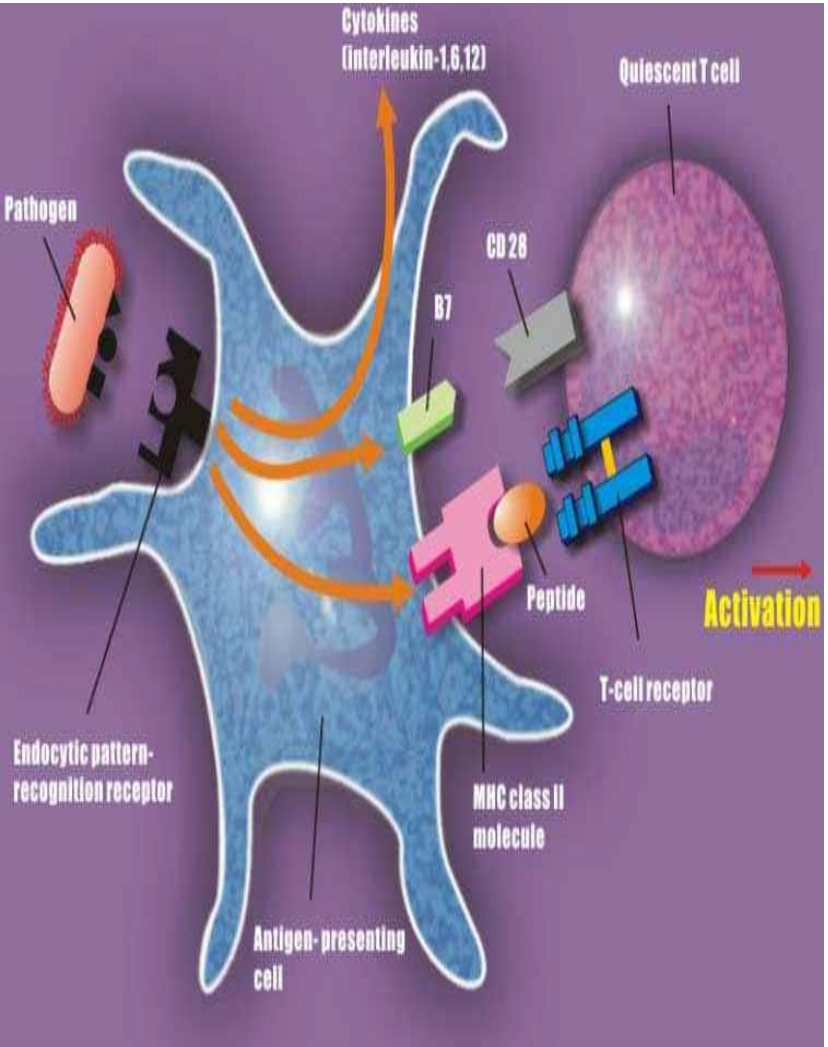
-Both MHC I and II molecules are found on macrophages

-Generally they are found in spleen, thymus and liver

Phagocytosis and Antigen Processing and Presentation



Antigen-presenting Cells



- Dendritic cells :

-Langerhans cell (the skin-epidermis)

- Follicular dendritic cells (Lymphoid organs-B cells)

- Interdigitating dendritic cell (Lymphoid organs-T cells)

-Generally they are found in the skin and lymph nodes.

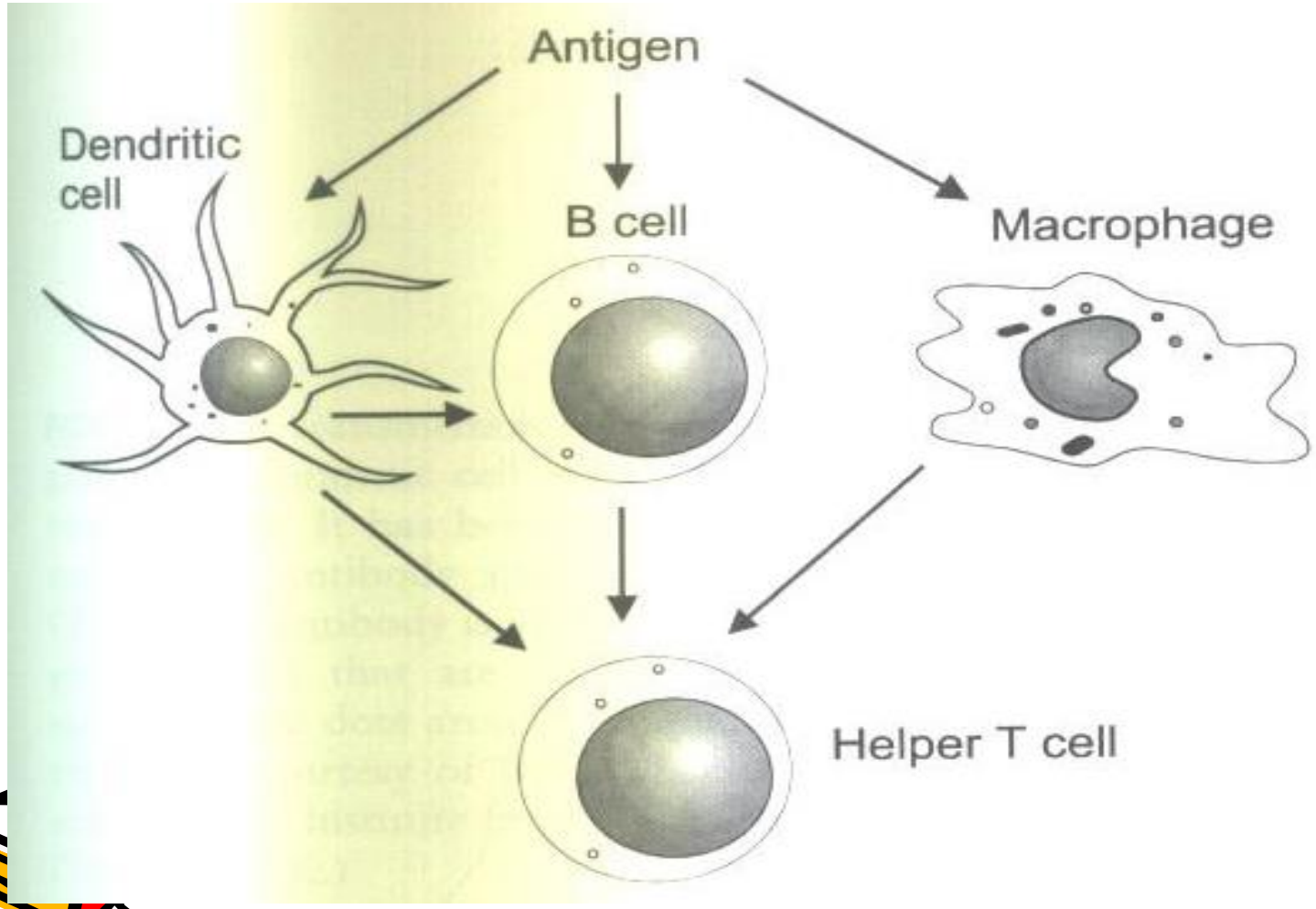
Antigen-presenting Cells

- There are 2 different antigen presentation pathways in dendritic cells
- Class I pathway applies for the antigens that are not previously encountered.
- Class II pathway applies for previously encountered antigens.

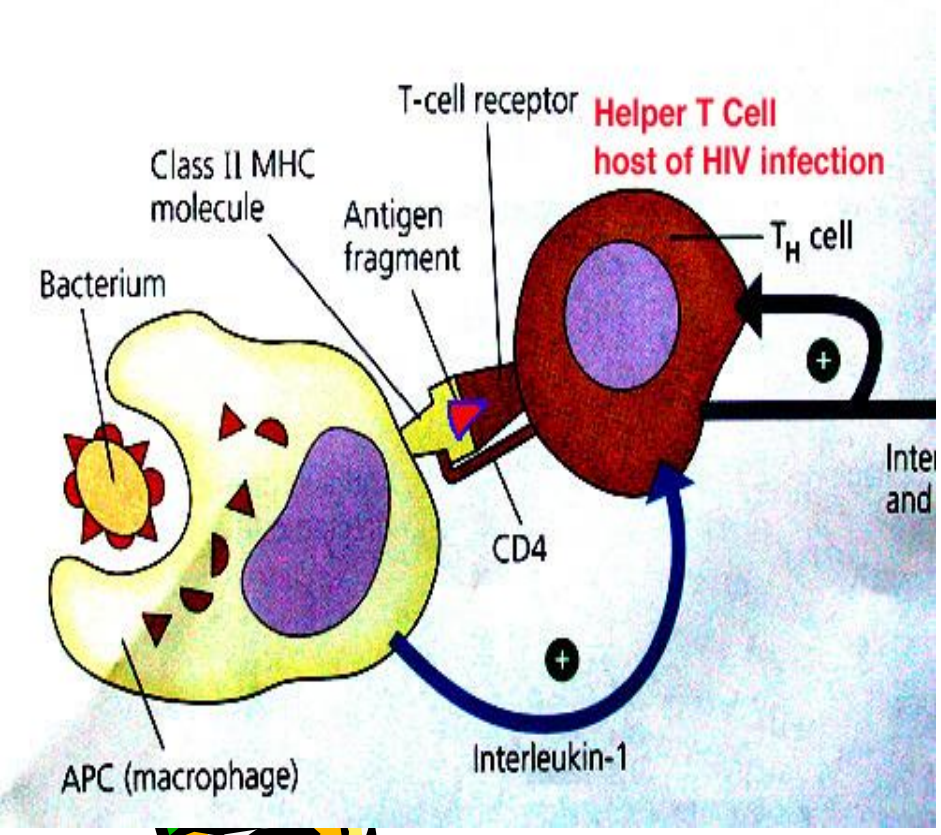
Antigen-presenting Cells

- B lymphocytes
- They bind to antigens via BCR.
- They present antigens with MHC class II molecules.
- They process and present iccosomes on dendritic cells.
- They are generally found in lymph nodes.

Antigen-presenting Cells



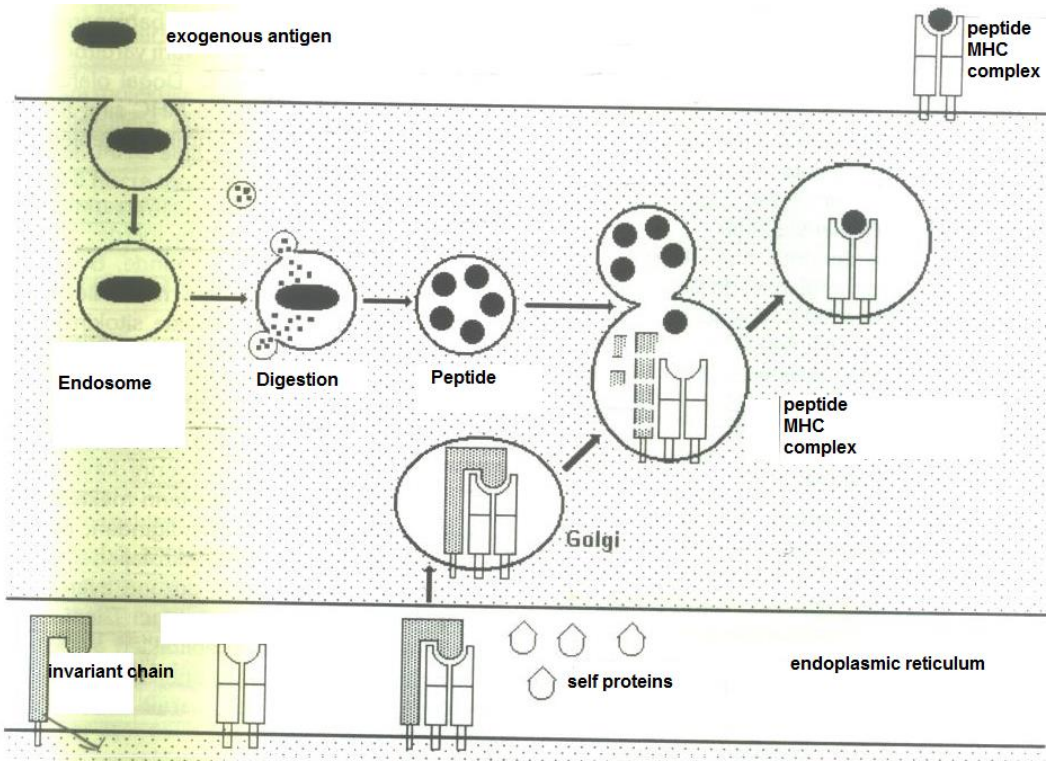
Antigen-presenting Cells



- Other APCs

-neutrophils,
-eosinophils,
-T lymphocytes,
-NK cells,
-endothelial cells
-fibroblasts etc.
(These cells have poor antigen processing and presentation functions)

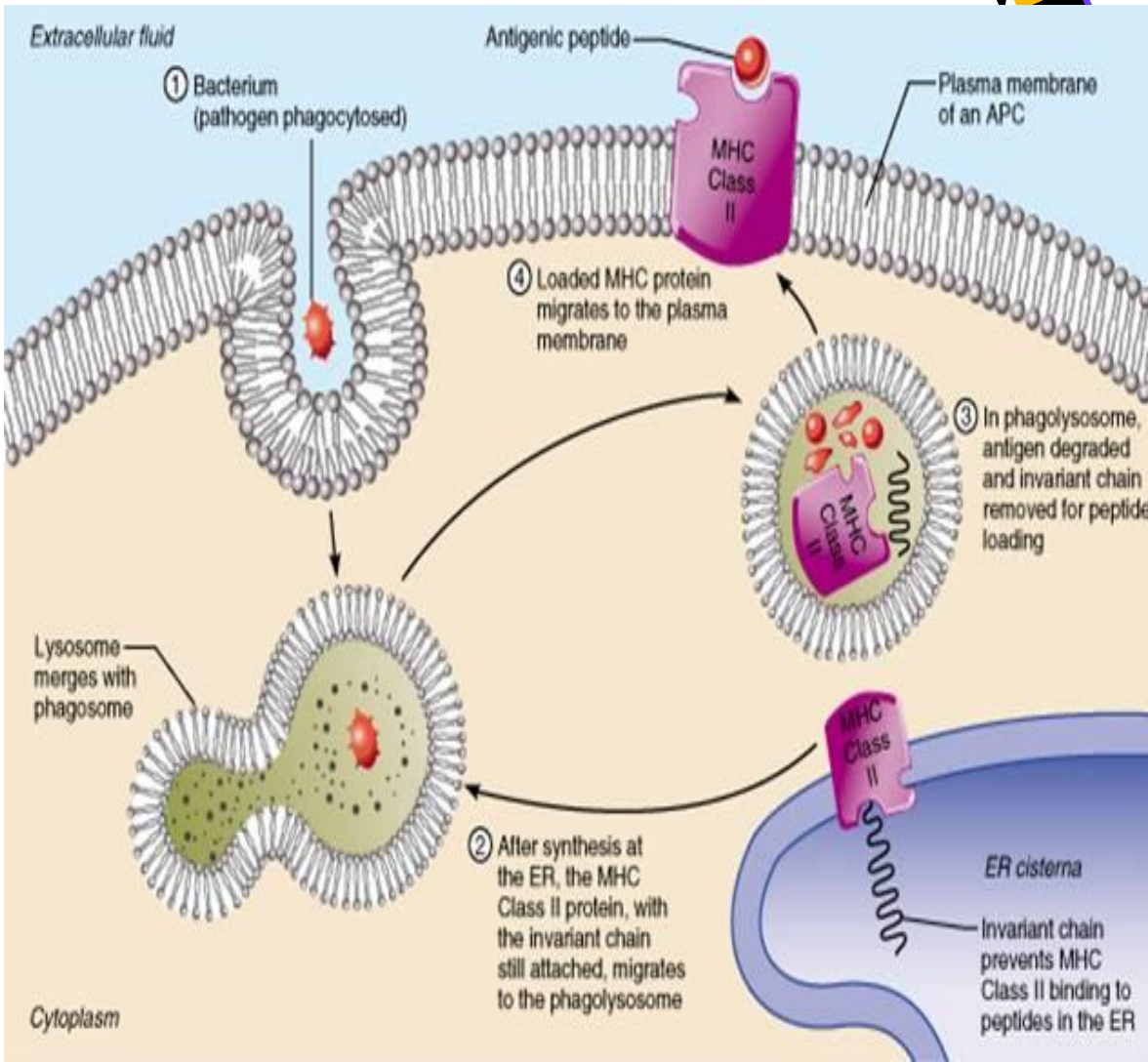
Exogenous Antigen Processing and Presentation



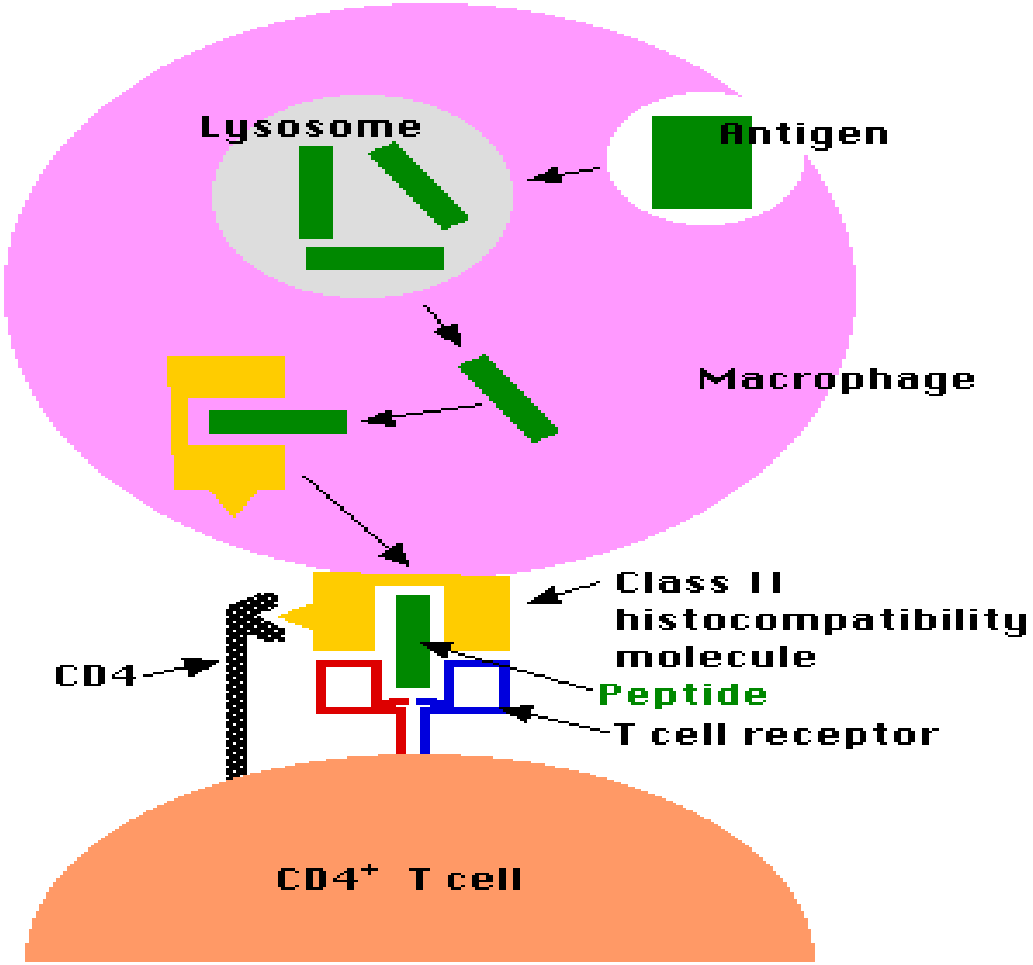
- In the phagolysosome the antigen is divided into 10-30 aa particles
- Synthesis of Class II MHC in ER and invariant chain
- Antigens in the phagolysosome Class II MHC merger
- Invariant of the chain separation
- Transport of antigen to cell surface

Exogenous Antigen Processing and Presentation

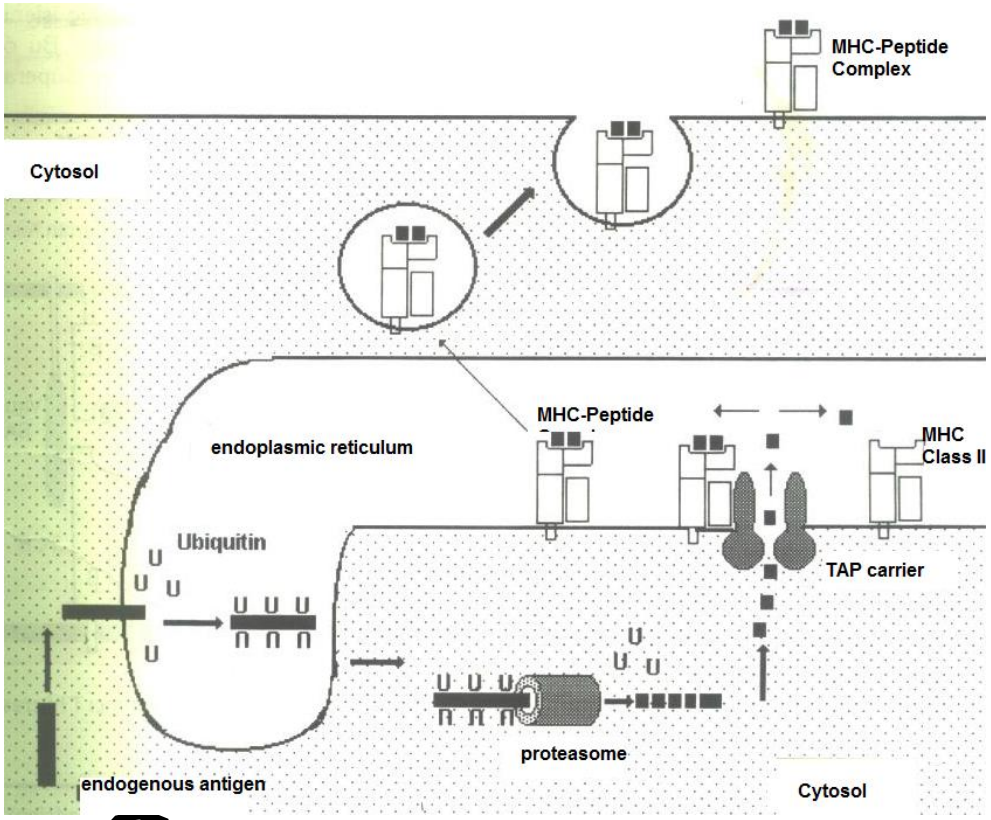
- Exogenous Antigen
- Synthesis of Class II MHC in ER and invariant chain
- Antigens in the phagolysosome ClassII MHC merger
- Invariant of the chain separation
- Transport of antigen to cell surface



Exogenous Antigen Processing and Presentation



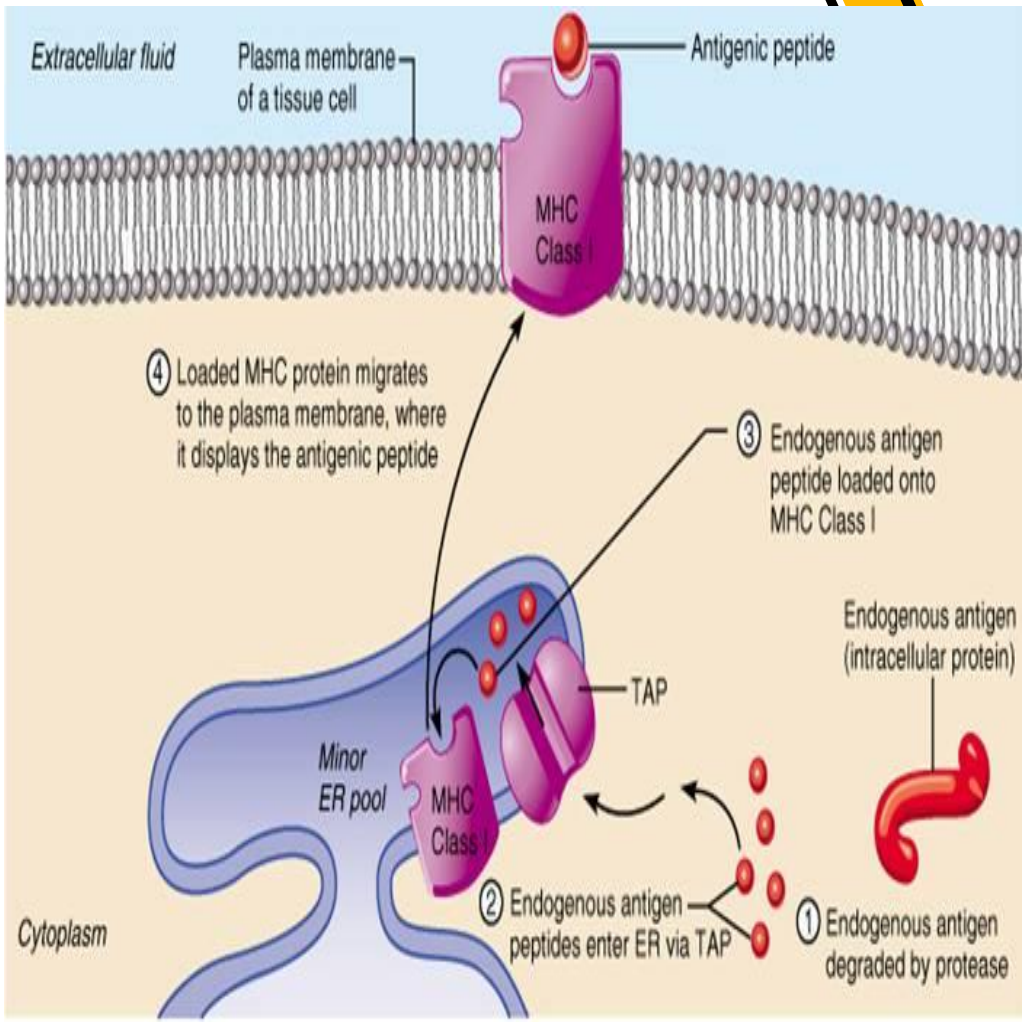
Processing and Presentation of Endogenous Antigens



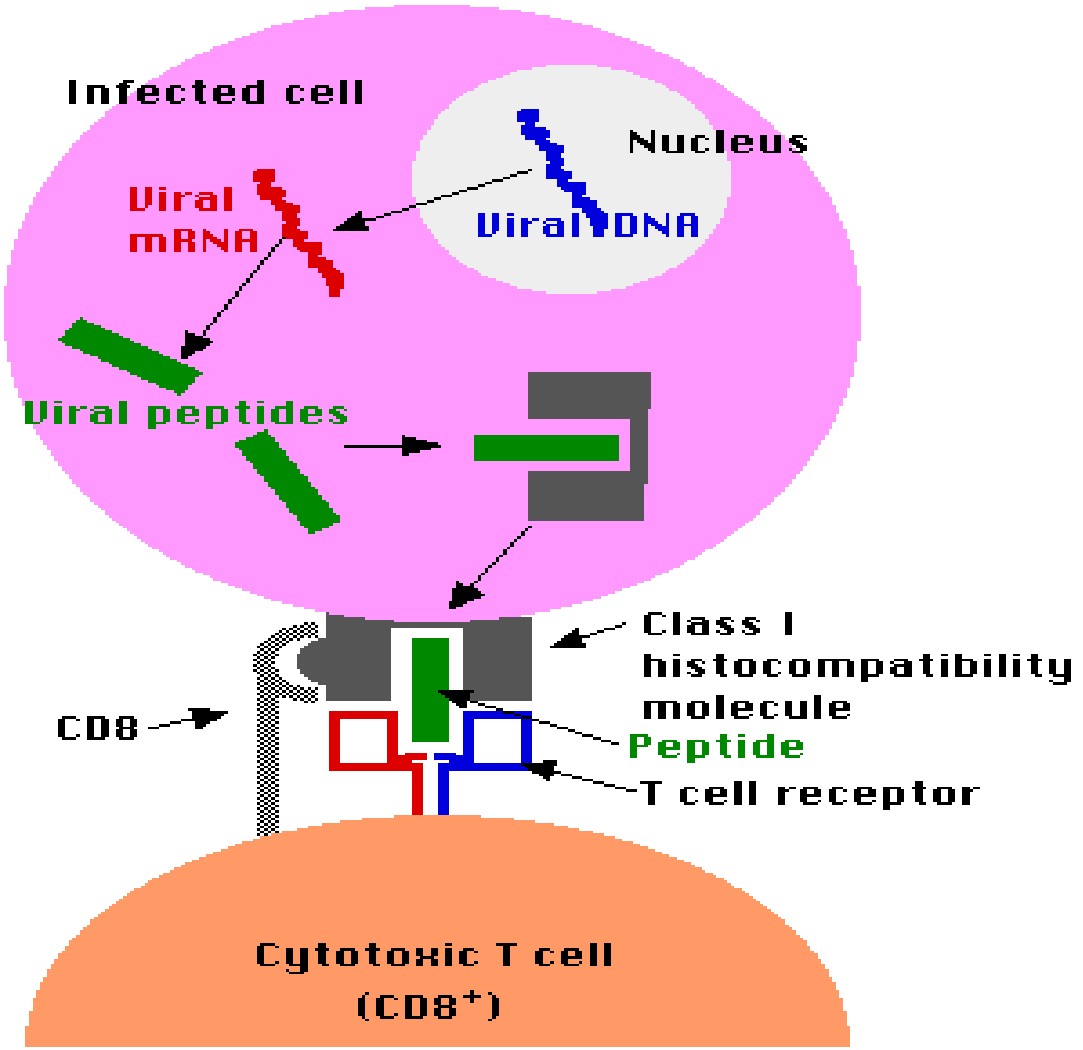
- Marking with Ubiquitin
- 8-10 aa segmentation of the proteosome
- Moving to ER with TAP
- MHC binding with class Ia
- Transport to the cell membrane

Processing and Presentation of Endogenous Antigens

- Antigens that are free in cell cytoplasm
- With protease fragmentation
- Transport to endoplasmic reticulum by TAP
- With Class I MHC merger
- Presenting on cell surface



Processing and Presentation of Endogenous Antigens



Superantigens

- They are protein antigens that stimulate HelperT-lymphocytes without processing in APCs.
- Bacterial exotoxins bind nonspecifically to MHC class II molecules on APC
- Extremely stimulate immune response