CONCEPT: MHC AND ANTIGEN PRESENTATION

Class I

● Class I **major histocompatibility complex (MHC)** bind to antigens and activate T_c cells

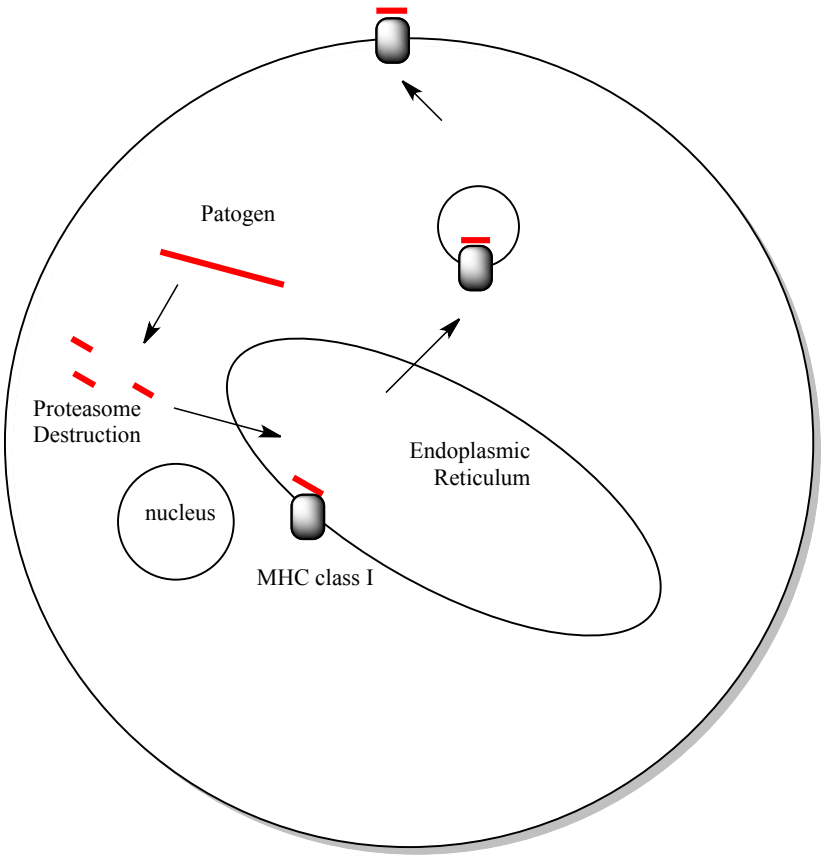
□ Structure consists of a single polypeptide chain with a non-MHC peptide (*β2-microglobulin)*

- Single peptide binding site that fits 8-10 amino acids (binds peptide ends)

□ Uses 6 steps to present antigens

1. Intracellular pathogen is present in cytosol (from infected cell, or cell expressing viral genes)
2. Pathogen is targeted for destruction by ubiquitin
3. The pathogen is degraded via the proteasome
4. The antigen is transported into the ER (via the *TAP complex*)
5. In the ER the antigen binds to the MHC class I molecule
6. The MHC-antigen complex is expressed on the plasma membrane

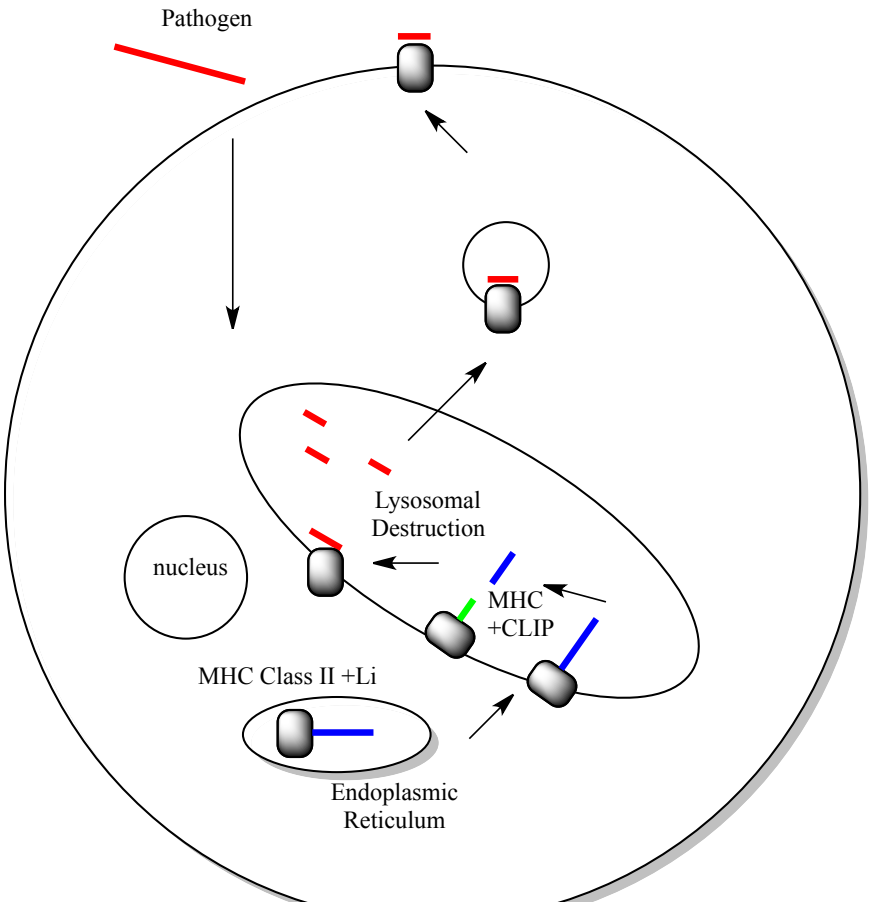
EXAMPLE:



Class II

- Class II **major histocompatibility complex (MHC)** bind to antigens and activate T_h cells and T regulatory cells
  - □ Structure consists of a heterodimer encoded by MHC genes
    - Single peptide binding site that fits 12-20 amino acids (binds entire peptide length)
  - □ Uses 6 steps to present antigens
    1. Extracellular pathogen is taken up by the cell
    2. The pathogen is moved to the lysosome for destruction
    3. The pathogen is degraded into tiny antigens
    4. The MHC class II molecule is made in the ER and complex with a small protein called *Li*
    5. The MHC class II enters the lysosome and Li is cleaved to leave small molecule called CLIP
    6. CLIP is replaced with the antigen in the lysosome
    7. The MHC-antigen complex is moved to the cell surface.

EXAMPLE:



PRACTICE:

1. Which MHC class presents intracellular pathogens?
    a. MHC class I
    b. MHC class II

2. MHC class I is used to activate which of the following cell types?
    a. Antigen presenting cells
    b. Cytotoxic T cells
    c. Helper T cells
    d. Regulatory T cells