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Introduction

- Major Histocompatibility complex (MHC) is set of surface proteins located on the cell membrane of nucleated cells.
- It plays more important work to identify the antigen between self and non self body, intracellular recognition and responsible for antigen presentation.
- **Histo** refers to tissues. **Compatibility** refers to living together harmoniously.
- MHC molecules always recognize only T lymphocytes. The two types of MHC are worked in immunity. T helper (Th) cell recognized by MHC molecules II, and T cytotoxic (Tc) cells are recognized by MHC I molecules.

Definition

- *“Major Histocompatibility complex is membrane attached protein which work on recognition of antigen between self and non self body and antigen presentation”.*

History

- **Peter Gorer (1930)** found that four group of MHC molecules he used the blood sample of mice to identified the blood group antigen which designated by I to IV group of MHC.
- **Georg Snell, Jean Dausset and Bariy** received noble prize in 1980 for their contribution to the discovery of MHC molecule.

Classes of MHC Molecules

- The MHC molecules are classified in to four classes namely ;-
1. Class I MHC molecules
 2. Class II MHC molecules
 3. Class III MHC molecules
 4. Class IV MHC molecules

Class I MHC Molecules

- Class I MHC(45 KD) molecule are a group of major histocompatibility antigen.
- They are present on the surface of all nucleated cells except nervous tissue and platelets.
- It present antigen to **Tc** cells.
- It bind with **CD-8** adhesion molecules of **Tc** cells.
- It brings about **cell mediated immune response**.

Structure of Class I MHC Molecule

- It consists two polypeptide chains namely α chain and β_2 - micro globulin.
- α chain which is non covalently attached with β_2 microglobuline . α chain contain a transmembrane glycoprotein which is encoded by A,B and C gene of grouped HLA.
- α chain is organized by three domains such as α 1, α 2 and α 3 each domain containing 90 amino acids sequences .
- β_2 microglobuline is similar in size of α 3 and it dose not contain trans membrane proteins .
- When the antigen is internalized and processed inside by proteosome (Ubiquitin, cytosolic degradation), the peptides are produced .
- Peptide is further loaded on the groove of MHC I molecules from endoplasmic reticulum.

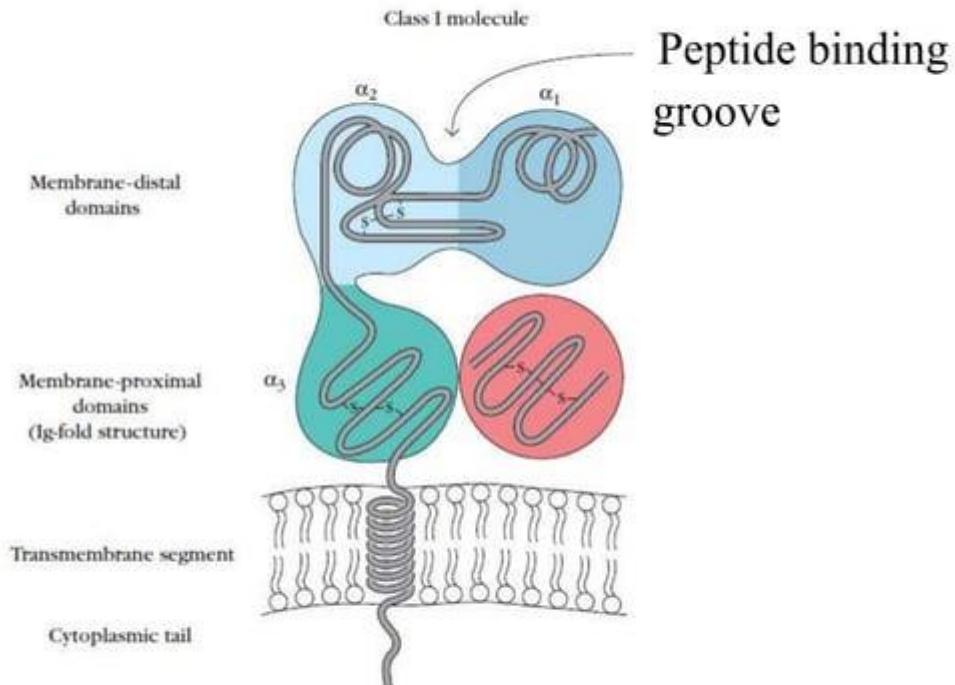


Fig:- Class I MHC antigen

Class II MHC Molecule

- Class II MHC molecule are present on the surface of antigen presenting cell and cell which engulfed the foreign antigen.
- It binds with the exogenous(endocytic degradation) antigens.
- It binds with CD4 adhesion molecules T_H cells.
- It also consist of two polypeptide chains namely α chain and β chain.
- Antigen is processed inside the **endosome** and peptide is further loaded on groove of MHC II molecules.

Structure of MHC II Molecule

- The class II MHC Molecule consists of two polypeptide chain namely α chain (33 kDa) and β (28kDa) chain.
- The both chain are attached noncovalently.
- Each chain contains two units. The two units of α chain are called $\alpha 1$ and $\alpha 2$. The two domains of β chains are called $\beta 1$ and $\beta 2$.
- $\beta 2$ and $\alpha 2$ are **transmembrane** domains anchoring the MHC to plasma membrane.
- The $\alpha 1$ and $\beta 1$ domains jointly bear a **peptide binding groove**.

Peptide binding
groove

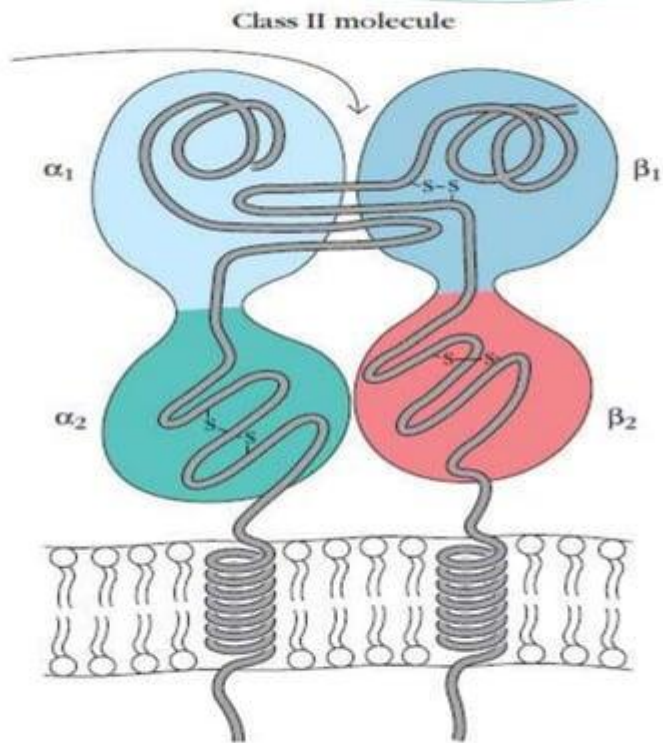


Fig:- Class II MHC molecule

Class III MHC molecule

- The molecules include complements like C2 and C4 and Bf (factor B).

Class IV MHC molecule

- These molecule is present on T cells of leukemia(T1a) as well as on immature thymocytes .

Function of MHC Molecules

- MHC molecules are loaded with a bit of sample peptide fragment derived from the **degradation of proteins** present inside the cell. This peptide is the **mirror image** of proteins present inside the cell.
- MHC molecules contain **self** as well as **nonself (foreign)** antigen.
- They bring about **defense against infections and diseases**.
- They mediate certain **autoimmune diseases**.
- They are responsible for **individual smell** of people.

Summary

- The both MHC I and II molecule are responsible for antigen presentation and it has application of antigen recognition between self and nonself recognition, mostly they are located on T lymphocytes encoded by chromosome 6 of the human. The two types of antigen degraded peptides (exogenous and endogenous) are involved to complete these process of antigen neutralization.

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Thank you