

# Antigen

Characters of antigenic  
substance

# Immunogen, antigen, epitope, hapten

- Immunogen: a stimulus that produces a humoral or cell-mediated immune response
- Antigen: any substance that binds specifically to an antibody or a T-cell receptor

# Immunogen, antigen, epitope, hapten

- All immunogens are antigens but not all antigens are immunogens
- Some very small molecules called haptens can bind to Ab's or TCR's but they cannot initiate an immune response...

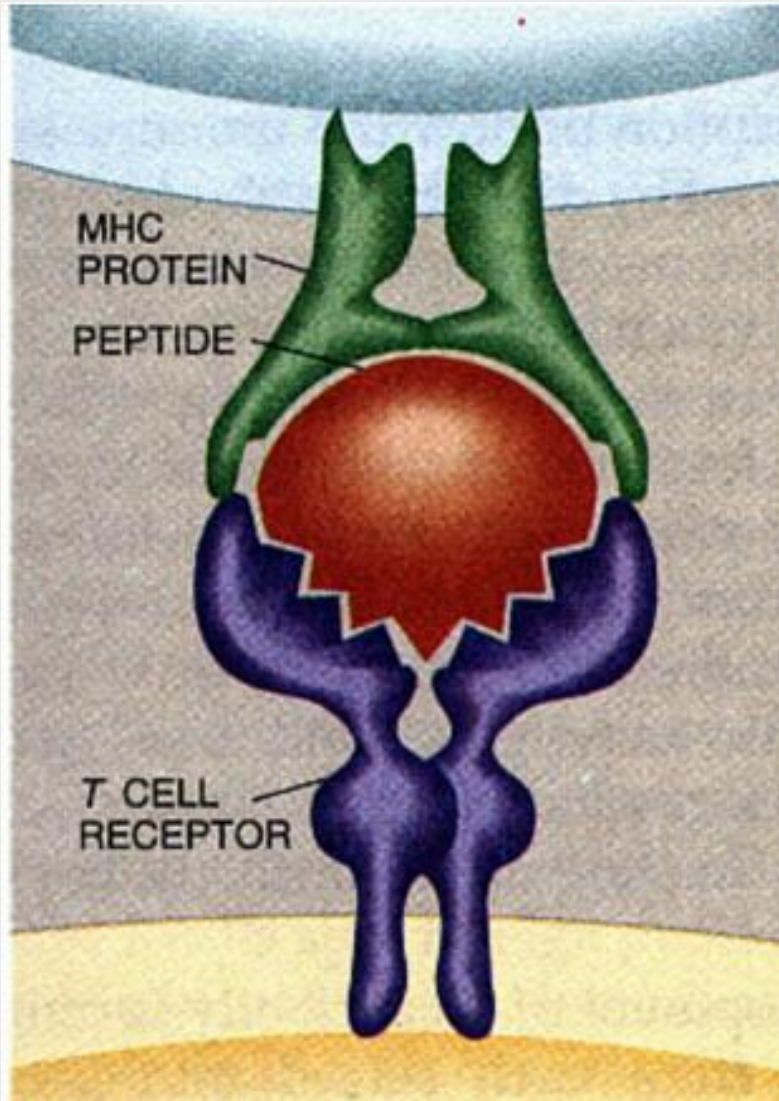
# Immunogen, antigen, epitope, hapten

- Immunogen: a stimulus that produces a humoral or cell-mediated immune response
- Antigen: any substance that binds specifically to an antibody or a T-cell receptor
- Epitope: the portion of an antigen that is recognized and bound by an Ab or TCR/MHC complex (aka antigenic determinant)
- Hapten: a low molecular weight molecule that can be made immunogenic by conjugation to a suitable carrier

# Immunogen, antigen, epitope, hapten

- Paratope...
- Paratope: “The site in the variable (V) domain of an antibody or T-cell receptor that binds to an epitope on an antigen

# The key event...



# The basis of immunogenicity...

- Foreignness
- Molecular size
- Chemical composition and heterogeneity
- Degradability

# The basis of immunogenicity...

1- Foreignness: the antigen should be foreign to stimulate the immune system.

2- Molecular size: the immune system react with the antigens of high molecular weight.



- 3- Chemical composition and heterogeneity:

The immune system usually react with the complex structure.

- 4- Degradability: The immune system react with the degradable antigen which engulfed by macrophage to make presentation of the antigens to other immune system cells

There are two general classes of antigens

Exogenous (external)

Endogenous (internal)

# There are two general classes of antigens

**Exogenous:** presented by Antigen Presenting Cells (APC's). These are macrophages, B-cells, and some dendritic cells

**Endogenous:** typically peptides derived from *any* protein; an infected cell displays “not-self” proteins and is, thus, an “altered self cell”

# There are two general classes of antigens

**Exogenous:** these antigens are presented in MHC-II; they are seen by T-cells with a TCR *and* an associated protein called CD4

**Endogenous:** these antigens are presented by MHC-I; they are seen by T-cells with a TCR *and* an associated protein called CD8

There are two classes of T-cells

$T_H$  have **CD4** which interacts with MHC-II; thus,  $CD4^+$  T-cells are “MHC-II restricted.”

$T_H$  cells are “helper cells” that send signals (via cytokines and surface proteins) to other cells of the immune system. The  $T_H$  cells function as the “brain” of the immune system.

There are two classes of T-cells

$T_C$  have **CD8** which interacts with MHC-I; thus,  $CD8^+$  T-cells are “MHC-I restricted.”

$T_C$  cells become *cytotoxic T lymphocytes* (CTL's) which attack “altered self-cells (*e. g.*, infected cells.) “Altered self-cells” are also called “target cells.” They are the targets for the CTL's cytotoxicity.

# Experimental systems...

*viz.* “haptens”

Hapten: a low molecular-weight molecule that can be made immunogenic by conjugation to a suitable carrier...