

**A.S.D.GOVERNMENT DEGREE COLLEGE FOR
WOMEN (AUTONOMOUS) KAKINADA**

DEPARTMENT OF MICROBIOLOGY

*Antigen Properties, types, Processing
and presentation*

II BSc CBMB SEM IV



BY

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Antigens

Introduction: “Antigens are macromolecules, upon introduction into the body, stimulates the production of antibodies”

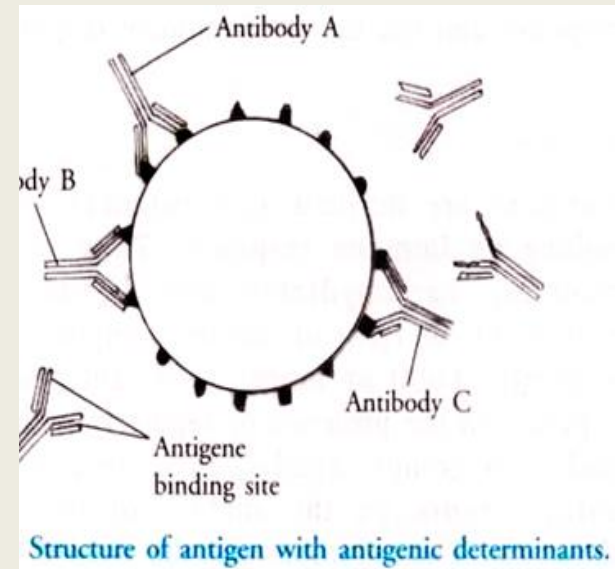
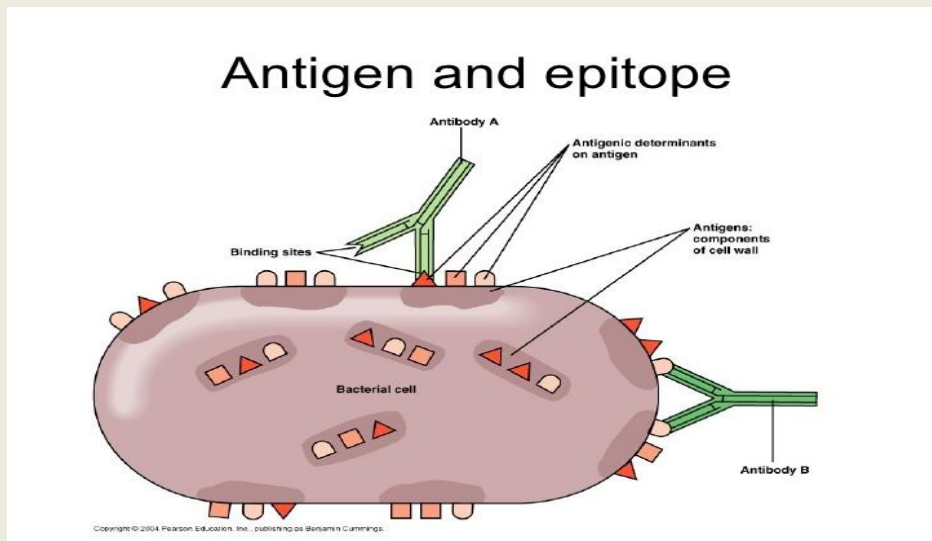
Properties of antigens:

1. Immunogenicity

It is the ability of an immunogen to induce specific immunity response. (Humoral or Cellular Immunity)

2. Antigenicity

It is the ability of an antigen to combine with final products of immune response



Chemical Nature of Antigens (Immunogens)

A. Protein

The vast majority of immunogens are proteins. These may be pure proteins or they may be glycoproteins or lipoproteins. In general, proteins are usually very good immunogens.

B. Polysaccharides

Pure polysaccharides and lipopolysaccharides are good immunogens.

C. Nucleic Acids

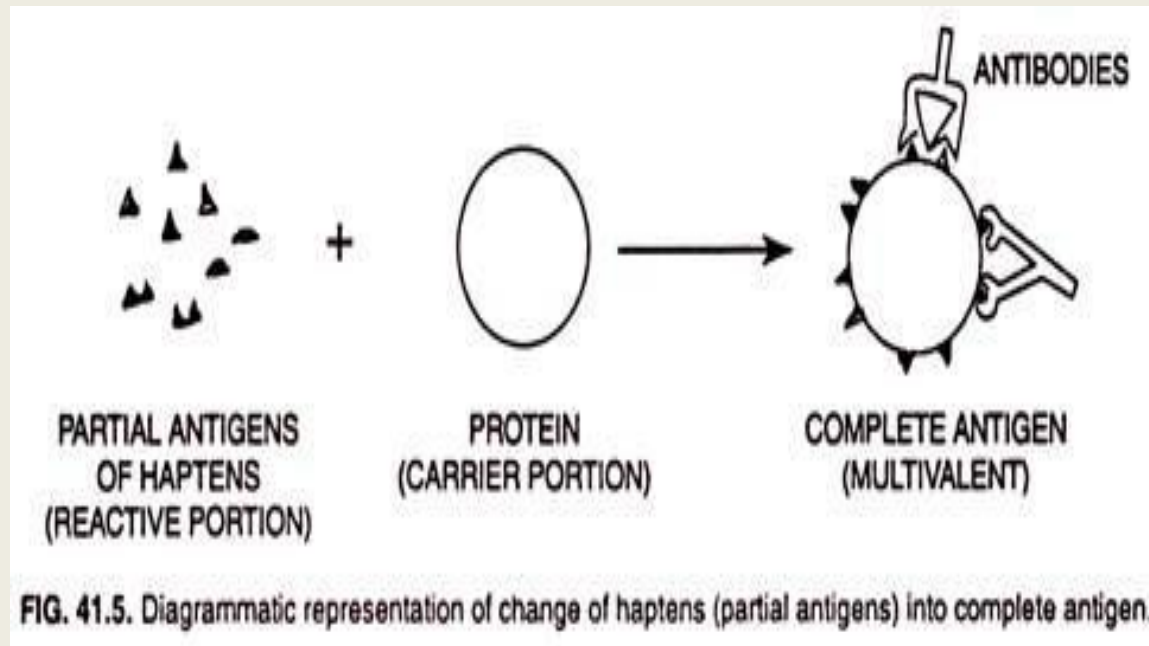
Nucleic acids are usually poorly immunogenic. However, they may become immunogenic when single stranded or when complexed with proteins.

D. Lipids

In general lipids are non-immunogenic, although they may be haptens.

Complete and Partial Antigens

- **Complete antigens** : possess both of the essential properties called **Complete antigen**
- It consists of **carrier portion and reactive portion**
- **Partial Antigens**: **“They lack immunogenicity, but interact with antibodies called Haptens”**
- **Hapten interact with protein called carrier to become A complete antigen**



Types of Antigens

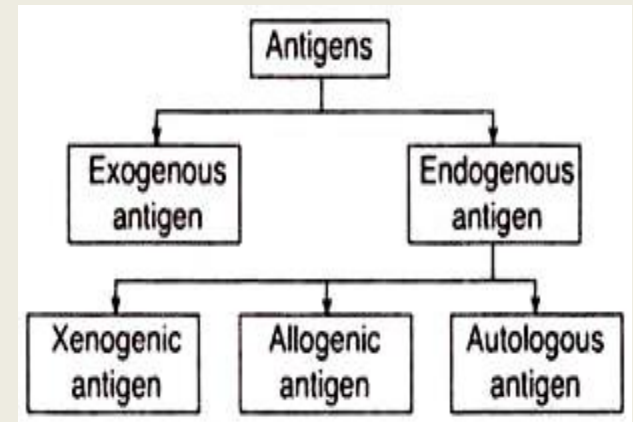
Exogenous Antigens: These are produced outside of the host cell and enter the cell by process of endocytosis. Eg: Microbial pathogens

Endogenous Antigens: Produced within the cell itself (intracellular antigens) Eg: Viral proteins.

Autoantigens: It is present in all individuals of same species. Usually a normal protein or complex protein (DNA or RNA) that is recognized by immune system of patients suffering with Autoimmune system

Alloantigens: Shows genetic variation among the members of the same species. Eg: Blood group antigens

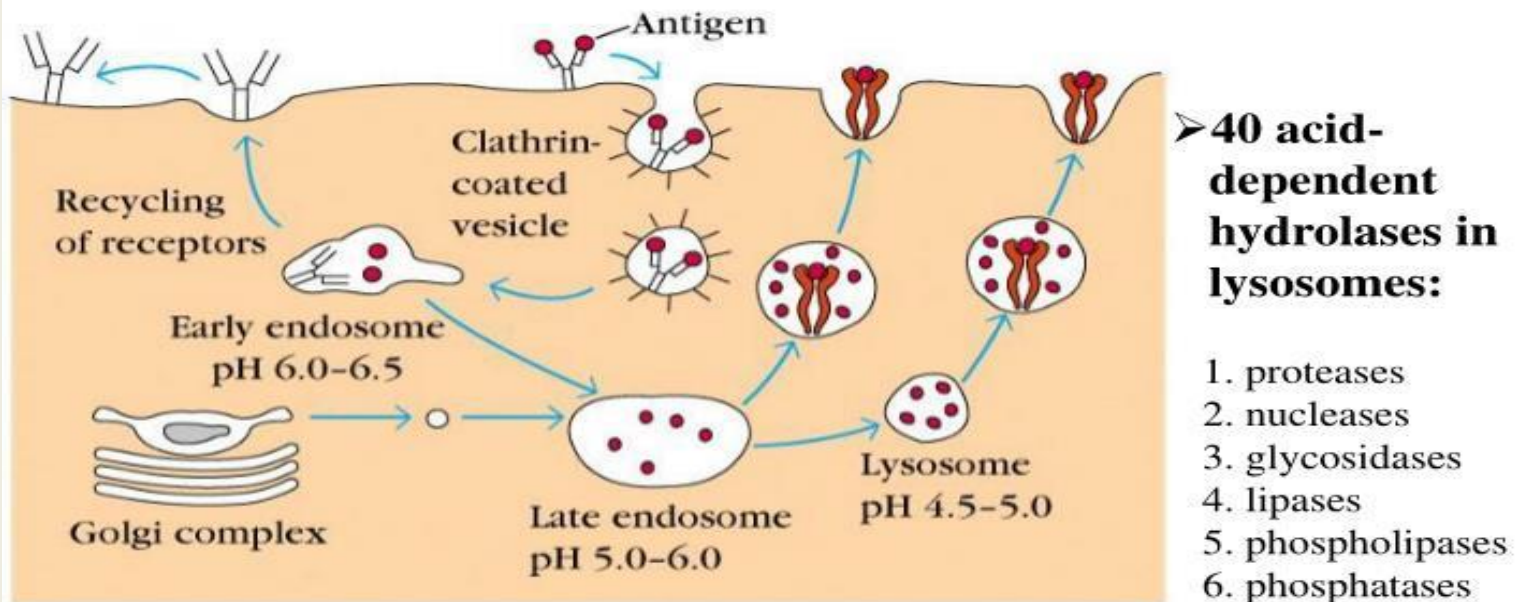
Xenogeneic antigen: It is an antigen common to members of one species but not to members of other species; called also heterogeneic antigen.



Antigen Processing and Presentation

Exogenous Antigens

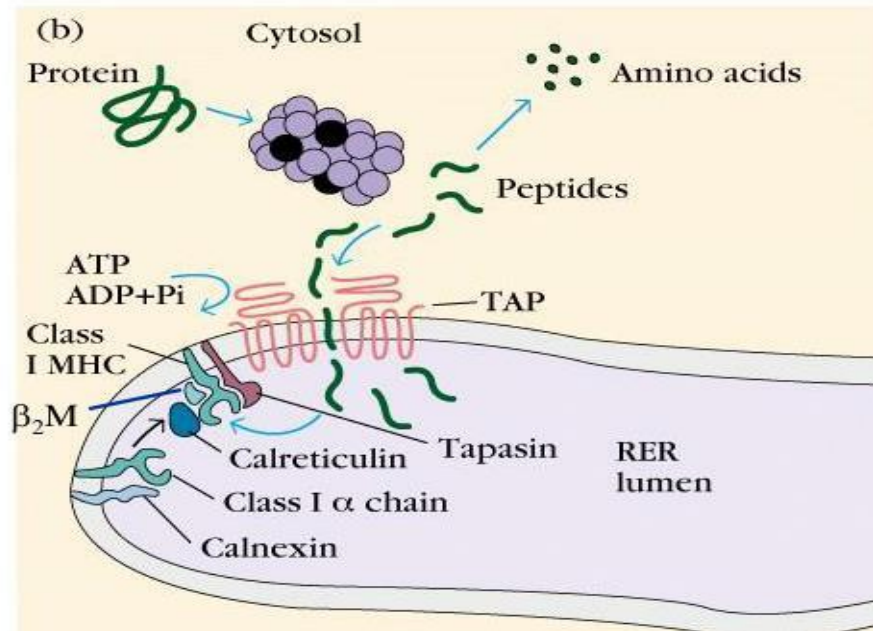
Generation of antigenic peptides in the endocytic pathway



Antigen Processing and Presentation

Endogenous Antigens

Generation of antigenic peptides in the cytosolic pathway



Proteasome subunits (LMP2, LMP7, and LMP10) favor the production of peptides that binds to class I MHC molecules.

T - Independent Antigens

- **Complex Carbohydrates**
- **Do not require processing**
- **Can directly interact with T cell**
- **No memory**

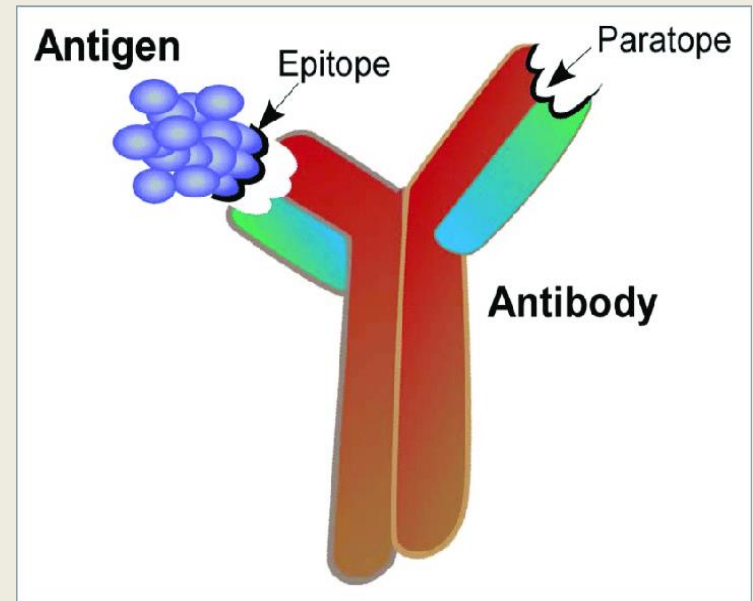
T - Dependent Antigens

- **Require macrophage and other APC**
- **Require T-helper Cell**
- **Require MHC molecules**
- **Many proteins**

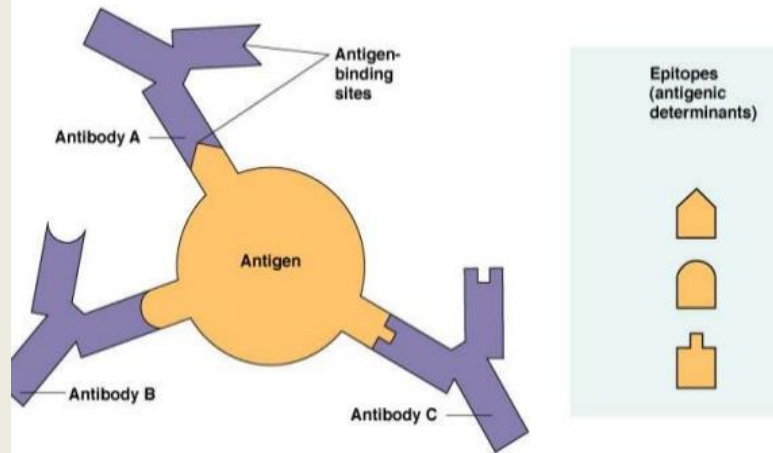
Epitopes or Antigenic Determinants

An **epitope**, also known as **antigenic determinant**, is the part of an antigen that is recognized by antibodies, B cells, or T cells. For example, the **epitope** is the specific piece of the antigen to which an antibody binds.

A **paratope**, also called an antigen-binding site, **is a part of an antibody which recognizes and binds to an antigen**. It is a small region (of 5 to 10 amino acids) of the antibody's Fab region, of the antibody's heavy and light chains.



Epitopes: Antigen Regions that Interact with Antibodies



Factors Affecting the Antigenicity

- Foreignness
- Molecular size
- Chemical Composition
- Ability to be processed and presented with MHC Molecules

Review questions

1. What is antigen and immunogen?
2. What are the criteria for immunogenicity? Which one is most essential and why?
3. How can you classify antigens?
4. What are the differences between T-dependant and T-independent antigens? Which will give long term immunity?
5. What is super antigen?
6. Where What is epitope and paratope? Where paratope is located?



