ANTIGEN

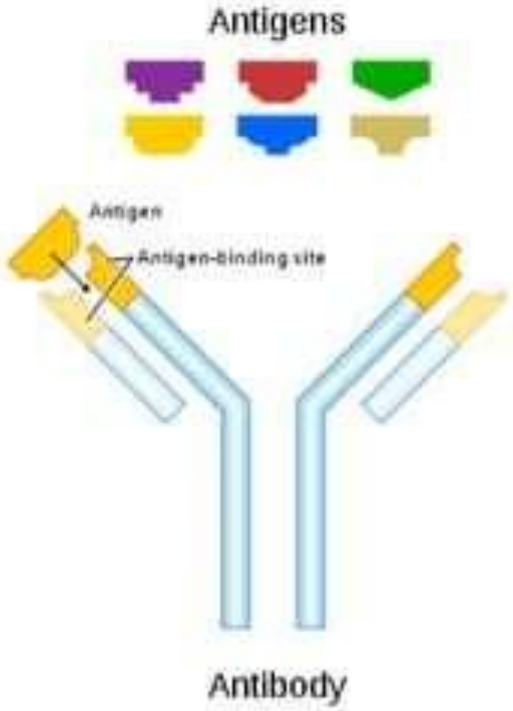
Jitendra kumar pandey
PG,2nd yr medical microbiology
MGM medical college ,mumbai

Introduction

- In 1899 Ladislas Deutsch (Detre) (1874–1939) named the hypothetical substances halfway between bacterial constituents and antibodies "substances immunogenes or antigenes". He originally believed those substances to be precursors of antibodies, just like zymogen is a precursor of zymase. But by 1903 he understood that an antigen induces the production of immune bodies (antibodies) and wrote that the word antigen was a contraction of "Antisomatogen.

DEFINITION OF ANTIGEN

Antigen is substance which when introduced parentally into the body stimulates the production of an antibody with which it reacts specifically and in an observable manner



Classification of Ag

Based on Immunogenicity

- **Complete antigen** : Substances which can induce antibody formation by themselves and can react specifically with these antibodies

- **Incomplete antigen (**haptens): substances unable to induce antibody formation on its own but can become immunogenic when covalently linked to proteins, called carrier proteins .they are of two types:

  - Complex
  - Simple

BASED ON ORIGIN:

- **Exogenous antigens**

  Exogenous antigens are antigens that have entered the body from the outside, for example by inhalation, ingestion, or injection. The immune system's response to exogenous antigens is often subclinical.

- **Endogenous antigens**

  Endogenous antigens are antigens that have been generated within previously normal cells as a result of normal cell metabolism, or because of viral or intracellular bacterial infection.

- **Autoantigens**

  An autoantigen is usually a normal protein or complex of proteins (and sometimes DNA or RNA) that is recognized by the immune system of patients suffering from a specific autoimmune disease. These antigens should, under normal conditions, not be the target of the immune system, but, due to mainly genetic and environmental factors, the normal immunological tolerance for such an antigen has been lost in these patients.

- Isoantigens
- Heterophile antigen

Factors of Antigenicity

1.FOREIGNNESS

Antigen must be **foreignness to immune system**:

What substances are foreignness to immune system ?

According to **Burnnet's clone selection theory**, **foreignness (non-self)** means substances that **never contact** with lymphocytes **during embryo period**

2.SIZE

- Larger molecules are highly antigenic
- Lower molecular weight are either non antigenic or weakly antigenic

3.Chemical Nature

- Most naturally occurring antigens are either proteins or polysaccharides.
- Lipids and nucleic acids are less antigenic on their own but do so when combined with proteins

4. Susceptibility to tissue Enzymes

- Substances which can be metabolised and are able to the action of tissue enzyme behave as antigen.

5.Antigenic specificity

- It depends upon epitope
- Position of epitope in the antigen molecule is important for specificity.

6.Species specificity

- Tissue of all individual in species possess species specific antigens.

7.Isospecificity

- It depends on isoantigens which may be found in some but not all members of species.

8.Autospecificity

- Self antigens are generally non-antigenic but in some case such as lens protein and sperm these are not recognised as self antigen because they are absent during the embryonic life and develop later.

9.Organspecificity

- Some organs such as the brain, kidney and lens protein of different species share the same antigens. such antigens are the characteristics of an organ or tissue found in different species and they are known as organ specific antigen.

10.Heterogenic specificity

- The same or closely related antigen may some time occur in different biological species, classes and kingdom are know as heterophile antigens.
- Antibodies to these antigen produced by one species cross react with antigen of other species. Eg. Forssman Ag, Weil-felix rxn., Paul-Bunnell test

SUPERANTIGENS

- When the immune system encounters a conventional T-dependent antigen, only a small fraction (1 in 104 -105) of the T cell population is able to recognize the antigen and become activated (monoclonal/oligoclonal response).
- However, there are some antigens which polyclonally activate a large fraction of the T cells (up to 25%). These antigens are called **superantigens**

TESTS FOR ANTIGEN DETECTION

- Direct ELISA
- Direct Immunofluoresence
- RIA
- Neutralization test
- CFT
- Immunohistochemistry

THANK YOU !