

ANTIGEN

Dept of Microbiology

DEFINITION OF ANTIGEN

- Antigen is a 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 ANTIGEN

- **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 Immunogenicity

- **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

- ***Auto antigen :***
- 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.
- ***Non –self or foreign antigen:*** They are immunogenic and are three types
Alloantigen , Isoantigens & Heterophile antigen

FACTORS INFLUENCING IMMUNOGENICITY

- Size of the Antigen
- Chemical nature of the antigen
- Susceptibility of antigen to tissue enzymes
- Structural complexity
- Foreignness to the host
- Genetic factor
- Optimal dose of antigen
- Route of antigen administration
- Repeated doses of antigen
- Multiple antigen

BIOLOGICAL CLASSES OF ANTIGEN

- **T – dependent [TD] Antigens:**

Antigens are processed and presented by antigen presenting cells [APCs] to T cells > T cell activation > secretes cytokines > B cell stimulation > Antibodies produced

- **T – cell independent [TI] Antigens:**

Few antigens such as bacterial capsule , flagella and LPS do not need the help of T cells and APCs. They directly bind to immunoglobulin receptors on B cells > stimulate B cells polyclonally > secretion of non- specific antibodies [i.e] hypergammaglobulinemia

SUPER ANTIGENS

- *Superantigens*

When the immune system encounters a conventional T-dependent antigen, only a small fraction (1 in 10^4 - 10^5) 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

- Bacterial super antigens
- Viral super antigens
- Fungal super antigens

TESTS FOR ANTIGEN DETECTION

- **Tests for antigen detection:**
- Direct ELISA
- Direct Immunofluorescence
- RIA
- Neutralization test
- CFT
- Immunohistochemistry