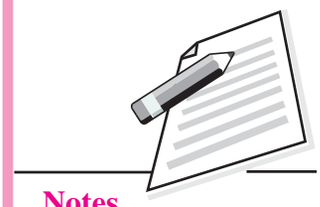


56

ANTIGENS

56.1 INTRODUCTION

Common perception about an antigen is that it is a substance which produces antibodies and react with them. However, it is not entirely correct – particularly in view of closely related groups of substances called immunogens and haptens. Hence there is need to be clearly defined.

OBJECTIVES

After reading this lesson, you will be able to:

- define antigen
- differentiate antigen from immunogens and haptens
- describe some of the characteristics of antigens

Antigen is defined as any substance which when introduced in the body, stimulates the production of an antibody with which it reacts specifically. Its ability to bind with antibodies or T-cell is referred to as antigenicity.

Immunogen is substance which produces an immune response as well as binds to its products i.e., antibodies or sensitized T-cells, when injected into the host.

Hapten refers to a group of substances, usually very small in size, which do not induce an immunresponse by themselves alone. But if combined with another molecules called carries, the hapten-carrier complex induces an immune response

Notes

INTEXT QUESTION 56.1

1. Antigens stimulates the production of .....
2. Ability of antigen to bind with antibody is termed as .....
3. ..... produces immune responses
4. ..... if combined with carriers induce immune response

56.2 TYPES OF ANTIGEN

Endogeneous Antigen – These enters the body from outside i.e external environment. Common examples includes microorganisms, drugs, pollen, pollutants or even food items etc.

Endogenous Antigens - These antigens are produced within the host.

56.3 ANTIGEN AND HOST RELATIONSHIP

Based on genetic consideration antigens are divided into three types: Autoantigens, alloantigens and heteroantigens

56.3.1 Autoantigens

These are the antigens belonging to host itself.

56.3.2 Alloantigens

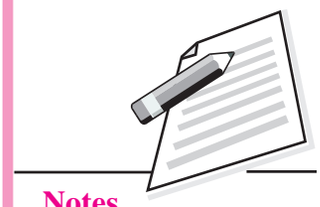
These are the antigens derived from other members of species of the host, but not from the host itself. Such antigens are important in tissue transplant and blood transfusion processes e.g, antigens present on donor and the recipient RBCs are alloantigens to each other.

56.3.3 Heteroantigens

These antigens are from two different species such as plants and animals or microorganisms etc.

The smallest unit of antigenicity is known as the antigenic determinant or epitope. The epitope is that small area on the antigen usually consisting of four or small area on the antigen. Usually consisting of four or five aminoacid or monosaccharaide residues, possessing a specific chemical structure, electrical charge and steric configuration, capable of sensitising an immunocyte and of reacting with its complementary site on the specific antibody or T cell receptor.

The combining area on the antibody molecules, corresponding to the epitope, is called the paratope.



INTEXT QUESTIONS 56.2

Match the following

1. Endogenous antigen	(a) Belongs to host
2. Exogenous antigen	(b) Derived from other members of species of host
3. Autoantigen	(c) Produced within the host
4. Alloantigen	(d) Enter from outside

56.4 DETRMINANTS OF ANTIGENICITY

A number of properties that make a substance antigenic have been identified but the exact basis of antigenicity is still not clear

56.4.1 Size

Antigenicity is related to the molecular size. Very large molecule are highly antigenic and particles with low antigenicity are nonantigenic. Low molecular weight substances may be rendered antigenic by adsorbing them on a large inert particles such as bentonite or kaolin.

56.4.2 Chemical nature

Proteins and polysaccharides are good immunogen as compared to lipids and nucleic acids, Among them proteins are better than carbohydrates. Nucleic acids, poor by themselves, can generate response in combination with other substances.

56.4.3 Susceptibility to tissue enzymes

Only substances which are metabolized and are susceptible to the action of tissue enzymes behave as antigens. Antigens introduced into the body are degraded by the host into fragments of appropriate size containing the antigenic determinants.

56.4.4 Foreignness

Only antigen which are 'foreign' to the individual (nonself) induce an immune response. The antigenicity of a substance is related to the degree of its foreignness. Antigen from related species are less antigenic than those from distant species.

56.4.5 Antigenicity specificity

The basis of antigenic specificity is a stereochemical .Crossreaction can occur between antigen that bear stereochemical similarities. In some instances, apparent cross reactions may actually be due to the sharing of identical antigenic determinants by different antigens.

Notes

56.4.6 Species specificity

Tissues of all individuals in a species contain species- specific antigens. There exits some degree of cross - reaction between antigens of related species.

56.4.7 Isospecificity

Isoantigens are antigens found in some but not all members of a species. The species may be grouped depending on the presence of different isoantigens in its members

56.4.8 Autospecificity

Autologous or self antigens are ordinarily nonantigenic but there are exceptions. Sequestrated antigens that are not normally found free in circulation or tissue fluids are not recognised as a self antigens.. Similarly, antigens that are absent during embryonic life and develop later are also not recognized as self antigens.

56.4.9 Organ specificity

Some organs, such as the brain, kidney and lens protein of different species, share the same antigen. Such antigens, characteristic of organ or tissue and found in different species, are organ – specific antigens.

56.4.10 Heterogenetic (heterophile) specificity

The same or closely related antigens may sometimes occur in different biological species, classes and kingdoms. These are known as heterophile antigens .

INTEXT QUESTIONS 56.3

1. Drugs and Pollen are examples of ..... antigen
2. Antigens that are of importance in Tissue transplant and Blood Transfusion are .....
3. The smallest unit of antigenicity is known as .....
4. Antigens found in some but not all members of a species are called as .....

WHAT YOU HAVE LEARNT

- A substance that induces an immune response is called an antigen. If the antigen stimulates production of an antibody, it will react specifically, generally in a observable manner, with antibody.

- An immunogen is a substance that can induces an immune response but which does not necessarily bind to its specific antibody.
- Most antigens are foreign to the host. They are large molecules, such as proteins and polysaccharides. Small chemical groups on the antigens molecules, called epitopes, constitute that are recognised by antibodies.

TERMINAL EXERCISE

1. Define antigen, immunogen and hapten?
2. Write characteristics of antigen?

ANSWERS TO INTEXT QUESTIONS

56.1

1. Antibody
2. Antigenicity
3. Immunogen
4. Hapten

56.2

1. (c)
2. (d)
3. (a)
4. (b)

56.3

1. Endogenous
2. Alloantigen
3. Antigenic determinant or epitope
4. Isoantigen