



Antigens

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Objectives:

By the end of this presentation you will be able to:

- **Describe heterophils, superantigens and haptens.**
- **Identify determents of antigenicity.**



Introduction

Antigens are any substance that stimulates the immune system to produce antibodies.

Antigens can be bacteria, viruses, or fungi that cause infection and disease.



Heterophils (Heterogenetic)

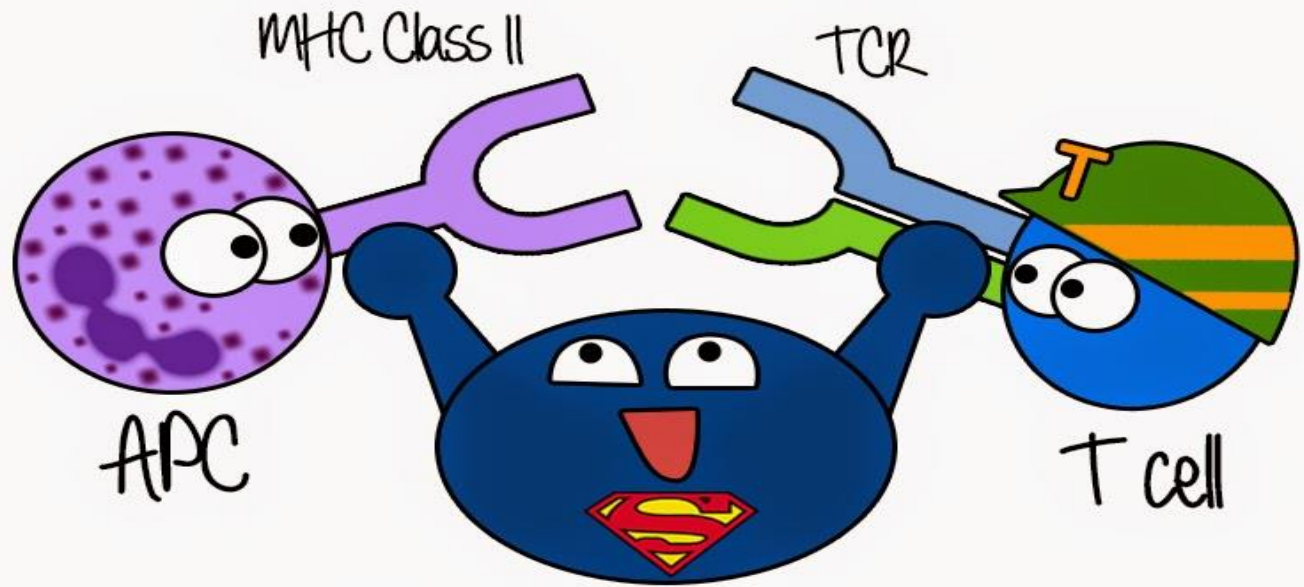
Same or closely related antigens occurring in different biological species, classes and kingdoms.

Ex. Forssman antigen: It is a lipid -carbohydrate complex widely distributed in man, animals, birds, plants and bacteria.



Superantigen

- Are bacterial proteins which can interact with **antigen presenting cells** (APCs) and **T cells**.
- **APCs** present antigens to **T cells** receptors by MHC class II and V β .



How super antigens work



Haptens

Are low-molecular-weight molecules which cannot induce an immune response when injected by themselves but can do so when covalently coupled to a large protein molecule called the carrier molecule.

EX. penicillin



Determinants Of antigenicity

Size

Molecular weight

Susceptibility
to tissue
enzymes

Isospecificities

Chemical nature

Antigenic
specificities

Autospecificity

foreignness

Species
specificities

Organ
specificities

1. size

Molecular weight



Low molecular weight

(less than 5000) are non-antigenic.



High molecular weight

Strong antigen



2. Foreignness

foreignness Only antigens which are 'foreign' to the individual (nonself) induce an immune response because host distinguishes self from nonself and normally does not respond to self.

3. Chemical nature



**Lipids and
nucleic acids**

Poor immunogens



Carbohydrates

weak immunogens



Proteins

best immunogens

4. susceptibility to tissue enzymes

Substances which can be metabolized and susceptibility to the tissue enzymes

antigenic •

Substances unsusceptible to the tissue enzymes

Not antigenic •

Substances very rapidly broken down by tissue enzymes.

Not antigenic •

Substances that are insoluble in body fluid



5. antigenic specificity Chemical Groupings

Antigenic specificity Chemical Groupings Foreignness of a substance to an animal can depend on the presence of chemical groupings that are not normally found in the animal's body.

Antigenic specificity varies with the position of antigenic determinant, i.e. whether it is in ortho, meta or para position.



6. species specificities

Tissues of all individuals in a species possess species-specific antigens. However, some degree of cross-reactivity is seen between antigens from related species.



7. Isospecificities

Isoantigens or alloantigens are antigens found in some but not all members of a species. On the basis of isoantigens a species may be divided into different groups.

ex. Human erythrocyte antigens:



8. Autospecificity

Sequestered Antigens

Autologous or self-antigens are ordinarily nonantigenic but there are exceptions. Certain self-antigens are present in closed system and are not accessible to the immune apparatus and these are known as sequestered antigens.



9. Organ specificity

Some organs, such as brain, kidney and lens protein of different species share the same antigens. These antigens are known as organ-specific antigens



Summary

Any

Q.?