**Antigen and Immunogen**

CHARACTERISTICS OF ANTIGENS AND IMMUNOGENS

An immunogen is any molecule (or group of molecules) that can induce an immune response, whilst an antigen is any substance that can react with antigenspecific receptors found on the surface of certain white blood cells. Thus, an antigen differs from an immunogen in that although an antigen can interact in a specific way with the immune system, it cannot by itself stimulate an immune response; other stimuli are required. Thus, all immunogens are antigens but not all antigens are immunogens.

When an antigen is recognised by the immune system, it interacts with specific

receptors on the surface of a group of white blood cells called lymphocytes.

That part of an antigen which binds to these receptors is known as the **antigenic**

**determinant** or **epitope.**

An antigen may be protein, lipid, carbohydrate or any combination of these.

It may be soluble or particulate, simple or complex with many different antigenic

determinants (e.g. a bacterium may have antigenic determinants on the cell wall,

the flagellum or on pili). Although an antigen may have many different antigenic

determinants each of which comprises a small number of amino acids (4–6) or

sugar residues, the resulting immune response may comprise antibodies which

recognise only a few of these.

Since antigens can be of almost any chemical composition, the proteins and

carbohydrates present in the membranes of our cells may be antigenic if the cells

are introduced into another person or an animal. It was just this principle that

was exploited in the production of monoclonal antibodies. Injecting human

cells into mice (where they are recognised as foreign) meant that mice produced

antibodies to the different molecules on the surfaces of the cells.

* FACTORS AFFECTING IMMUNOGENICITY

Various physical and biochemical characteristics affect a substance’s immunogenicity.

It is important to understand how an antigen’s immunogenicity may be modified since this may for example affect the ability of a candidate vaccine

to stimulate a protective response.

1. FOREIGNNESS

The immune system is designed to eliminate anything that does not belong in the normal healthy body, i.e. it is capable of distinguishing between ‘‘self ’’ and ‘‘non-self’’; it can recognise things that are foreign to it. The more foreign a molecule is, the more likely it is that the immune system will react to it and the more immunogenic it will be.

It is important to remember that although a molecule may not be immunogenic in the normal host, if it is introduced into a different host, it may become so. For example, rabbit serum albumin injected into a rabbit will not be immunogenic. The same molecule injected into a dog will stimulate an immune response.

1. SIZE

The size of a molecule appears to affect its immunogenicity. Generally, substances with molecular weights greater than 100 kDa are potent immunogens, whilst those of less than 10 kDa may not stimulate an immune response at all.

Although some small molecules may contain antigenic determinants and can bind antigen-specific receptors on cells, they are not large enough to stimulate an effective immune response. However, these molecules may be made immunogenic by attaching them to a larger molecule known as a carrier. Under these circumstances, the small antigenic molecule is known as a hapten.

1. CHEMICAL COMPLEXITY

The chemical complexity of a molecule may affect its ability to stimulate an immune response. Large polymers of amino acids might be expected to be good immunogens (because of their size) but only prove to be so when they consist of a mixture of amino acids.

The type of amino acids present in a peptide also affects its immunogenicity. Aromatic amino acids make a molecule more immunogenic than non-aromatic molecules because non-covalent, hydrophobic, forces govern the interaction between an antigen and its specific receptor on a cell.

1. ROUTE OF ADMINISTRATION

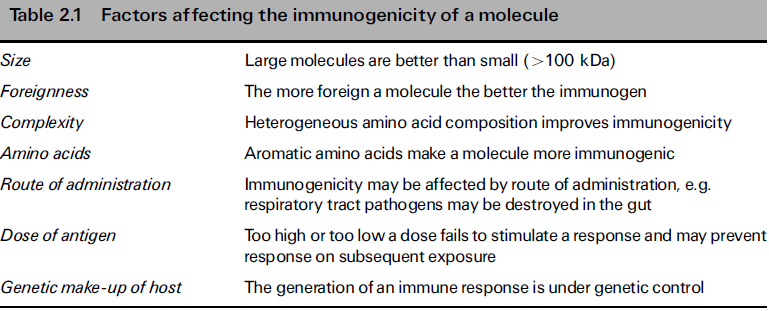
The type of immune response elicited by an immunogen may be very different at one particular site in the body compared to another. Thus, the route by which an antigen gains access to the immune system may affect its immunogenicity. For example an organism that normally causes infection when introduced in the lungs (a respiratory pathogen) may be destroyed by the acid in the gut if swallowed.

1. DOSE

The dose of an antigen may also affect its ability to be immunogenic. Given at too high or too low a dose, the immune system may fail to respond to an antigen, which at the correct dose is immunogenic. This failure to respond is known as immunological tolerance.

1. HOST GENETIC MAKE-UP

Since the immunogenicity of a molecule is determined by the size of the subsequent immune response, and an individual’s ability to mount an immune response is genetically controlled, then the genetic make-up of the host must play a role in determining the relative immunogenicity of a molecule. This is demonstrated by the fact that some antigens, which stimulate an immune response in man are non-immunogenic in other animals.



**Other Properties of antigen :**

* **according to the rote of adminstrate**

1. **Exogenous antigen:** foreign antigen that are ingested endophagocytosis such as bacterial , fungi antigen
2. **Endogenous antigen:** internally generated and presented by special self-body cells like MHC such as transplant tissue
3. **Autoantigen:** normal cell receptor converted to abnormal cell due to autoimmunodisease
4. **Tumor antigen:** degenerative or modified antigenicity receptor

* **According to the natural structural**

1. **Protein antigen:** more antigenic such as snak venomes, cell surface protein
2. **Polysaccardide**: such as starch or glycogen not good antigen
3. **Lipid:** poor antigen relative simplicity and rapid metabolism