I am Ruella D’souza.

Today we will be beginning with Unit Three

and studying module one under antigens.

The outline- characteristics of an antigen.

Under which we shall study its foreignness,

molecular size, heterogeneity,

degradeability and presentation.

Physical form. and we shall

also study what is a hapten?

The learning outcomes

At the conclusion of this presentation,

the student will be able to understand

the complexity of an antigen with

respect to certain key points.

And comprehend the characteristics

of a Hapten with the help

of examples.

introduction.

Substances that can be recognized by the

immuno globulin receptor of B cells.

Also by the T cell receptor.

When complexed with the major

histocompatibility complex,

or MHC are called antigens.

Antigens are various small biochemicals.

An antigen.

Is a substance that induces

a specific immune response.

And is more appropriately termed

an Immunogen.

The two essential properties of

an antigen are immunogenicity,

that is, the ability to stimulate

antibody production by B cells.

And specificity that is its

specific reactivity with antibody molecules.

Examples of antigens include proteins,

nuclear proteins, lipoproteins,

polysaccharides and so on.

The 1st characteristic of an antigen

we shall be studying is foreignness.

It does not respond immunologically to self.

A host will not respond to its own antigens.

They move foreign a substance is ,

the more immunogenic it is.

That is, the greater the phylogenetic

distance between two species,

the greater the immunogenicity

of that particular antigen.

However, there is an exception.

An individual may mount an immune

response against his or her own tissues.

A situation we term autoimmunity.

point number 2.

The molecular weight or the size

Relatively small substances

are very low in immunogenicity,

whereas larger substances

have greater immunogenicity.

Let us take an example.

Penicillin, an antibiotic,

has a molecular weight of

less than 1000 Daltons.

And is not immunogenic.

Insulin,

the hormone.

Has a weight of anywhere

between 1000 to 6000 Daltons,

and may or may not be immunogenic.

Albumin or tetanus toxin

proteins having molecular weight

of more than 6000 Daltons are

generally immunogenic in nature.

Point Number 3 is the chemical

composition and heterogeneity.

The greater the chemical complexity,

the greater the immunogenicity of an antigen.

Co-polymers are usually more immunogenic

than homopolymers of the same constituents.

The amino acid lysine,

which is a homopolymer,

has a molecular weight

of around 30,000 Daltons.

It is poorly immunogenic.

But when lysine is attached to

a low molecular weight moiety,

the molecule becomes immunogenic.

This results in an immune response

directed against both components.

It is important to note that the

four levels of protein structural

complexity affects immunogenicity.

That is the primary structure, secondary

structure the tertiary structure

and the quartenary structure,

which is 3D folding of the

protein molecule

point number 4 is degradeability and presentation.

Antigens that are easily phagocytized

are generally more immunogenic.

For T dependent antigens,

the development of an immune

response requires phagocytosis,

processing,

and presentation of the antigen

to be carried out.

This is done by antigen presenting

cells or what we call APCs and they

present the antigen to T helper cells.

This is done in conjunction

with the host macrophages.

This topic will further be

covered in an upcoming study.

Point number 5 is the physical form.

It is important to note that a

particulate antigen is more immunogenic

when compared to a soluble one.

And the native form of an antigen is less

immunogenic than a denatured antigen.

We now come to haptens.

Haptens are one or more reactive

proteins present in an antigenic molecule,

and they are capable of chemically

reacting with an antibody.

The specific antibody is part of

the humoral response in the host.

A hapten is unable by itself to elicit

the formation of antibody simply

because it has very low molecular

weight and is chemically simple.

Therefore,

a complete antigenic molecule is

reactive as well as elicits the

production of specific antibodies haptens

are antigenic but not immunogenic.

Which means that the hapten is only

capable of provoking an immune

response when coupled to a carrier

at the bottom right of your screen.

You have an image of a hapten coupled to

a carrier called a hapten carrier conjugate.

The HAPTEN is designated by Red Stars

while the carrier is green color.

If this conjugate is inoculated in a rabbit.

There will be demonstrated

antibodies to specific components.

There will be demonstrated

antibodies to the hapten.

Antibodies to the carrier,

as well as antibodies to

both Hapten and carrier.

For example,

penicillin,

is a hapten that becomes antigenic

upon combining with tissue proteins.

An example is trinitrophenyl

bovine serum albumin.

All immunogens are antigens but

not all antigens are immunogens.

In order to summarize what we

have studied in this molecule,

an antigen is a substance that

provokes an immune response.

It is both immunogenic and specific.

Its major characteristics include

Foreigness, size, its chemical

composition and heterogeneity.

It's degradeability and

presentation and its physical form.

We also studied haptens which

are antigenic but not immunogenic

in nature they need carriers to

stimulate an immune response.

For references, you can refer to

the prescribed textbooks, thank you.