## Immunogen, Hapten and Adjuvant.

Entire microbe is not responsible for any disease. But these organisms possess numerous sites called as epitopes that are recognized by antibodies or receptors on the cells in the immune system. Majority of antigens are proteins but some are carbohydrates, lipids, and nucleic acids.

## Immunogens`

Immunogen is a stimulus that produces a humoral or cell-mediated immune response, whereas antigens are any substance that binds specifically to an antibody or a T-cell receptor. All immunogens are antigens, but all antigens may not be immunogens, some very small molecules called haptens can bind to antibodies or B-cell receptor but they cannot initiate an immune response.

## Hapten

Hapten is a molecule that reacts with specific antibody but is not immunogenic by itself, it can be made immunogenic by conjugation to a suitable carrier. Many drugs like penicillins are <u>haptens</u>. A hapten is essentially an incomplete antigen. These small molecules can elicit an immune response only when attached to a large carrier such as a protein; the carrier typically does not elicit an immune response by itself.



## Adjuvant

An adjuvant is a pharmacological or immunological agent that modifies the effect of other agents. Directly immunizing most antigens will lead to a poor immune response and rapid removal of the antigen from the body. To prevent this, the antigen is first combined with an adjuvant, which is a material that helps stimulate and enhance the immune response against the antigen through the creation of a depot effect. Adjuvants can act in various ways in presenting an antigen to the immune system. They can act as a depot for the antigen, presenting the antigen over a longer period of time, thus maximizing the immune response before the body clears the antigen. Adjuvant's immunobiological functions are:

- Improve the immunogenicity of highly purified or recombinant antigens (protein or peptide).
- Increase the innate immune response to antigen by interacting with pattern recognition receptors (PRRs) on or within accessory cells.
- Provide physical protection to antigens which grants the antigen a prolonged delivery.
- Increase the capacity to cause local reactions at the injection site (during vaccination), inducing greater release of danger signals by chemokine releasing cells such as helper T cells and mast cells.
- Help in the translocation of antigens to the lymph nodes where they can be recognized by T cells.