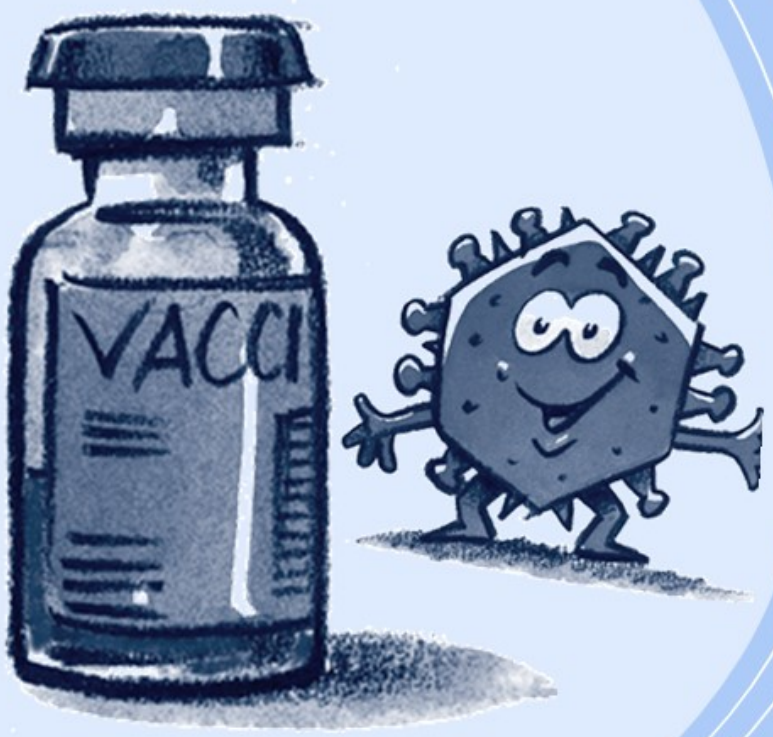

Date: 27 October, 2020

Post Graduate (PG); Monsoon semester, 2020

VMC 607: VACCINOLOGY

Topic: ***Traditional vaccine***

Dr Manoj Kumar
Assistant Professor
Department of Veterinary Microbiology
Bihar Animal Sciences University, Patna

TYPES OF TRADITIONAL VACCINES

- Inactivated vaccine preparation
- Live vaccine preparation
- Toxoid vaccines

INACTIVATED VACCINE PREPARATION

- An inactivated vaccine - uses a dead or killed virus or bacteria to help your body develop an immune response.

- An inactivated vaccine cannot cause the particular disease that it is intended to prevent.

- Some inactivated vaccines require multiple doses and periodic boosters for protection to continue. Live vaccines require only one dose.

How an Inactivated Vaccines Created?

- The common means to make a pathogen safe for use in a vaccine is by treatment with heat or chemicals or gamma irradiation
  - This kills the pathogen but still allows it to induce an immune response to at least some of the antigens contained within the organism.

- Heat inactivation is often unsatisfactory due to extensive denaturation of proteins.

- Chemical inactivation with formaldehyde or various alkylating agents are used for inactivation.

Disadvantages:

- Even after pathogens are killed >>> inactivated whole-organism vaccines still carry certain risks.
- Large quantities of the infectious agent needs to be handled prior to inactivation.
- Less immunogenic and tend not to have an extended duration of immunity (memory) compared to attenuated vaccines.
- Often contain an adjuvant purposely to incite local inflammation & enhance the immune response to the antigen.

LIVE ATTENUATED VACCINE

- **Contain live organisms**
- Live, Attenuated vaccine - The microbe, weakened in the laboratory to fight the infection without causing any serious harm but very closely reproduces the natural stimulus to the immune system.

- Attenuation - involves deletion of essential virulence factors or mutation of genes encoding metabolic enzymes whose function is essential for survival outside the laboratory.

- Attenuated viruses produce milder infections than the pathogenicity produced by the virulent wild-type counterparts.

Disadvantages:

- Integration of the plasmid harbored by bacterial vaccine vehicles is a potential hazard.
- The route of administration of the vaccine important . Can cause disease if given by the wrong route.
  - For e.g. live bacterial vaccines is fit for mucosal administration ; simultaneously ingestion of foreign DNA does occur.
- Peptides can be absorbed through the mucosa and some may induce an allergic reaction.
- Vaccination using live bacterial vaccines or exposure to the natural infections can lead to the formation of auto reactive antibodies

TOXOID VACCINE

- Toxoid vaccines –
  - selected toxins (proteins)
  - sufficiently attenuated (rendered harmless)
  - able to induce a humoral (antibody) immune response.

- Toxoid proteins are biologically inactivated forms of toxins.

- The most often used toxoid is tetanus toxoid, but other proteins are also used.

- Toxoids can be used to couple haptens through any of the chemical reactions.

- Generate strong immunological responses in vivo.

Disadvantages:

- Toxoid vaccines have
  - short duration of immunity comparable to attenuated viral vaccines
  - multiple sequential initial doses may be required to protect

- Revaccination (booster) may be required multiple times in a single year depending on individual risk factors.

Thanks