DEFINITION

"Vaccine is a suspension of living or killed pathogenic microorganism modified to make it non pathogenic and administration of which induce immune response in the recipient sufficient to prevent susceptible disease."

- A vaccine is a preparation which is used to improve immunity to a particular disease. The term derives from Edward Jenners use of cowpox ("vacca" means cow in Latin), which, when administered to humans, provided them protection against smallpox, the work which Louis Pasteur and others carried on.

- Vaccines are based on the concept" of variolation originating in China, in which a person is deliberately infected with a weak form of smallpox.
- Jenner realized that milkmaids who had contact with cowpox did not get smallpox.

- The process of distributing and administrating vaccines is referred to as vaccination.

- Since vaccination was much safer, smallpox inoculation fell into disuse and was eventually banned in England in 1848.

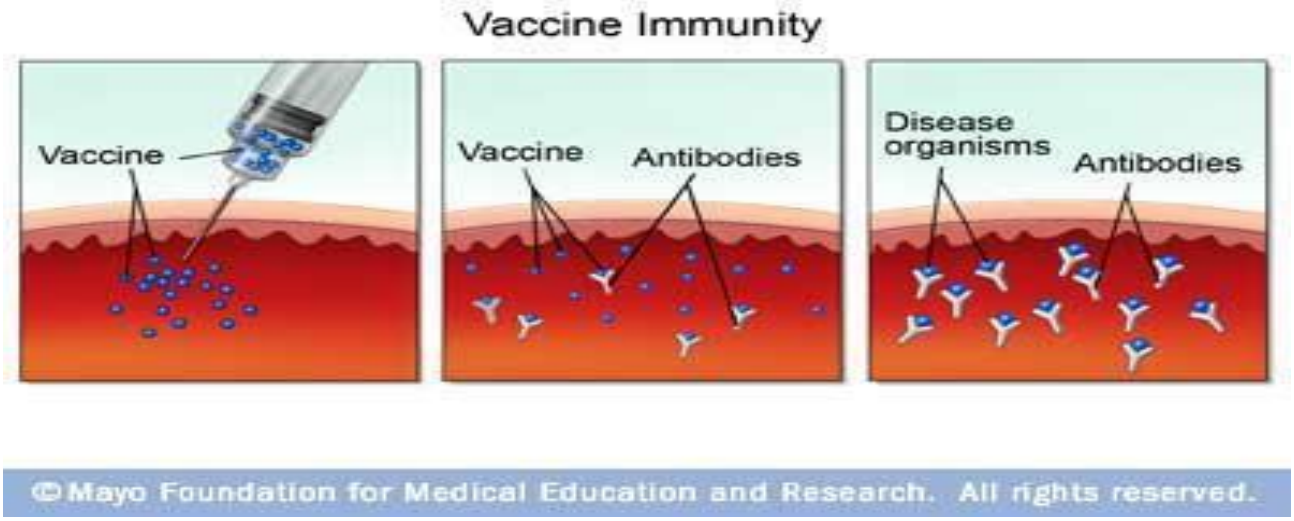
- Vaccines can be prophylactic (e.g. to prevent or ameliorate the effects of a future infection by any natural or "wild" pathogen), or therapeutic (e.g. vaccines against cancer are also being investigated;

- Vaccines may be dead or inactivated organisms or purified products derived from them.

DEVELOPING IMMUNITY

The immune system recognizes vaccine agents as foreign, destroys them, and 'remembers them. When the virulent version of an agent comes along the body recognize the protein coat on the virus, and thus prepared to respond by.

(1) Neutralizing the target agent before it can enter cells,
(2) By recognizing and destroying infected cells before that agent can multiply to vast numbers.



Vaccine have contributed to the eradication of small pox, one of the most contagious and deadly diseases known to man. Other diseases such as rubella, polio, measles, mumps, chicken pox, and typhoid are No where near as common as they where just hundreds years ago.

AIM OF VACCINATION:

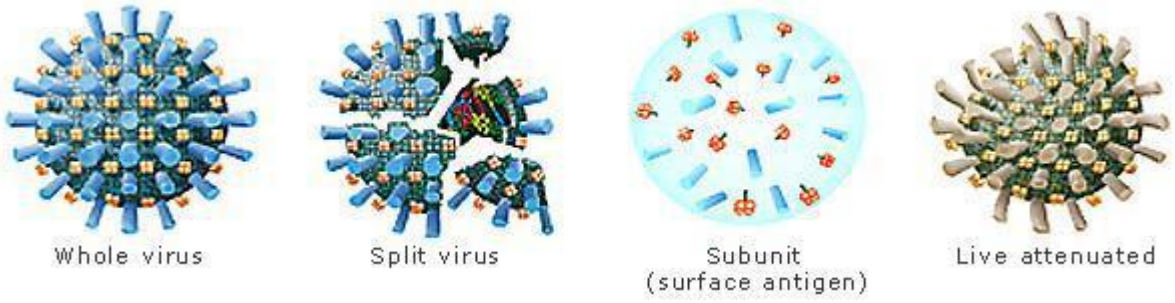
The aim of vaccination in the individual is to induce a prime state such that on contact with the relevant infection a more rapid and effective secondary response could be mounted leading to the prevention of disease thus the primary aim is to eliminate the disease.

IDEAL VACCINE:

Some important requirements (features) of an ideal vaccine are:

- **Non- pathogenicity:** Non pathogenic not cause original disease.
- **Immunogenicity:** Strongly immunogenic to produce antibodies.
- **Efficacy:** Greater than 90%.
- **Effective:** When given orally.
- **Produce long lived immunity:** (hope full life long)
- **Low cost**.
- Induce a wide range of appropriate responses.
- Compatible with co administrated vaccine.
- Stable genetically and thermally.

TYPES OF VACCINES



1. LIVE ATTENUATED VACCINES

There are conventionally used live viral bacterial vaccines, consist of mutants of wild type microbes which are limited in their ability to infect body e.g. BCG (bacterial vaccines), Measles, polio, yellow fever small pox (viral vaccines). They are prepared by same method as killed vaccines except the process of sterilization.

2. KILLED VACCINES.

These consist of killed or inactivated microorganisms are used where living vaccines are not available e.g. rabies, influenza, polio (viral vaccines), cholera, pertusis, plague, typhoid (bacterial vaccines).

3. HETEROLOGOUS VACCINES.

"These vaccines are based on the principle that if the antigenic site is available on some other organism inspite of using actual molecule, we can use this heterosite to induce some immune - response" e.g. monkey derived rotavirus has been tried with some success in human infants.

4.SUB-UNIT VACCINES (2nd GENERATION VACCINES).

"These ere vaccines which contain one or more pure or semi pure part or subunits of microorganisms i.e. pilli capsule, coat etc. e.g. Haemophilus meningitis vaccine produced from capsule polysaccharide molecule.

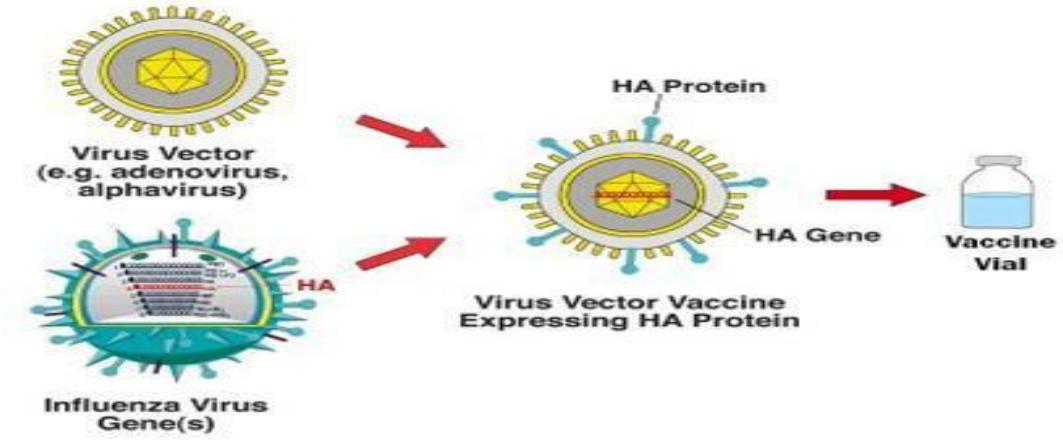
5. MARKER VACCINES.

These are vaccines which can be used in conjunction with a diagnostic test to differentiate a vaccinated animal from a carrier animal e.g. used for Herpes viruses of pigs & cattle's.

6. DNA VACCINES (3rd GENERATION VACCINES).

These are the vaccines that contain microbial fraction produced by genetic engineering. These are also called polynucleotide or genetic vaccines.

6. VECTORED VACCINES.



In this type of vaccines, the vector completed with inserted gene itself act as vaccine.
Viruses used as vector are adenovirus, Herpes virus.

Bacteria used as vector are salmonella, BCG.

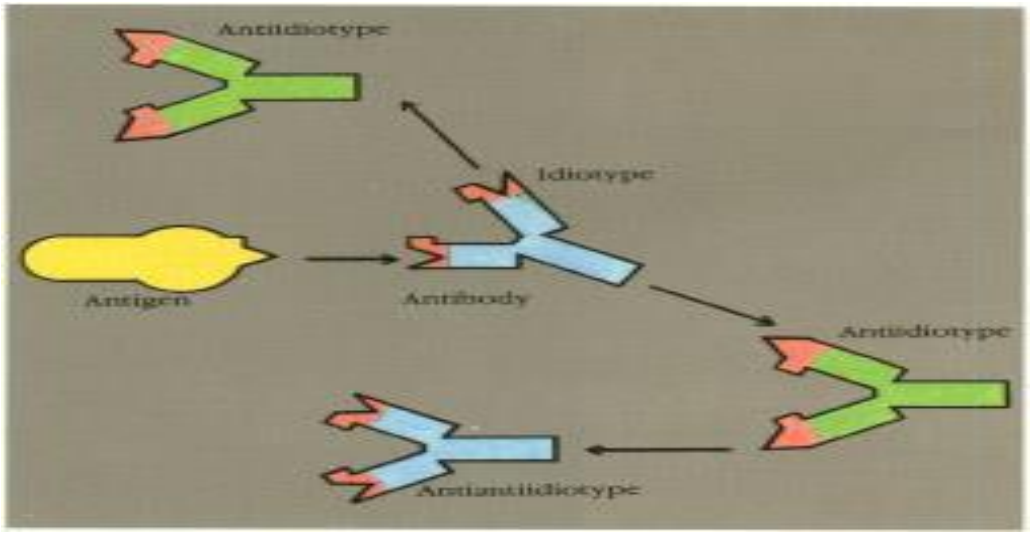
8. ONE-SHOT VACCINE.

It will be the vaccine of future consisting of viral or bacteria vector containing genes for all required vaccines (i.e. against all type of diseases) appeared in weekly review of "The New Scientist" in London.

9. PEPTIDE VACCINES.

These are the subunit vaccines prepared by chemical synthesis of short immunogenic peptides"

10. ANTI-IDIOTYPE VACCINES.



It is a vaccine in which antibody molecules are used to prepare antigen such that these antibody molecules themselves are copies of antigen. The antibody, which recognizes the antigen is called idiotype, which is use to raise second antibodies (antiideotype antibodies) e.g. this technique is successfully used against streptococci.

11. GENE-DELETED VACCINES.

"These are genetically engineered vaccines which involve the removal or mutation of virulence gene of the pathogen"