**St Peter’s Institute of Pharmaceutical Sciences**

**Course: Bachelor of Pharmacy**

**Subject: Pharmaceutical Biotechnology**

**Subject Code: BP605T**

**PREPARATION OF VIRAL VACCINES**

Viral vaccines contain viruses as antigens in the form of attenuated or inactivated virus. Attenuated vaccines are the vaccines in which the virus particles are made less virulent without disturbing the antigenicity. In inactivated viral vaccines, the virus particles are killed without disturbing the antigenicity.

Steps involved in the manufacturing of viral vaccine:

1. Selection of suitable strain
2. Cultivation of virus
3. Separation and purification of virus particles
4. Attenuation or Inactivation of virus particles
5. Dispensing into the final containers/lyophilization/packing and labeling
6. **Selection of suitable strain**

An exact viral strain is used for the production of viral vaccines, because the strain has to contain the antigenic portions which are required to stimulate the immunity. If more than one strain exists then all of them are taken for production. E.g: Type I, II, III strains for polio vaccine production.

1. **Cultivation of virus**

Viruses are obligate parasites which can be grown only in living environment. So, virus can be grown in the following tissues:

* 1. Live animals
  2. Fertile eggs
  3. Animal Tissue cultures

1. **Live animals**: Healthy animals are selected and quarantined. The animals are thoroughly examined. Virus is inoculated (injected) into the animal through an appropriate route of administration into a suitable tissue based on the type of viruses. Ex: Nervous tissue, skin, lungs, kidney etc. Once the virus in introduced into animal, it is allowed for incubation. Virus multiplies in the animal. After sufficient incubation period, the animal is sacrificed and tissue is isolated which contains the virus.
2. **Fertile eggs**: Fertile eggs are living environment in which the virus can be cultivated. Different parts of the fertile egg like chorioallantoic membrane, embryo, amniotic fluid etc. are inoculated with virus. And the eggs are allowed to incubation. Virus multiplies in the inoculated areas and after sufficient incubation period, the eggs are broken and the area of the egg with virus is separated.
3. **Animal Tissue culture**: Animal tissue growth is first establishes artificially under laboratory conditions. Then virus is inoculated into the animal tissues. This is the widely accepted method, because virus can be cultivated without contamination and complete process can be monitored in laboratory. Once the animal tissues are inoculated, it is allowed for incubation of virus. The virus particles get multiplied in the tissue. Then the tissues are taken for viral separation.
4. **Separation and purification of virus particles**

The tissues containing virus is ground in a suitable vehicle like glycerin and buffer at low temperature. Virus particles come into the vehicle. The tissue debris is removed by filtration process. Clear liquid contained virus is taken and again subjected to bacteriological filtration. Viruses pass through these filters. Then the virus is crystallized for further purification.

1. **Attenuation or Inactivation of virus particles**

Virus particles are attenuated or inactivated by any one of the following methods.

**Different methods of attenuation**:

1. Use of old cultures: A pathogenic microorganism when cultivated in a media looses its virulence character with time.
2. Use of related strain instead of original strain:

Instead of original strain, a related strain is used for preparation of vaccine.

1. Cultivation of organism in an unfavorable environment:

When a pathogenic microorganism is grown in unfavorable conditions then it looses its virulence character.

1. Passing the organism into an unfavorable host:

When a pathogenic microorganism enters an unfavorable or unnatural host it may loose virulence property.

1. Chemical method of attenuation: Using chemicals like formaldehyde, it may loose virulence nature.

**References**

1. S.J.Carter.Cooper and Gunns Tutorial Pharmacy.(2005) pp 389-392.