# VACCINE: POLIOMYELITIS

## 1. Vaccine indication

Polio vaccine is indicated for the active primary prevention of polio in persons not previously infected with the poliovirus.

## 2. Rationale for vaccination

The primary objective of polio vaccination is to prevent infection with the polio virus, and thereby prevent polio paralysis.

## 3. Type of vaccine

There are two types of polio vaccines: the inactivated polio vaccine (IPV) and the live-attenuated oral polio vaccine (OPV).

## 4. Composition of the vaccines

Both the IPV and the OPV contain all three types of polioviruses

- ORAL POLIO VACCINE (SABIN VACCINE)

  The live-attenuated oral polio vaccine (OPV) is prepared by the passaging of polioviruses in monkey kidney epithelial cells until they demonstrate a lack of association with paralytic disease in humans, and display low virulence. The OPV closely mimics natural infection, in that it replicates in the gut mucosa and induces broad immune response encompassing both humoral and mucosal immunity. Mucosal immunity is effective in decreasing the circulation of poliovirus in the community. The short-term shedding of vaccine virus in the stools of recently vaccinated children means that in areas where hygiene and sanitation are poor - and the incidence of polio is likely to be highest – immunisation with OPV can result in herd immunity, as unimmunised persons having close contact with vaccinees will ingest the vaccine virus, thereby being passively vaccinated. OPV is orally applicable and can be administered by trained health personnel and volunteers. Unlike most vaccines, it does not require sterile injection equipment and because of this, in resource-poor settings, is the polio vaccine of choice for the eradication of polio.

- INACTIVATED POLIO VACCINE (SALK VACCINE)

  The inactivated polio vaccine (IPV) is prepared by harvesting polioviruses in cell culture supernatants and then inactivating them with formaldehyde. The vaccine induces humoral immunity and, can thus prevent the spread of poliovirus to the central nervous system. However, it induces very low levels of local (gut) immunity. Because of this, it provides individual protection against polio paralysis but, unlike OPV, cannot passively vaccinate unvaccinated individuals. It is preferred for immunisation of pregnant women, immunocompromised patients and their households.

## 5. Immunogenicity of the vaccines

- IPV

  Immune response following immunisation with three doses is between 92% and 100%. There is a good response to each of the three polio viruses in the vaccine. Immunocompromised persons also demonstrate a good response to IPV.

- OPV

  Immunisation with OPV leads to an average seroconversion rate of 91% for all three polioviruses.

## 6. Efficacy and long term protection

Immunity following OPV immunisation is thought to be lifelong, since OPV mimics natural infection, antibodies to which are lifelong.

## 7. Candidates for vaccination

In South Africa, polio vaccine is given to babies as part of the EPI-SA schedule with the first dose being administered immediately after birth.

In addition, the following persons are also at risk of infection with poliovirus:

- Young adults who were not vaccinated as children
- Laboratory workers who might handle poliovirus
- Health care workers treating patients with suspected polio

## 8. Vaccination regimen and route of administration

- OPV

  Two drops are administered orally. The OPV has a six-dose schedule with the first dose being given immediately after birth. The subsequent doses are administered at 6, 10 and 14 weeks, 18 months and 5 years of age

- IPV

  IPV is given in 4 separate doses by intramuscular injection in the anterolateral aspect of the thigh in infants, or the deltoid muscle for older children and young adults. In infants the first 3 doses are administered as a combination with DTP and the last dose as a monovalent. This regimen is not available in South Africa and most developing countries.

## 9. Interchangeability of vaccines

Vaccines of different types (IPV or OPV) can be used interchangeably to complete a vaccination course.

## 10. Side effects

- OPV

  - OPV causes almost no side-effects, with less than 1% of recipients of the vaccine developing headache, diarrhoea, or muscle pain.
  - However, in two to four cases for every one million children vaccinated, the live-attenuated virus in OPV can revert to neurovirulence and cause vaccine-associated poliomyelitis paralysis (VAPP).

- IPV

  IPV is very safe. Mild side-effects include soreness at the site of injection, fatigue, and fever.

## 11. Special precautions

- Children with rare congenital immune deficiency syndromes should receive IPV rather than OPV.
- The following persons should not be vaccinated:
  - those who had an allergic reaction to a previous dose of polio vaccine;
  - those who are allergic to the antibiotics neomycin, streptomycin, or polymyxin.

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