



# Global Polio Eradication Initiative

Compiled by Dr. Leana Maree

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On the 20<sup>th</sup> of April 2016 South Africa changed from trivalent oral polio vaccine (tOPV) to bivalent oral polio vaccine (bOPV) as part of the Global Polio Eradication Initiative Endgame Strategic Plan.

## Introduction

Poliovirus is a positive sense, single-stranded RNA virus that belongs to the *Enterovirus* genus of the *Picornaviridae* family. There are three serotypes (1 – 3) which are antigenically distinct. Transmission occurs faecal-orally and humans are the only known natural host. The incubation period is usually around 7 – 10 days (range 3 – 35 days), and the majority (72%) of patients are asymptomatic. Approximately 24% of patients develop minor, non-specific symptoms, including fever, headache, sore throat and lethargy. Only 1 in 200 infections result in flaccid paralysis (paralytic poliomyelitis) when the virus enters the central nervous system and replicates in the anterior horn cells of the spinal cord.

## Poliovirus vaccines

As the 3 poliovirus serotypes are antigenically distinct, antibodies produced against one serotype does not provide protection against the other two types. There are two types of vaccine available against poliovirus, an inactivated polio vaccine (IPV) and a live-attenuated oral polio vaccine (OPV).

**Inactivated polio vaccine** was first introduced in 1955 and is an injectable vaccine containing formalin-inactivated (killed) wild-type poliovirus of all 3 serotypes. It is highly immunogenic as at least 99% of people develop protective antibody levels against all 3 serotypes after 3 doses of IPV. Vaccination with IPV produces less local gastro-intestinal immunity than OPV. As a result, these people can still be infected with wild-type poliovirus, leading to local viral replication and excretion, and thus risking continued circulation of wild-type poliovirus in the community.

**Oral polio vaccine** was first introduced in 1961 and contains live-attenuated poliovirus of all 3 serotypes, which have been specifically selected for their reduced neurovirulence and transmissibility. OPV produces better local gastro-intestinal immunity than IPV, and more than 95% of people are immune to all 3 serotypes after 3 doses. For several weeks after immunisation the patient can excrete vaccine virus, which can result in passive immunisation of close personal contacts who have not been vaccinated directly.

Although OPV is safe and effective, adverse events may occur on extremely rare occasions. Vaccine-associated paralytic poliomyelitis (VAPP) occurs approximately once in every 2.7 million doses of OPV, and is much more likely to occur in patients with certain immunodeficiencies (e.g. hypogammaglobulinaemia and agammaglobulinaemia). Cases of VAPP are clinically indistinguishable from poliomyelitis due to wild-type poliovirus. The second OPV-related adverse event is circulating vaccine-derived poliovirus (cVDPV). This occurs when vaccine-related viruses are allowed to circulate in the community due to low vaccination coverage, and over time they can acquire the transmissibility and neurovirulence characteristics of wild-type viruses due to the accumulation of genetic mutations. In the last 10 years, 24 outbreaks due to cVDPVs, resulting in 750 cases of paralytic poliomyelitis, have been reported.

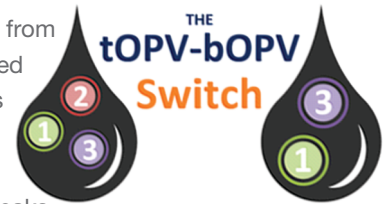
## What is the Global Polio Eradication Initiative?

The Global Polio Eradication Initiative was launched by the World Health Assembly in 1988. Since then the number of polio cases worldwide has decreased by more than 99%, from an estimated 350 000 cases in more than 125 countries to only 74 cases in two countries (Pakistan and Afghanistan) in 2015. Eighty percent of the world's population now live in certified polio-free regions. Until poliovirus transmission is interrupted in these last two endemic countries, all countries remain at risk of poliovirus importation. Poor infrastructure, geographic inaccessibility, political instability and conflict all continue to hamper polio eradication efforts.

## Why switch from trivalent OPV to bivalent OPV?

The last case of wild-type poliovirus type 2 was reported in India in October 1999. Since then all cases of paralytic poliomyelitis related to poliovirus type 2 have been linked to the vaccine-derived strain. In the last 10 years, 90% of all cVDPV cases and 40% of VAPP cases have been due to vaccine-derived poliovirus type 2. Thus while the poliovirus type 2 component of OPV remains in use, there is continual risk of re-introduction of VDPV type 2.

Consequently, between 17 April and 1 May, approximately 150 countries have switched from the trivalent OPV vaccine to the bivalent OPV vaccine, which only contains live-attenuated poliovirus types 1 and 3. The switch had to be synchronised to ensure that no country is put at risk of importing VDPV type 2 from another country that continues to use tOPV. By the end of 2015, all countries had also introduced at least 1 dose of IPV into their routine immunisation schedule as a risk mitigation measure for new cVDPV type 2 outbreaks.



### **What happens after the switch?**

Worldwide, all remaining stock of tOPV will be collected and disposed of properly. All laboratories and research facilities must also ensure that all potential sources of poliovirus are contained securely to prevent accidental release into the environment. A global stockpile of 500 million doses of monovalent OPV type 2 will be kept for use during outbreaks involving VDPV type 2 that started circulating prior to cessation of OPV type 2.

The last case of poliomyelitis due to wild-type poliovirus type 3 was reported in November 2012 in Nigeria, raising hopes that this serotype has also been eradicated. The Global Polio Eradication Initiative is working towards interruption of wild-type poliovirus type 1 transmission, and the complete withdrawal of bOPV by 2019, ensuring the elimination of all (wild-type and vaccine-derived) polioviruses.

### **What can you do?**

- If you immunise patients at your facility, ensure that only IPV and bivalent OPV are in use.
- Please report all cases of acute flaccid paralysis to the relevant authorities, as sensitive surveillance remains the primary mechanism for the detection of poliovirus, to validate the interruption of transmission, and to help document the elimination of vaccine-related strains.

### **Acute Flaccid Paralysis (AFP)**

#### **Case Definition:**

- A child under 15 years of age with sudden onset of weakness of any limb(s), excluding injury but including transverse myelitis and Guillian-Barrè syndrome OR
- A person of any age with paralysis in whom you suspect polio.

#### **Action:**

- Report the suspected case to your local surveillance / infection control officer.
- Conduct a thorough neurological examination and carefully document the site of paralysis, muscle tone, power and reflexes.
- Complete the Acute Flaccid Paralysis Case Investigation Form as supplied by the surveillance / infection control officer.
- Collect 2 stool samples, taken 24 – 48 hours apart, within 14 days of onset of paralysis.

#### **References:**

1. World Health Organization. Poliomyelitis. Available at: <http://www.who.int/biologicals/areas/vaccines/poliomyelitis/en/>
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3. Polio Global Eradication Initiative. Available at: <http://www.polioeradication.org/>
4. World Health Organization. Replacing trivalent OPV with bivalent OPV. Available at: [http://www.who.int/immunization/diseases/poliomyelitis/endgame\\_objective2/oral\\_polio\\_vaccine/en/](http://www.who.int/immunization/diseases/poliomyelitis/endgame_objective2/oral_polio_vaccine/en/)

#### **HEAD OFFICE**

Lancet Corner, Ground Floor, Cnr Menton and Stanley Roads, Richmond, Johannesburg, South Africa.  
(011) 358 0800

#### **PRETORIA MAIN LABORATORY**

1st Floor Pocardia Building, 509 Pretorius Street, Arcadia, South Africa.  
(012) 483 0100

#### **DURBAN MAIN LABORATORY**

102 Lancet Medical Centre, 74 Ismail C Meer Street, Durban, South Africa.  
(031) 308 6500

#### **CAPE TOWN MAIN LABORATORY**

85 Klipfontein Road, Mowbray, South Africa.  
(021) 685 2056

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