

DETECTION OF CIRCULATING VACCINE DERIVED POLIO VIRUS-**2**

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ABSTRACT

This article review is related to circulating vaccine derived polio virus type 2 (cVDPV). In general a vaccine is a substance that stimulates antibodies and boost immunity in an individual. Circulating vaccine derived poliovirus -2 is a well documented strain of poliovirus mutated from the strain of oral polio vaccine (OPV). Circulating vaccine derived polio virus-2 is the vaccine that is able to circulate for a prolonged period of time uninterrupted that can mutate and reacquire neurovirulence in a course of 12- 18 months. Episodes of circulating vaccine derived poliovirus are rare. Over the past ten years, a period during which more than ten billion doses of oral polio vaccine were

given worldwide – cVDPV outbreaks resulted in fewer than 800 cases. It works by infecting cells in the gut with weakened poliovirus thereby enhancing the immunity to polio without the risk of paralysis posed by real disease. Oral Polio Vaccine is known to retain its potency over a long period if stored at -20°C or below.

KEYWORDS: Circulating Vaccine Derived Poliovirus-2.

INTRODUCTION

Vaccine is a biological preparation that provides active acquired immunity to particular infectious disease. A vaccine typically contains a weakened or killed form of the microbe, its toxins, or one of its surface proteins which stimulates the body's immune system to recognize

as a threat and destroy it. Vaccines can be prophylactic or therapeutic and some vaccine offer full sterilizing immunity.

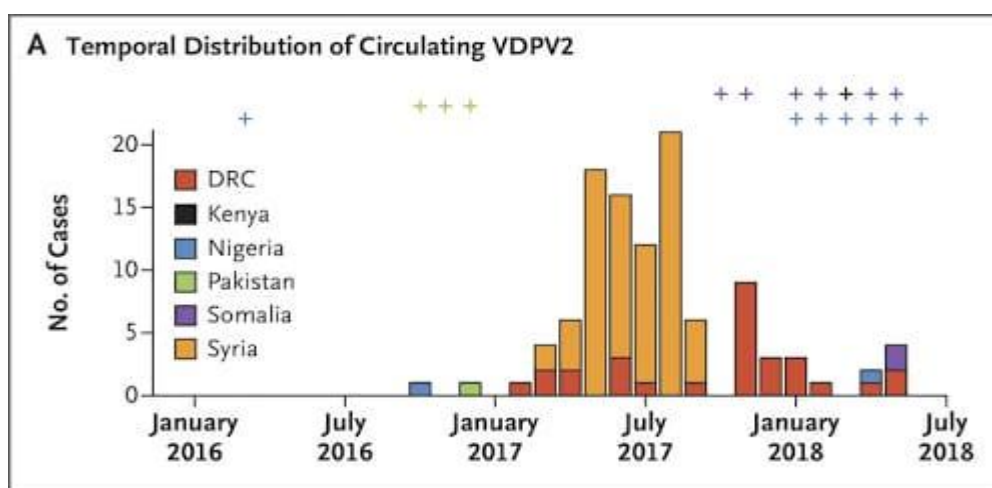
Circulating vaccine derived polio virus (cVDPV) is a strain related to weakened live polio virus contained in oral polio vaccine (OPV). If a population is seriously under immunized there are enough susceptible children for the excreted vaccine-derived polio virus to begin circulating in the community. If the vaccine-virus is able to circulate for a prolonged period of time uninterrupted, it can mutate over the course of 12- 18 months, reacquire neuro-virulence. These viruses are called circulating vaccine-derived polio virus (cVDPV). The lower the population immunity, the longer these viruses survive. The longer they survive, the more they replicate, change and exchange genetic material with entero-viruses as they spread through a community.

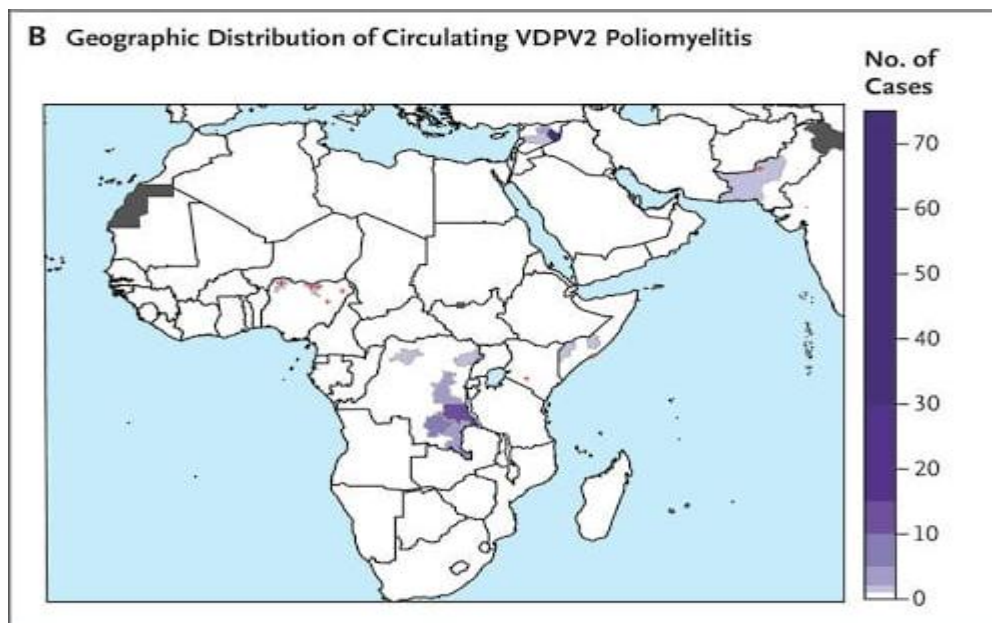
If a population is fully immunized against polio, it will be protected against the spread of both wild and vaccine strains of polio viruses.

Polio mainly effects children under 5 years of age. However, anyone of any age who is unvaccinated can contract the disease. There is no cure for polio. It can be only be prevented.

POLIO VACCINE GIVEN MULTIPLE TIMES CAN PROTECT A CHILD FOR LIFE

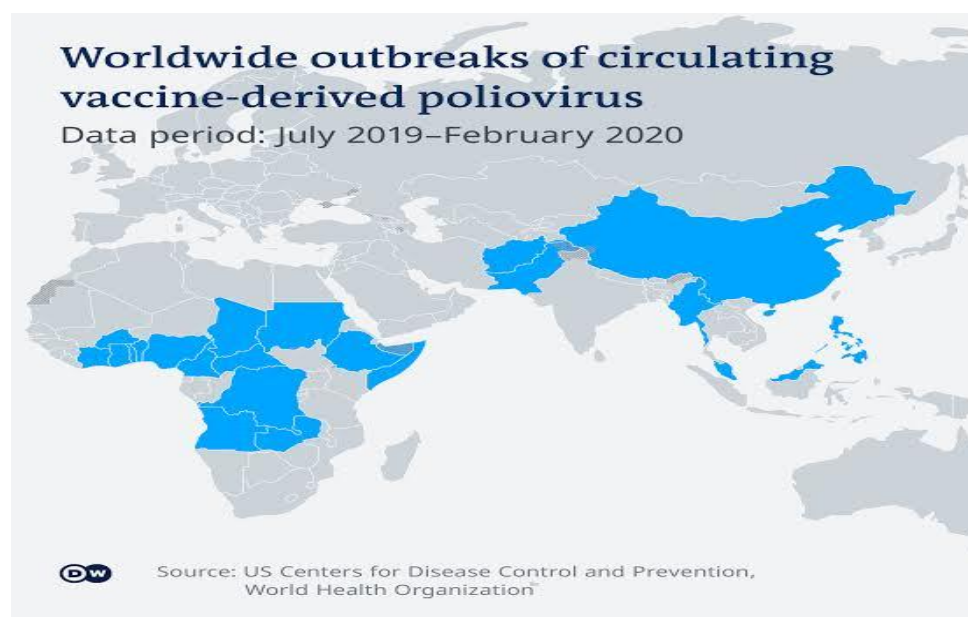
Vaccine-associated paralytic poliomyelitis (VAPP) is an adverse event following exposure to Oral Polio Vaccine. OPV is made with live attenuated (weakened) polio virus that can cause sporadic and rare cases of paralytic polio. IPV, the only polio vaccine used in the United States since 2000, carries no risk of VAPP.





Circulating Vaccine-Derived Polioviruses

Wild poliovirus (WPV) is the most commonly known form of the poliovirus. But, there is another form of polio that can spread within communities known as circulating vaccine-derived poliovirus, or cVDPV. While cVDPVs are rare, they have been increasing in recent years due to low immunization rates within communities. cVDPV type 2 (cVDPV2) are the most prevalent, with 959 cases occurring globally in 2020. Notably, since the African Region was declared to have interrupted transmission of the wild poliovirus in August 2020, cVDPV are now the only form of the poliovirus that affects the African Region.



Wild polio eradicated in Africa

Countries with polio cases in the past 12 months

■ Vaccine-derived poliovirus

■ Wild poliovirus



*Afghanistan and Pakistan also have cases of vaccine-derived poliovirus

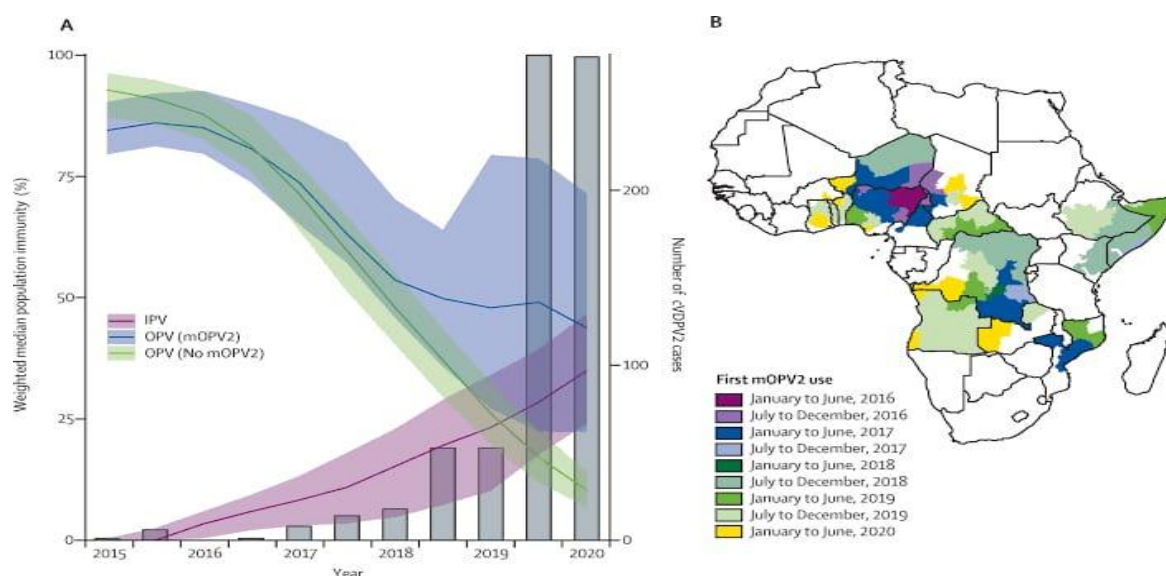
Source: WHO (data up to 19 August 2020)

BBC

Occurrence of cVDPV's

The oral polio vaccine (OPV) that has brought the wild poliovirus to the brink of eradication has many benefits: the live attenuated (weakened) vaccine virus provides better immunity in the gut, which is where polio replicates. The vaccine virus is also excreted in the stool, and in communities with low-quality sanitation, this means that it can be spread from person to person and actually help protect the community.

However, in communities with low immunization rates, as the virus is spread from one unvaccinated child to another over a long period of time (often over the course of about 12-18 months), it can mutate and take on a form that can cause paralysis just like the wild poliovirus. This mutated poliovirus can then spread in communities, leading to cVDPVs.



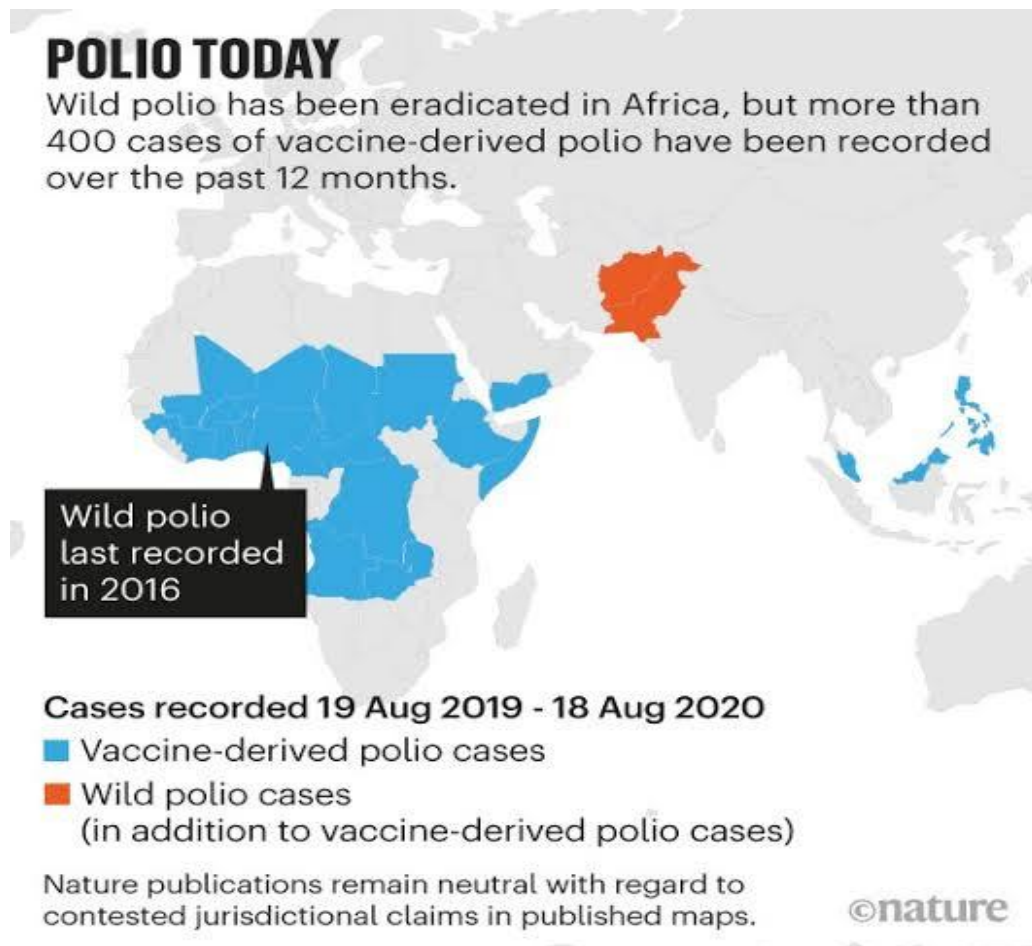
GPEI Work to Stop cVDPVs

As mentioned above, the cause of cVDPV is low immunization rates. So, the best way to prevent them and stop them when there is an outbreak is to vaccinate children. The polio vaccine protects children whether the kind of polio is wild poliovirus or vaccine-derived poliovirus. Outbreaks (whether WPV or cVDPV) are usually rapidly stopped with 2–3 rounds of high-quality supplementary immunization activities (immunization campaigns).

In addition to high-quality immunization campaigns, the GPEI is working to deploy an improved outbreak response tool: the novel oral polio vaccine type 2, or nOPV2. This vaccine is similar to mOPV2 (the monovalent oral polio vaccine type 2), the current outbreak response vaccine that is used when cVDPV type 2 outbreaks occur. However, it contains improvements that help make the vaccine virus less likely to mutate and cause disease in communities with low immunization rates – meaning that it can help reduce the risk of cVDPV2 outbreaks.

Additional Information on Vaccine-Derived Polioviruses

While cVDPVs affect communities and warrant public health action (i.e., outbreak response) given the public health threat that they pose, there are other kinds of vaccine-derived polioviruses (VDPV) that are found in individuals and the environment. This section provides more information on those types of VDPVs.



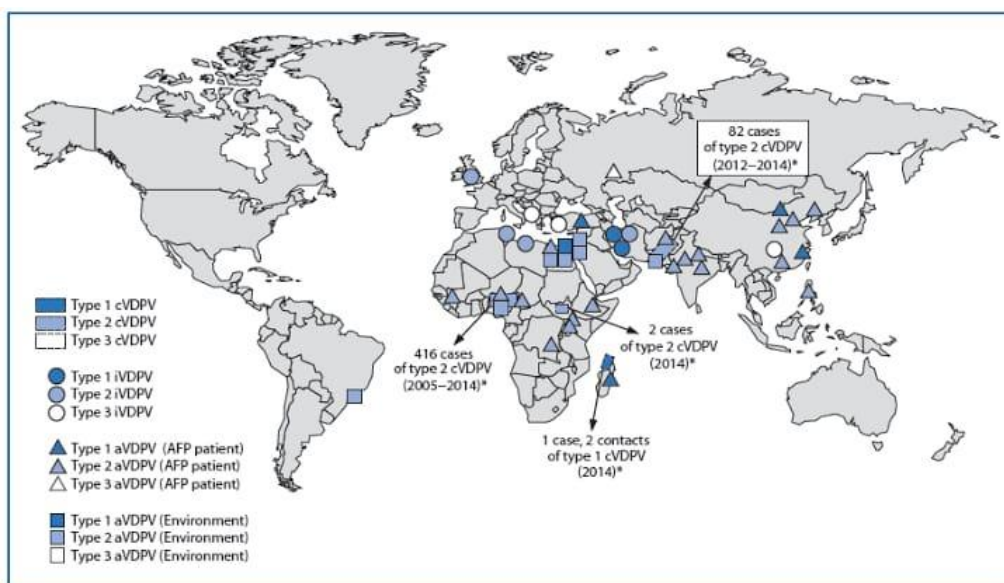
Immunodeficiency-related vaccine-derived poliovirus (iVDPV)

Prolonged replication of VDPVs has been observed in a small number of people with rare immune deficiency disorders. Because they are not able to mount an immune response, these people are not able to clear the intestinal vaccine virus infection, which is usually cleared within six to eight weeks. They therefore excrete iVDPVs for prolonged periods.

The occurrence of iVDPVs is very rare.

Ambiguous Vaccine-Derived Polioviruses (aVDPV)

When a vaccine-derived poliovirus is found in an individual that is not immunocompromised (i.e., it is not an iVDPV) *and* it is confirmed that this VDPV is not circulating within a community (i.e., it is not a cVDPV), then this case is referred to as an aVDPV.



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