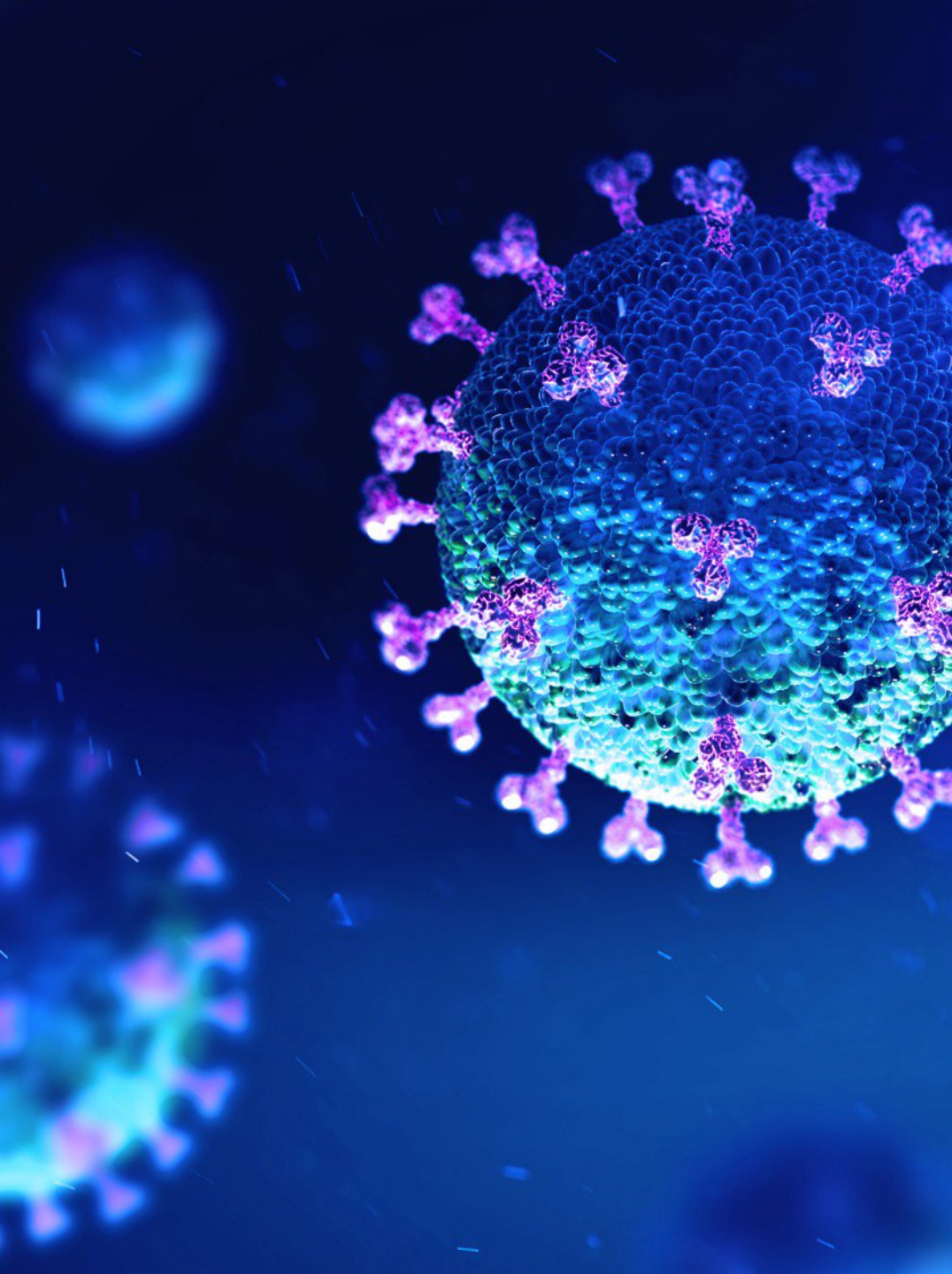




Cerba Research

WORLDVACCINE
CONGRESS | EUROPE

Polio Eradication: A Challenge for Vaccine Delivery

Marta Murreddu, PhD

19 October 2026

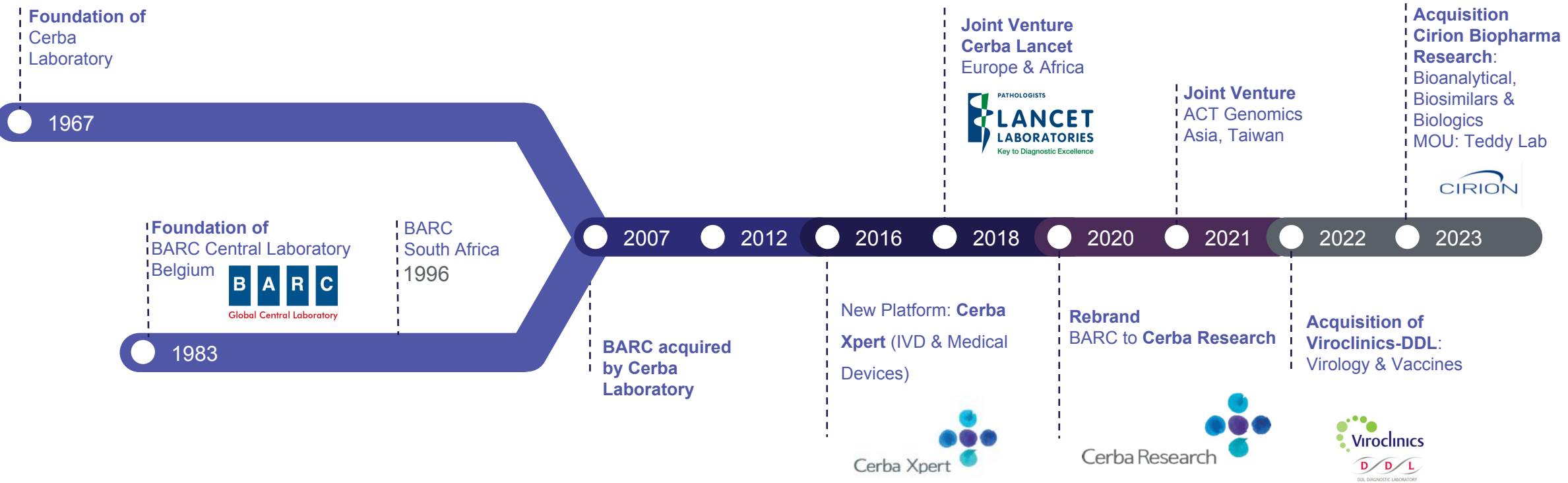
From Viroclinics-DDL to Cerba Research

Viroclinics-DDL 

A Cerba Research Company

Our history

Rooted in specialty and diagnostic laboratory services



Infectious Diseases and Virology Highlights



~600
ID trials
since 2018



250
Focused on COVID-19



90%+
Trials include
specialty testing



Cerba NL
Virology center of
excellence

Targets

Influenza (seasonal and HP),
Sars-Cov-1 and 2, MERS, RSV, HMPV,
PIV, HPV, HBV, HCV, HDV, CMV, Dengue,
EBV, HIV, TB and Polio.

CEPI

Gates
Foundation



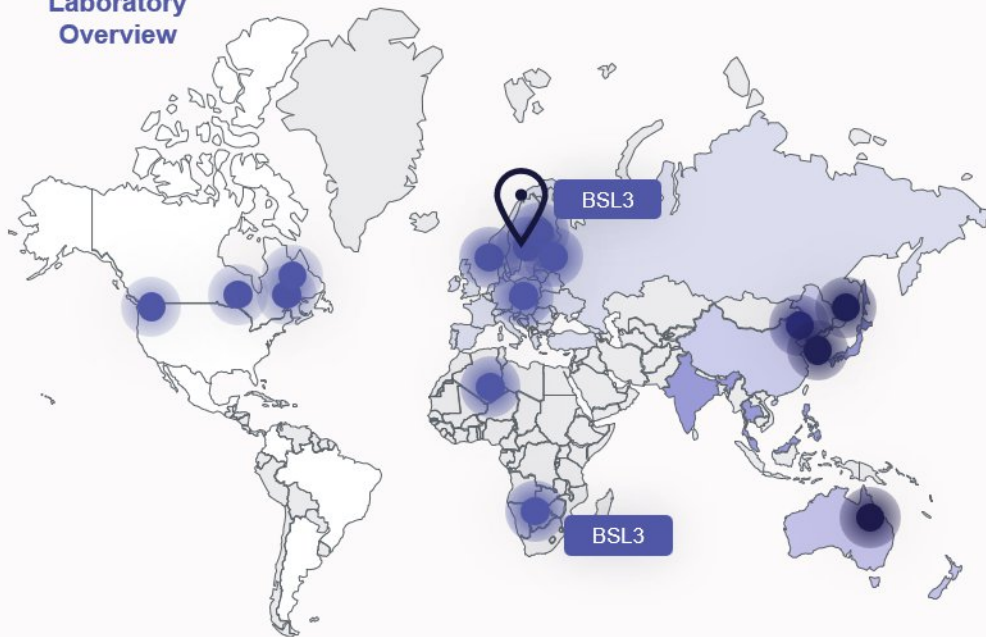
= **PATH**

Partnership



National Institutes
of Health

Laboratory Overview



**NL center of excellence for virology – global capacity
for method transfer at CR laboratories & partner labs**

Our Virology and Vaccine Center of Excellence

Rijswijk

- Sequencing Center of Excellence
- Next Generation Sequencing, Long Read Sequencing
- Bio-informatics
- FDA compatible data analysis pipelines
- Multiple isolation and PCR platforms
- Real Time qPCR
- ddPCR



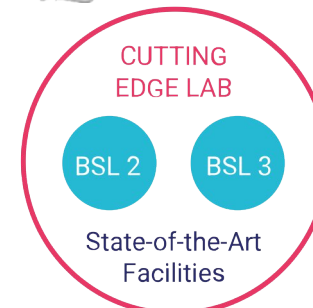
Rotterdam

- Clinical Trial Support for Infectious Diseases
- Virology Laboratory Services
- Immunology & Biomarker Analysis
- Custom Assay Development & Validation
- Biobanking & Logistics
- Dedicated team of Scientists and Consultants



Schaijk

- Preclinical facility for SPF, Conventional, BSL2 and BSL3(+)
- Wide Range of different preclinical animal models (wild-type and GMO)
- Solutions for any kind of experimental set up and early development
- Dedicated Team of Scientists and Study Directors
- **Polio High Containment Facility (working towards GAPIV certification) for clinical sample testing**



Polio Eradication: Main Challenges

World Polio Day: October 24

- **Raises awareness** of polio and the vital role of vaccination in preventing this devastating disease.
- **Polio can cause irreversible paralysis:** approximately **1 in 200 infections** results in paralysis, with **5–10% of paralysed patients dying** when respiratory muscles are affected.
- **Major progress since 1988:** following the global eradication initiative, wild poliovirus cases have declined by **99%**.



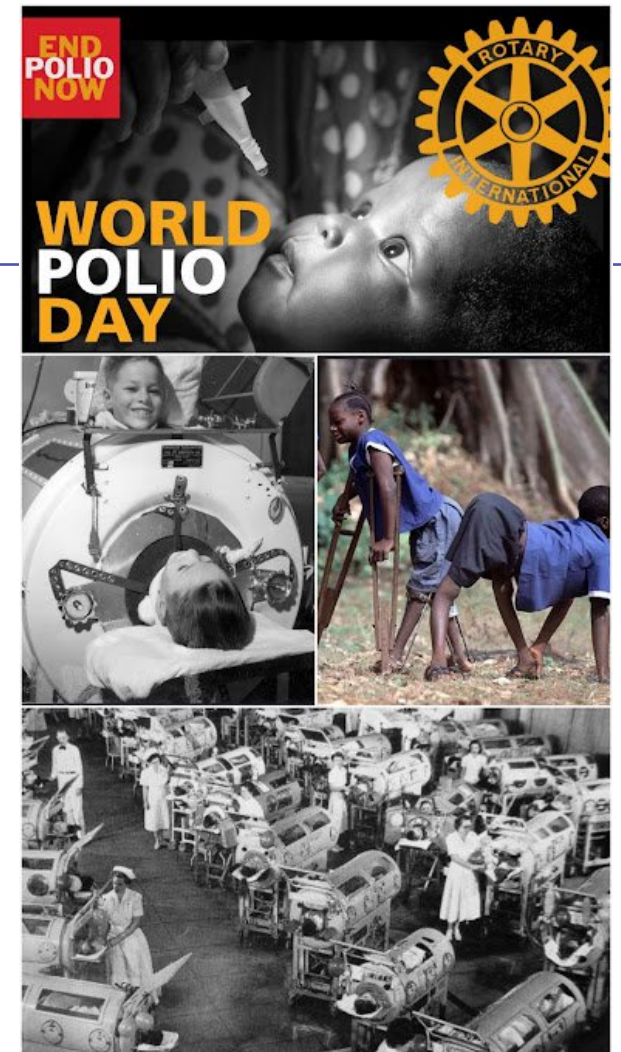
Polio (Poliovirus)

Family *Picornaviridae* > Genus *Enterovirus* > Species *Enterovirus Coxsackiepol*

30nm particle & Single-stranded +RNA genome & 7.5 kb genome

3 serotypes/genotypes:

- Poliovirus 1 (PV1)
- Poliovirus 2 (PV2)
- Poliovirus 3 (PV3)



World Polio Day, October 24 | Rotary Club of Rockland

Global Polio Eradication: Current Status

Significant Progress

- **>99% reduction** in wild polio cases since 1988
- Wild poliovirus **Types 2 and 3 eradicated**
- Wild poliovirus **Type 1 (WPV1)** remains endemic only in: Afghanistan and Pakistan
- Global efforts also contend with outbreaks of circulating vaccine-derived polioviruses (cVDPV)

[Polio This Week](#) | [GPEI](#) | [Most Recent News](#) | [Countries](#)

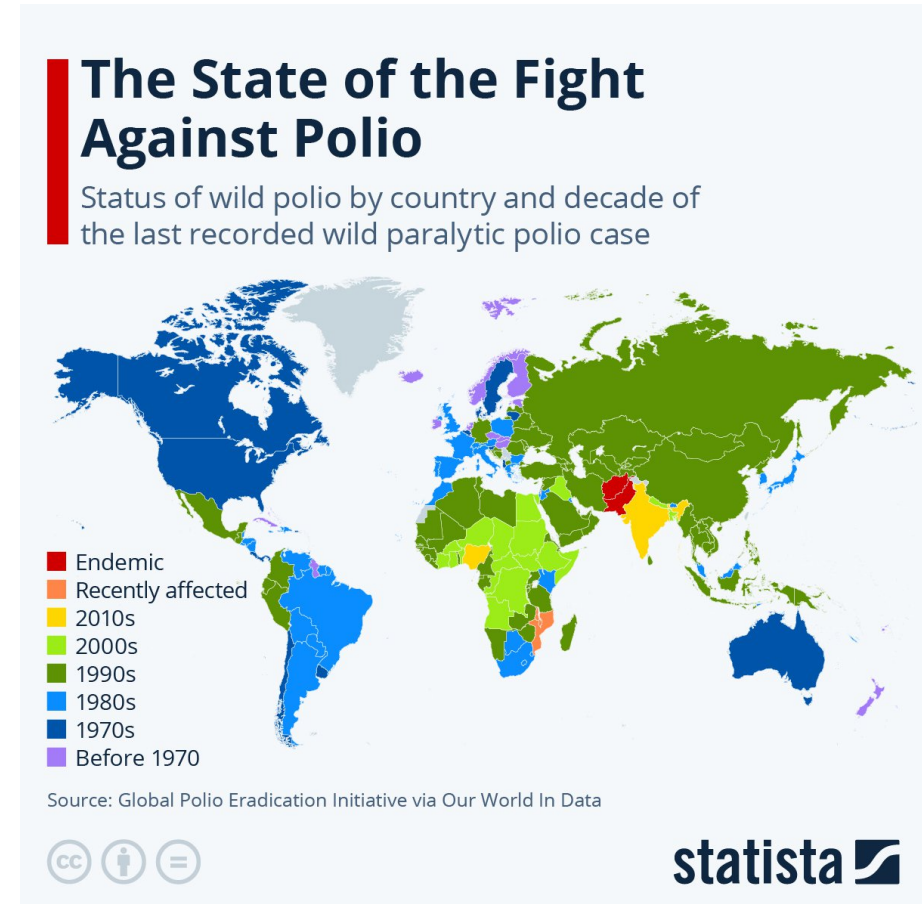


Chart: The State of the Fight Against Polio | Statista

Key Challenges

Ongoing transmission persists in hard-to-reach and conflict-affected communities

Review

Public health responses following identification of poliovirus in wastewater

Marie Lesenfant, Elisabetta Saffredini, Pamela Mancini, Agata Franco, Daniele Congiu, Jan Richter, Christina Christodoulou, Anke Meyers, Shahin Hosseyni, Paola Stefanelli, Giuseppina La Rosa

Poliovirus continues to pose a global public health threat, with both wild and vaccine-derived viruses detected in clinical and environmental samples, including in countries declared to be polio free. Although wastewater and environmental surveillance increasingly reveal silent poliovirus circulation, how these findings are translated into public health action remains unclear. We reviewed the literature to identify documented events in which poliovirus detection in wastewater triggered public health responses across WHO regions: 26 unique events across 21 countries and all six WHO regions were included. Public health actions were analysed across five response domains defined for this Review: environmental surveillance; clinical surveillance; vaccination; risk communication; and coordination. Across diverse epidemiological contexts, poliovirus detection in wastewater consistently prompted public health action, often in the absence of paralytic cases. Enhanced environmental surveillance was the most common response, frequently accompanied by intensified clinical surveillance and targeted vaccination activities. Overall, our Review highlights environmental surveillance as an operational early warning system within the Global Polio Eradication Initiative and provide insights applicable to preparedness and response frameworks beyond poliovirus.



Lancet Public Health 2025; 11: e329-42
Published Online
April 10, 2025
[https://doi.org/10.1016/S2468-2667\(25\)00051-4](https://doi.org/10.1016/S2468-2667(25)00051-4)
Epidemiology of Infectious Diseases Service, Epidemiology and Public Health Department, Solomons, Brussels, Belgium (M Lesenfant MS, A Meyers MS); Department of Food Safety, Nutrition and Veterinary Public Health, ...

Outbreak News Today

INDIAN SUBCONTINENT

Pakistan reports 6th polio case of 2026

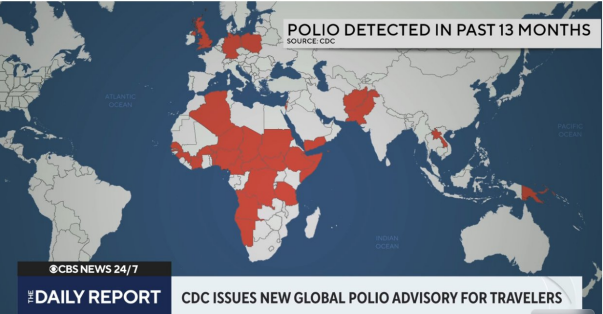
ROBERT HERRIMAN
OCT 06, 2026



Share

Pakistan health officials report the sixth polio case of 2026 in a seven-year-old male from Union Council Chundi A in Takht Imam, Khyber District in Khyber

from Khyber Pakhtunkhwa province, alone.



eClinicalMedicine
Volume 81, March 2025, 103136

Health Policy

Public health, war and cross-border challenges: the recent cVDPV2 polio outbreak in Gaza

Itamar Grotto^a, Hazem Agha^b, Ahmad Abu Al-Halaweh^c, Nadav Davidovitch^{a,b}, Martin McKee^d, Dorit Nitzan^a

Chauhan et al.

SUMMARY

Poliomyelitis is caused by Poliovirus, a member of a large group of enteroviruses. Vaccine-derived polioviruses (VDPVs) stem from mutated live poliovirus, which is contained in the Oral Polio Virus vaccine (OPV). In addition, the emergence of VDPV is one of the global challenges for the eradication of poliomyelitis. VDPVs continue to affect different parts of the world; 1081 cases occurred in 2020 and 682 cases in 2021. There are several reasons that may have caused the increase in circulating vaccine-derived poliovirus (cVDPV) after the “switch” from the trivalent to the bivalent oral polio vaccine. One reason is the low vaccination rate among

the targeted population, which has been further aggravated by the COVID-19 pandemic. Several strategies could control the spread of VDPV including the use of the monovalent OPV (mOPV-2). The risk of VDPV can be minimized through increased immunization rates and the use of safer vaccine alternatives. The global effort to eradicate polio has made significant progress over the years, but continued vigilance and investment in immunization programs are needed to achieve the ultimate goal of a polio-free world.

Keywords: Poliovirus, vaccine derivative poliovirus.

Letter to the editor:

IS POLIO MAKING A COMEBACK? THE COST OF VACCINE HESITANCY AND THE DISPARITY IN VACCINE COVERAGE

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Why is polio still a concern, also in Europe?

Thea K. Fischer^{a,b,c}, Caroline Klent Johannessen^a, Natasa Berginc^c, Jean-Luc Bailly^d, Kim Berschop^{e,f} and Heli Harvala^{a,h}

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^fCentre for Infectious Disease Control (CIb), the Netherlands
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^hDivision of Infection and Immunity, University College London, London, UK

How Cerba Research is supporting Polio Eradication

Specialized Laboratory Services: Schaijk



*We are participating in the WHO Global Action Plan for Poliovirus Containment, Fourth Edition (GAPIV)**

The main objectives are to:

- **Prevent accidental release** of poliovirus from laboratories or manufacturing facilities.
- **Reduce the risk of reintroducing poliovirus** into communities where polio has been eliminated.

Ensure appropriate containment measures, including facility requirements, biosafety procedures, risk assessments, and staff training.

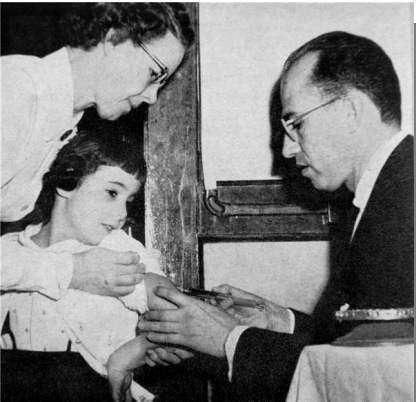
Support global polio eradication efforts by managing poliovirus materials safely.



[Containment Guidance & Tools | Polio Biosafety | GPEI](#)

Polio Vaccines

IPV (Inactivated Polio Vaccine) vs OPV (Oral Polio Vaccine)



Jonas Salk administering inactivated vaccine (1954)
Source:[Jonas Salk - Wikipedia](#)

 IPV: Inactivated Polio Vaccine	 OPV: Oral Polio Vaccine
Inactivated (non-live) poliovirus	Live, weakened (attenuated) poliovirus
Injection	Oral drops
Excellent protection against paralytic polio	Strong intestinal immunity, helping interrupt transmission
Less effective at preventing intestinal infection/transmission	Highly effective at reducing person-to-person transmission
Cannot cause vaccine-associated polio	Rarely, vaccine-derived poliovirus can emerge in under-immunised populations
Expensive production	Excellent Protection against Paralytic Polio and Cheaper production.



Albert Sabin administering live-attenuated vaccine
Source:[Jonas Salk and Albert Bruce Sabin | Science History Institute](#)

IPV (Inactivated Polio Vaccine): Mechanism of Action

- 🪡 **IPV contains inactivated poliovirus:** it cannot replicate or cause infection.
The immune system recognizes the viral **antigens** as foreign.
- 🛡️ **B cells produce neutralizing antibodies**, particularly **IgG antibodies** in the blood.
- 🧠 **Immune memory cells** are generated, allowing a faster response if the person encounters poliovirus later.
- 🚫 These antibodies prevent poliovirus from reaching and damaging the **central nervous system**, thereby providing strong protection against **paralysis**.
- ⚠️ IPV provides less **intestinal/mucosal immunity** than OPV, so vaccinated individuals can still potentially become infected in the intestine and transmit the virus.



[Polio_Lab_Manual04.pdf](#)

OPV (Oral Polio Vaccine): Mechanism of Action

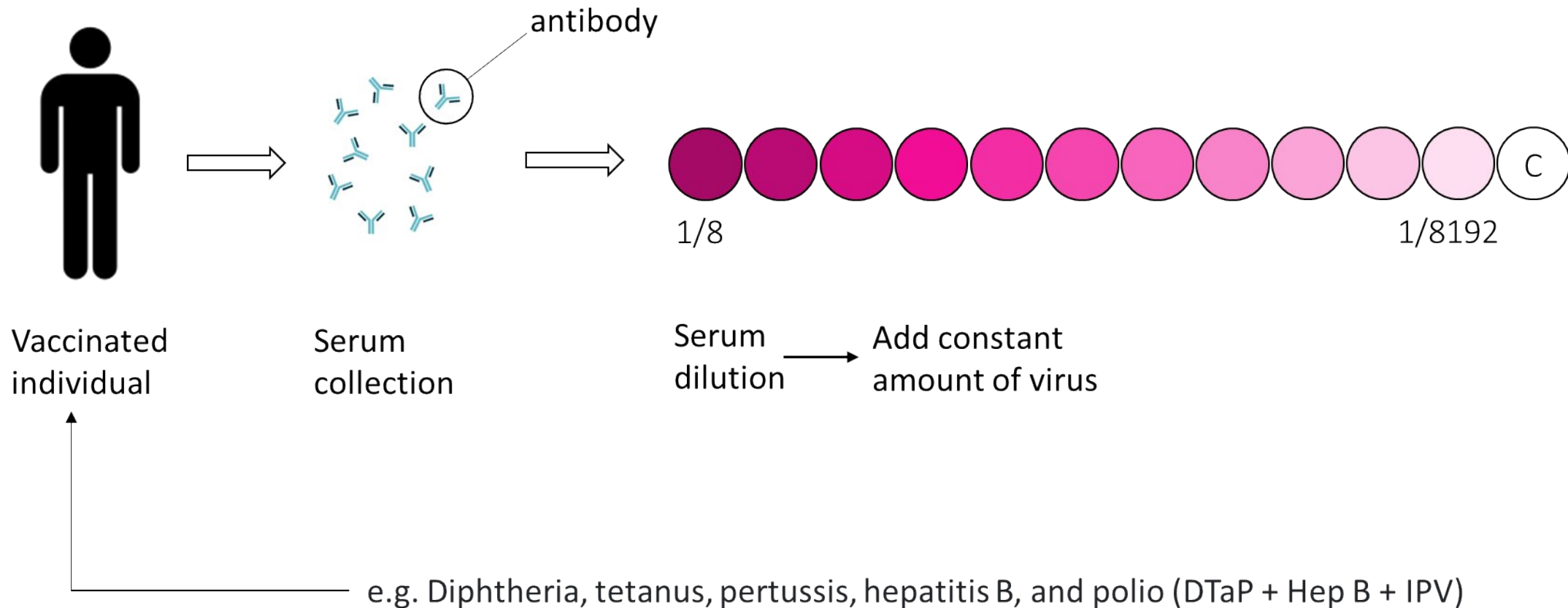
- 💧 **OPV contains live, attenuated poliovirus** that can replicate to a limited extent in the intestine without normally causing disease.
 - The attenuated virus is recognized by the **mucosal immune system** in the gut.
- 🛡️ This stimulates **mucosal immunity**, particularly the production of **secretory IgA antibodies**.
- 🚫 When the person encounters poliovirus later, intestinal antibodies can **limit viral replication and shedding**.
- 🌐 Reduced viral shedding helps **interrupt person-to-person transmission**, which is particularly important for polio eradication campaigns.
- 🧠 OPV also induces systemic antibodies and provides protection against **paralytic disease**.



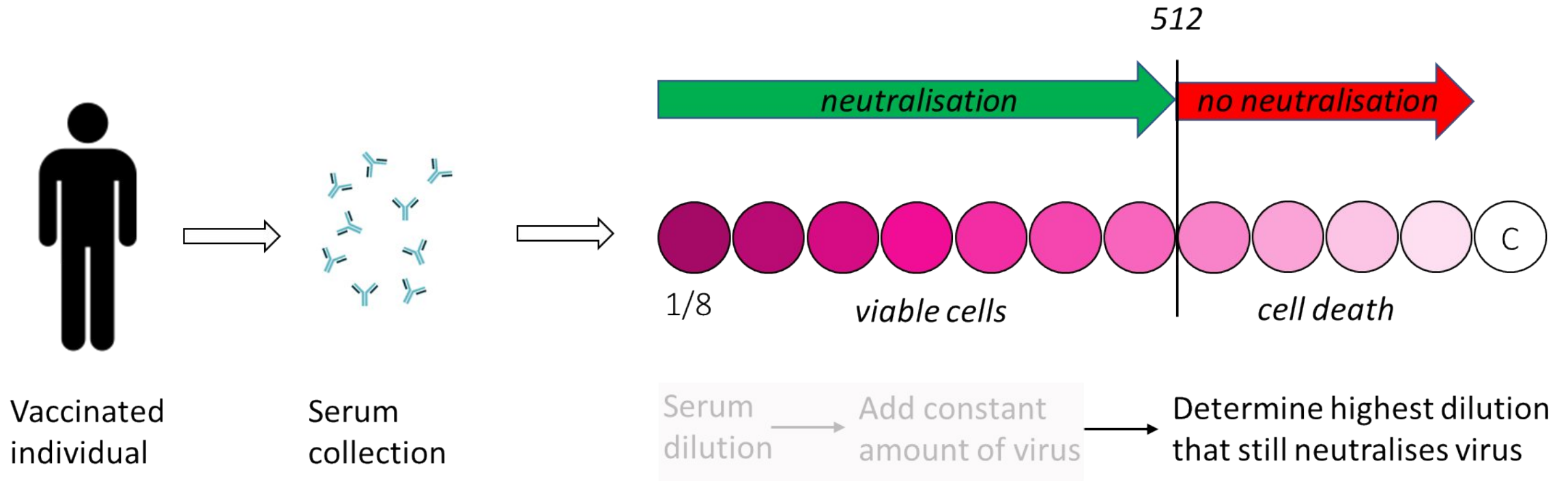
STANDARD OPERATING PROCEDURE
NEUROVIRULENCE TEST
OF TYPES 1, 2 OR 3 LIVE ATTENUATED POLIOMYELITIS
VACCINES (ORAL) IN TRANSGENIC MICE SUSCEPTIBLE
TO POLIOVIRUS

Neurovirulence Test of Types 1, 2 or 3 Live attenuated
Poliomyelitis vaccines (Oral) in Transgenic Mice
susceptible to Poliovirus

Serological testing after IPV vaccination



Serological testing after IPV vaccination



Both Sabin and Salk poliovirus strains can be tested

Safety testing after (n)OPV vaccination



Vaccinated individual (OPV)



Excretion and spread to others in close contact



Passive immunization



community with insufficient vaccine coverage



Prolonged circulation and spread, reacquired neurovirulence



Vaccine-derived poliovirus outbreak



Safety testing after (n)OPV vaccination



Vaccinated individual (OPV)



Excretion and spread to others in close contact



Passive immunization



community with insufficient vaccine coverage



Prolonged circulation and spread, reacquired neurovirulence

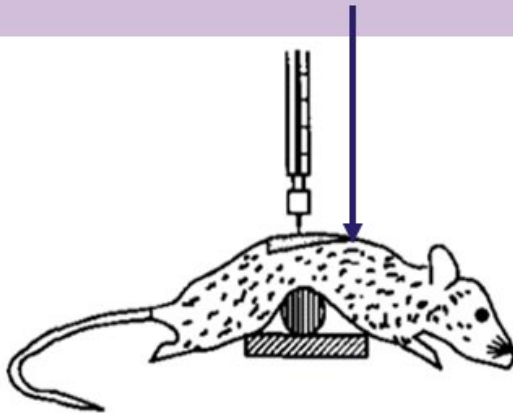


Vaccine-derived poliovirus outbreak



Safety testing after (n)OPV vaccination

Needle inserted between the spinous process and the first lumbar vertebrae



Stages	Physical signs		
Normal	Grips the edge of the cage	Walks normally on the grid and on a flat surface	Full ability to move limbs forward
Weak	Unable to grip the edge of the cage	Walks normally on the grid and on a flat surface	Full ability to move limbs forward
Paresis/ Partial paralysis	Unable to grip the edge of the cage	Limbs fall through the grid more than once while walking and toes curl repeatedly while walking on a flat surface	At least a partial to move limb forward
Paralysis	Unable to grip the edge of the cage	No use of limb on grid or flat surface	Inability to move the limb forward



STANDARD OPERATING PROCEDURE
NEUROVIRULENCE TEST
OF TYPES 1, 2 OR 3 LIVE ATTENUATED POLIOMYELITIS
VACCINES (ORAL) IN TRANSGENIC MICE SUSCEPTIBLE
TO POLIOVIRUS

Inoculation via injection between the 13th Thoracic vertebrae and 1st Lumbar vertebrae

Molecular Assays available at Cerba Research

1. Quantitative poliovirus detection: Validated qPCR protocols for quantitative virus detection.
2. Poliovirus whole-genome deep sequencing (NGS)
Mutational analysis of the poliovirus genome using deep sequencing. Relevant for characterizing genetic variants and monitoring genetic stability.



[NextSeq 1000 & NextSeq 2000 Systems | Flexible, versatile sequencing](#)

Genetic and phenotypic stability of poliovirus shed from infants who received novel type 2 or Sabin type 2 oral poliovirus vaccines in Panama: an analysis of two clinical trials

Rahnuma Wahid^{1,2,3}, Laina D Mercer¹, Tirza De Leon^{2,3}, Rodrigo DeAntonio, Xavier Sáez-Llorens^{3,4}, Andrew Macadam^{1,5}, Konstantin Chumakov^{6,7}, Jeroen Strating, Björn Koel, Jennifer L. Konopka-Anstadt¹⁰, M. Steven Oberste¹⁰, Cara C. Burns¹⁰, Raul Andino¹¹, Erman Tritama¹², Ananda S. Bandyopadhyay¹³, Gabriela Aguirre¹⁴, Ricardo Rüttimann¹⁴, Chris Gast¹, John O. Konz¹

Evaluating stability of attenuated Sabin and two novel type 2 oral poliovirus vaccines in children

Rahnuma Wahid^{1,2,3}, Laina Mercer¹, Chris Gast¹, Tirza De Leon^{2,3}, Xavier Sáez-Llorens^{3,4}, Alan Fix^{1,5}, Andrew Macadam^{1,5}, Laura Stephens⁵, Konstantin Chumakov^{6,7}, Saskia L. Smits⁸, Marta Murreddu⁹, Jennifer L. Konopka-Anstadt¹⁰, M. Steven Oberste¹⁰, Cara C. Burns¹⁰, Raul Andino¹¹, Novilia Sjafrí Bachtiar¹², Erman Tritama¹², Ananda S. Bandyopadhyay¹³, Gabriela Aguirre¹⁴, Ricardo Rüttimann¹⁴ and John O. Konz¹

NGS as an alternative to Poliovirus Neurovirulence Testing

A promising molecular approach — with an important distinction between molecular consistency testing and biological neurovirulence testing

What NGS can contribute

- Quantifies minority genetic variants and attenuation-associated mutations
- Provides a high-resolution view of viral genome composition
- Collaborative WHO studies found strong agreement with MAPREC for OPV molecular consistency

What it does not automatically replace

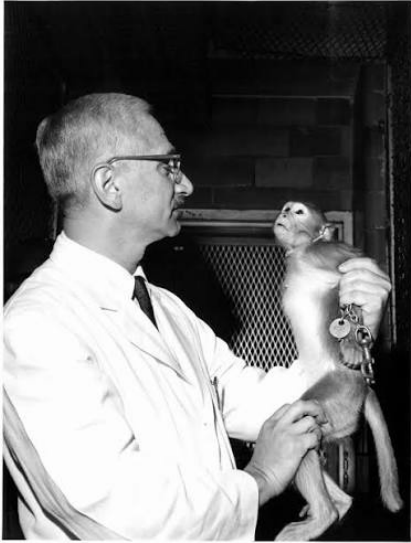
- NGS measures genotype; NVT assesses biological neurovirulence
- Evidence for replacing MAPREC is not the same as formal replacement of an animal NVT
- Applicability depends on vaccine type, intended use, validation and regulatory acceptance

Regulatory signal: WHO ECBS, April 2026

WHO reported establishing international reference reagents for high-throughput sequencing of Sabin IPV (sIPV), noting the potential of these technologies to improve quality control and reduce animal testing where scientifically justified.

Take-home: NGS is a strong candidate for modernising poliovirus vaccine QC; a claim of NVT replacement must be product- and regulator-specific.

Animal Efficacy Studies in Poliomyelitis



Albert Sabin and a research monkey, c.1950s.
Courtesy the Hauck Center for the Albert B.
Sabin Archives, Henry R. Winkler Center for
the History of the Health Professions,
University of Cincinnati Libraries.

Macaques have historically been used to assess oral polio vaccine neurovirulence and vaccine safety.

Applications: neurovirulence assessment and studies of poliovirus pathogenesis.



[Transgenic Mouse Models as Alternatives | Charles River](#)

Transgenic mouse models:

- Mice expressing the human poliovirus receptor (CD155) develop susceptibility to poliovirus.
- Applications: vaccine-induced protection, antibody responses and antiviral efficacy

Animal studies are essential for evaluating vaccine protection, live-vaccine neurovirulence and candidate antiviral activity. Vaccine efficacy evidence is more established; poliovirus antivirals remain investigational.

Antiviral candidates under investigation

- No licensed specific antiviral therapy for poliovirus infection.
- Treatment is supportive: respiratory support, pain management, rehabilitation and prevention of complications.

Antiviral	Mechanism	Current status
Pocapavir (V-073)	Capsid inhibitor; interferes with viral uncoating	Investigational; available through compassionate-use pathways for selected patients
V-7404 (imocitrelvir)	Viral protease inhibitor	Investigational; studied in combination with pocapavir
Poliovirus-neutralising monoclonal antibodies	Bind the virus and block infection	Under development

Pocapavir is a leading investigational poliovirus antiviral; Pocapavir plus V-7404 is a combination strategy under development. Supportive care and vaccination remain central to clinical management and prevention.

Conclusions

Global Polio Eradication: Current Status & Key Challenges

Innovation & Response

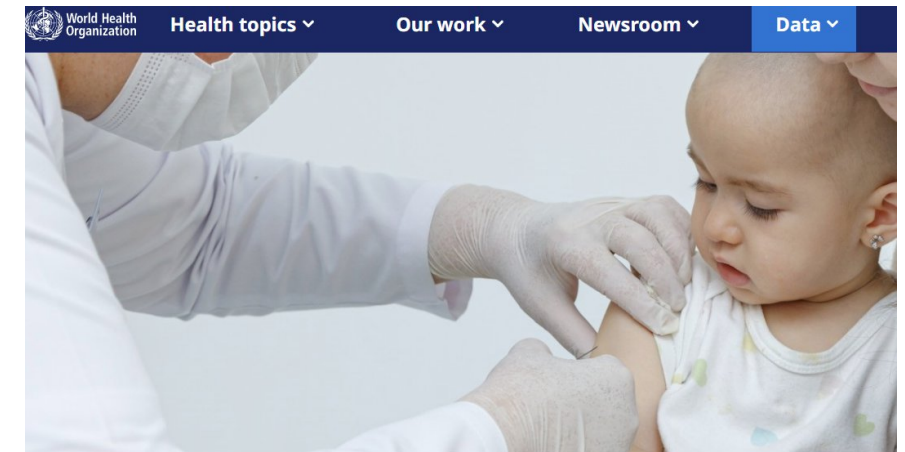
- Deployment of **Novel Oral Polio Vaccine** to improve outbreak control
- Enhanced environmental surveillance
- Integrated vaccination campaigns reaching vulnerable communities
- Continued global collaboration through the **Global Polio Eradication Initiative (GPEI)**

Looking Ahead

Final eradication requires:

- Sustained political commitment
- Strong surveillance systems
- High vaccination coverage
- Reliable vaccine supply and delivery
- Long-term investment until transmission is interrupted worldwide

The world is closer than ever to eradicating Polio but reaching the last remaining reservoirs and controlling cVDPV outbreaks require sustained vaccination, surveillance, and global collaboration.



World Polio Day: vaccination remains key to keeping Europe polio free

24 October 2025 | News release | Reading time: 2 min (461 words)

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