



HAL
open science

Notes from the Field : Circulating Vaccine-Derived Poliovirus Type 2 Emergences Linked to Novel Oral Poliovirus Vaccine Type 2 Use - Six African Countries, 2021–2023

Jaume Jorba, Elizabeth Henderson, Mark. Deka, Kelley Bullard, Anfumbom Kfutwah, Simona Zipursky, Javier Martin, Cara Burns, Maël Bessaud, Lester Shulman, et al.

► To cite this version:

Jaume Jorba, Elizabeth Henderson, Mark. Deka, Kelley Bullard, Anfumbom Kfutwah, et al.. Notes from the Field: Circulating Vaccine-Derived Poliovirus Type 2 Emergences Linked to Novel Oral Poliovirus Vaccine Type 2 Use - Six African Countries, 2021–2023. *MMWR: Morbidity and Mortality Weekly Report*, 2023, 72 (38), pp.1041-1042. <10.15585/mmwr.mm7238a4>. <pasteur-04255691>

HAL Id: pasteur-04255691

<https://pasteur.hal.science/pasteur-04255691v1>

Submitted on 24 Oct 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons CC0 1.0 - Universal - International License

Notes from the Field

Circulating Vaccine-Derived Poliovirus Type 2 Emergences Linked to Novel Oral Poliovirus Vaccine Type 2 Use — Six African Countries, 2021–2023

Elizabeth Davlantes, MD¹; Jaume Jorba, PhD²; Elizabeth Henderson²; Kelley Bullard, MS²; Mark A. Deka, PhD³; Anfumbom Kfutwah, PhD⁴; Javier Martin, PhD⁵; Maël Bessaud, PhD⁶; Lester M. Shulman, PhD⁷; Kaija Hawes, MBA⁸; Ousmane M. Diop, PhD⁹; Ananda S. Bandyopadhyay, MBBS⁸; Simona Zipursky, MSc⁹; Cara C. Burns, PhD²

Circulating vaccine-derived poliovirus (cVDPV) outbreaks can occur when oral poliovirus vaccine strains (most often, Sabin monovalent oral poliovirus vaccine type 2 [mOPV2]) undergo prolonged circulation in undervaccinated populations, resulting in genetic reversion to neurovirulence. A novel type 2 oral poliovirus vaccine (nOPV2) has been developed, which has been shown in clinical trials to be less likely than mOPV2 to revert to paralytic variants and to have limited genetic modifications in initial field use (1–4). Approximately 700 million doses of nOPV2 have been administered worldwide in response to outbreaks of cVDPV type 2 (cVDPV2). cVDPV2 detections originating from nOPV2 use from initial rollout during March 2021–September 7, 2023, are described in this report.

Investigation and Outcomes

Polio surveillance and laboratory data collected through the Global Polio Eradication Initiative were reviewed. During August 2021–July 2023, seven cVDPV2 emergences of nOPV2 origin from 61 paralytic cases and 39 environmental surveillance (sewage) samples were detected in six countries, all in Africa: Burundi, Central African Republic (CAR), Democratic Republic of the Congo (DRC), Nigeria, Tanzania, and Zambia (Figure). The isolates have limited divergence from the parental nOPV2 vaccine strain in the VP1 capsid protein coding area (six to 16 nucleotide substitutions), indicating that surveillance detected emergence relatively early after vaccination. This activity was reviewed by CDC, deemed not research, and was conducted consistent with applicable federal law and CDC policy.*

Circulation of four of the seven cVDPV2 emergences derived from nOPV2 use has been detected only in subnational areas of the countries in which they originated (CAR, DRC, and Nigeria), two have spread to other areas of the originating country (CAR and DRC), and one has spread from the originating country (DRC) to neighboring countries (Burundi, Tanzania,

and Zambia). Three emergences spreading within or outside of the originating country (all from DRC) might be ongoing, with most recent detections in July 2023. The largest and widest-spreading emergence, RDC-SKV-1, was first detected in DRC's South Kivu province in September 2022; viruses from this emergence have been identified in six provinces of DRC and in neighboring Burundi, Tanzania, and Zambia. RDC-SKV-1 has been detected as recently as July 2023 in Tanzania.

Preliminary Conclusions and Actions

The potential for mutation and reversion to neurovirulence is a rare but recognized risk for all live attenuated oral poliovirus vaccines; extensive use of nOPV2 worldwide since March 2021 suggests that reversion occurs less frequently than with mOPV2 (4). A preliminary estimate suggests that cVDPV2 emergences occur after mOPV2 use at a rate of one emergence per 10 million mOPV2 doses administered; for nOPV2, this rate is approximately 10 times lower, at one emergence per 100 million doses. As with all cVDPV emergences, cVDPV2 outbreaks of nOPV2 origin are more likely to occur when nOPV2 supplementary immunization activities (SIAs) do not achieve high coverage in populations with persistently low immunity against polioviruses (5). To combat all cVDPV2 outbreaks and reduce future emergences, responding with prompt SIAs that reach all targeted children is essential.

Acknowledgments

National Institute for Communicable Diseases of South Africa; Institut Pasteur of Bangui, Central African Republic; Institut Pasteur, France; National Institute of Biomedical Research, Democratic Republic of the Congo; Feyrouz Kurji.

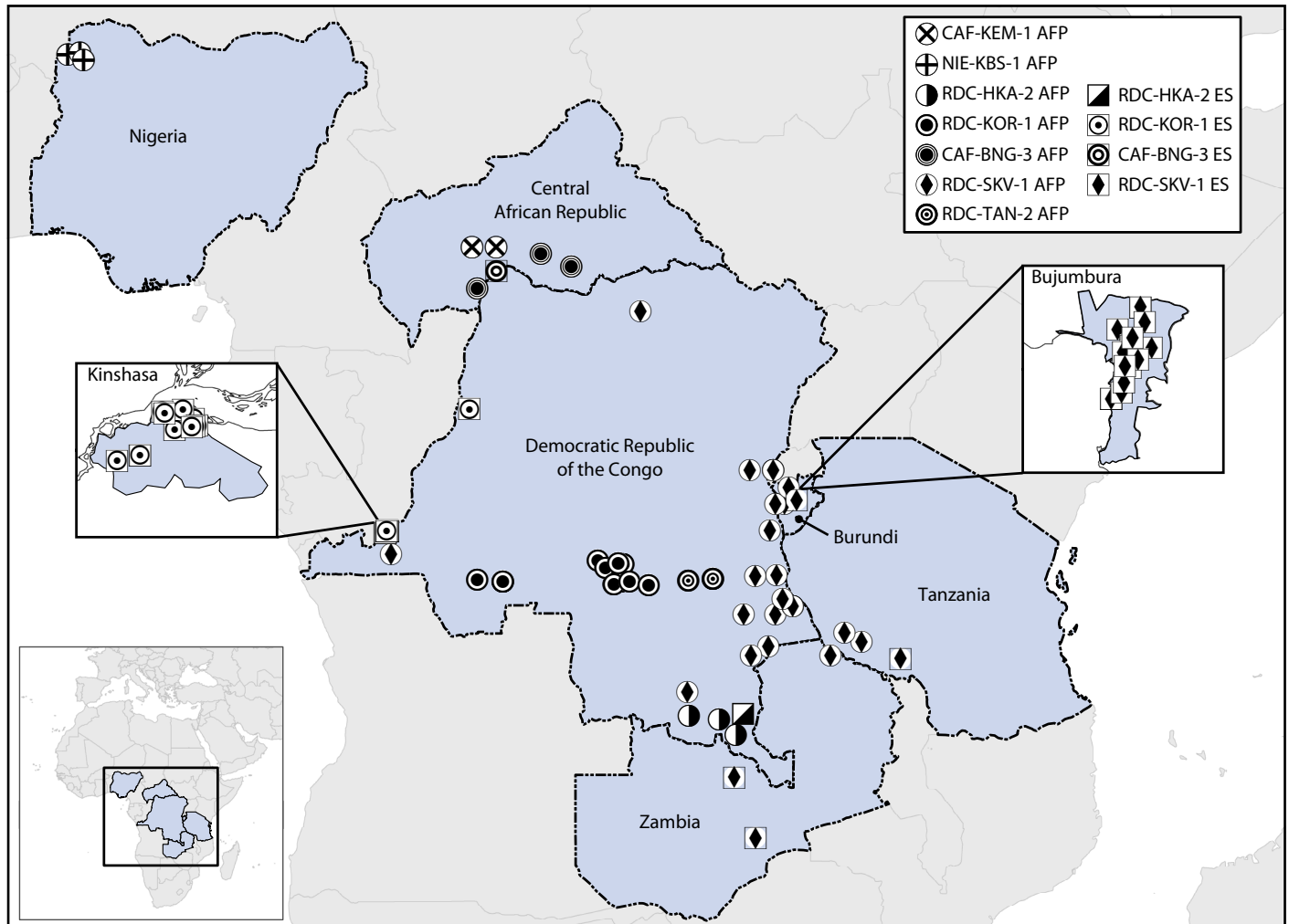
Corresponding author: Elizabeth Davlantes, Lyo2@cdc.gov.

¹Global Immunization Division, Global Health Center, CDC; ²Division of Viral Diseases, National Center for Immunization and Respiratory Diseases, CDC; ³Geospatial Research, Analysis, and Services Program, Agency for Toxic Substances and Disease Registry, Atlanta, Georgia; ⁴Regional Polio Laboratory Network, World Health Organization Regional Office for Africa, Brazzaville, Republic of the Congo; ⁵Division of Vaccines, Medicines and Healthcare products Regulatory Agency, Potters Bar, United Kingdom; ⁶Institut Pasteur, Université Paris Cité, Virus Sensing and Signaling Unit, Paris, France; ⁷Central Virology Laboratory, Public Health Services, Israel Ministry of Health, Tel Aviv, Israel; ⁸Bill & Melinda Gates Foundation, Polio Team, Seattle, Washington; ⁹World Health Organization, Geneva, Switzerland.

All authors have completed and submitted the International Committee of Medical Journal Editors form for disclosure of potential conflicts of interest. Javier Martin reports institutional support from the Bill & Melinda Gates Foundation. Lester M. Shulman reports support from McKing Consulting Corporation for technical consultation on nOPV2, grant support from the

*45 C.F.R. part 46.102(l)(2), 21 C.F.R. part 56; 42 U.S.C. Sect. 241(d); 5 U.S.C. Sect. 552a; 44 U.S.C. Sect. 3501 et seq.

FIGURE. Detections of circulating vaccine-derived poliovirus type 2 linked to novel oral poliovirus type 2 vaccine use, by emergence group — Africa, 2021–2023



Abbreviations: AFP = acute flaccid paralysis case; ES = environmental surveillance isolate.

World Health Organization, travel support from the Bill & Melinda Gates Foundation to attend the February 2023 nOPV2 work group meeting in London, and voluntary position as recording secretary for the Israel National Polio Certification Committee and for the Israel Emergency Response Team during 2022–2023. No other potential conflicts of interest were disclosed.

References

1. Yeh MT, Bujaki E, Dolan PT, et al. Engineering the live-attenuated polio vaccine to prevent reversion to virulence. *Cell Host Microbe* 2020;27:736–751.e8. PMID:32330425 <https://doi.org/10.1016/j.chom.2020.04.003>
2. Martin J, Burns CC, Jorba J, et al. Genetic characterization of novel oral polio vaccine type 2 viruses during initial use phase under Emergency Use Listing—worldwide, March–October 2021. *MMWR Morb Mortal Wkly Rep* 2022;71:786–90. PMID:35709073 <https://doi.org/10.15585/mmwr.mm7124a2>
3. Zaman K, Bandyopadhyay AS, Hoque M, et al. Evaluation of the safety, immunogenicity, and faecal shedding of novel oral polio vaccine type 2 in healthy newborn infants in Bangladesh: a randomised, controlled, phase 2 clinical trial. *Lancet* 2023;401:131–9. PMID:36495882 [https://doi.org/10.1016/S0140-6736\(22\)02397-2](https://doi.org/10.1016/S0140-6736(22)02397-2)
4. Bandyopadhyay AS, Zipursky S. A novel tool to eradicate an ancient scourge: the novel oral polio vaccine type 2 story. *Lancet Infect Dis* 2023;23:e67–71. PMID:36162417 [https://doi.org/10.1016/S1473-3099\(22\)00582-5](https://doi.org/10.1016/S1473-3099(22)00582-5)
5. Pons-Salort M, Burns CC, Lyons H, et al. Preventing vaccine-derived poliovirus emergence during the polio endgame. *PLoS Pathog* 2016;12:e1005728. PMID:27384947 <https://doi.org/10.1371/journal.ppat.1005728>