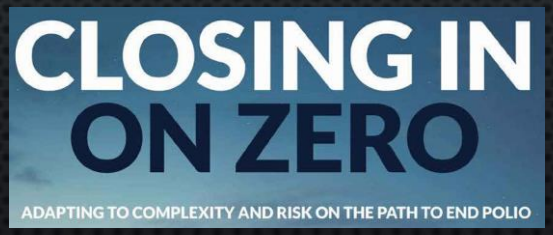
"POLIOMIELITE" (UM COMBATE DE TODA A HUMANIDADE QUE NÃO SE PODE PERDER)

José MD Poças

Médico, Internista e Infeciologista



QUEM SÃO OS PRINCIPAIS FINANCIADORES E QUANTO VAI SER INVESTIDO

WHAT IS THE GLOBAL POLIO ERADICATION INITIATIVE?

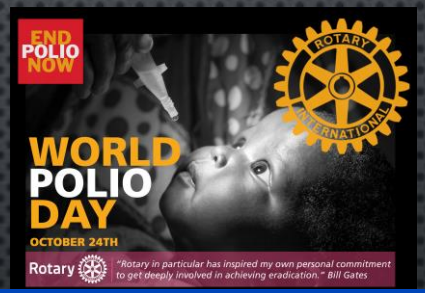
We are the GPEI. We were formed by the Forty-first World Health Assembly's commitment to eradicate polio, contained in landmark resolution WHA41.28. From the beginning, the effort to eradicate polio has been spearheaded by national governments, along with Rotary International, WHO, the US Centers for Disease Control and Prevention and the United Nations Children's Fund (UNICEF). Later, the Bill & Melinda Gates Foundation and Gavi, the Vaccine Alliance, joined the GPEI. These organizations jointly organize, coordinate and raise resources for the collective effort.

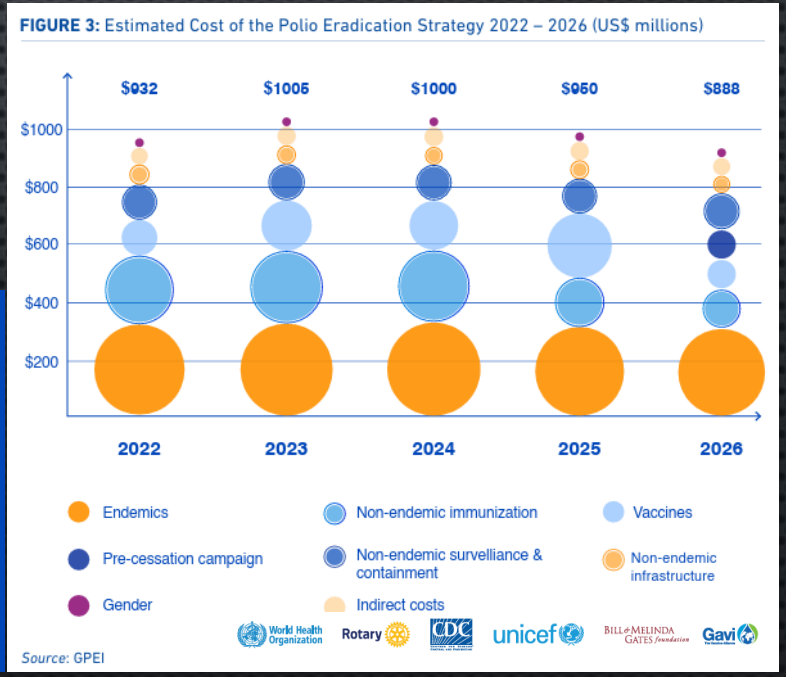
But no matter who the "we" in the GPEI are; it is we — every single person, collectively, together — who are responsible for taking the decision to eradicate polio. Only with a combined commitment can we finish the job. That is why we are asking you to join us in our work – and WE will beat polio.

Table 2. Estimated cost of various eradication timelines

Eradication timeline	Projected five-year cost (US$)
Interrupt WPV transmission in 1 year and certify in 4 years	4.5 billion
Interrupt WPV transmission in 2 years and certify in 5 years	**5.1 billion**
Interrupt WPV transmission in 3 years and certify in 6 years	5.5 billion
Interrupt WPV transmission in 5 years and certify in 8 years	6.2 billion

EVERY LAST CHILD

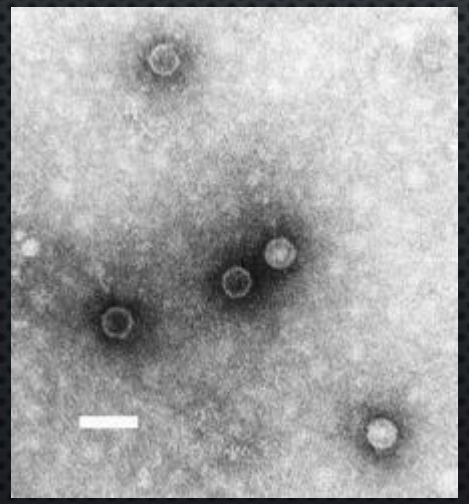


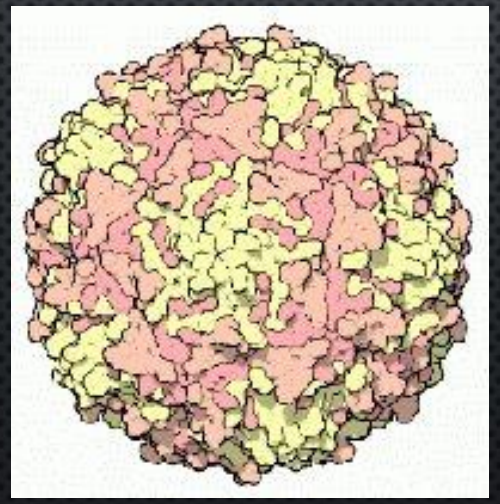


INTRODUÇÃO

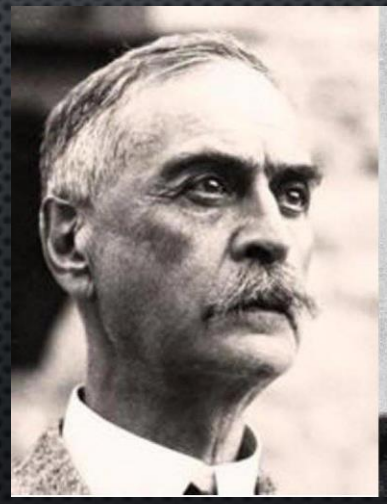
O VÍRUS

Enterovírus da família *Picornaviridae*





Isolamento em 1908 por Karl Landsteiner, 1868-1943, Prémio Nobel em 1930 e Erwin Popper 1879-1955



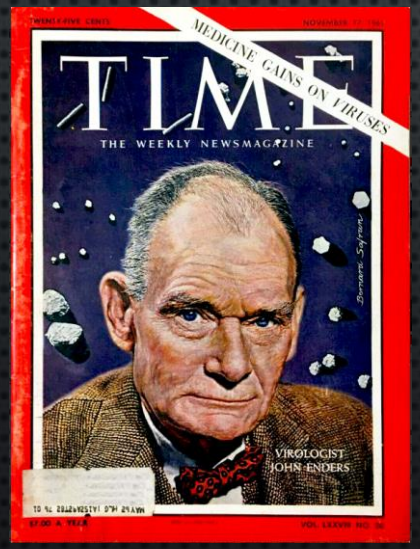
REPRESENTAÇÕES HISTÓRICAS

DO EGÍTO (1400 AC),

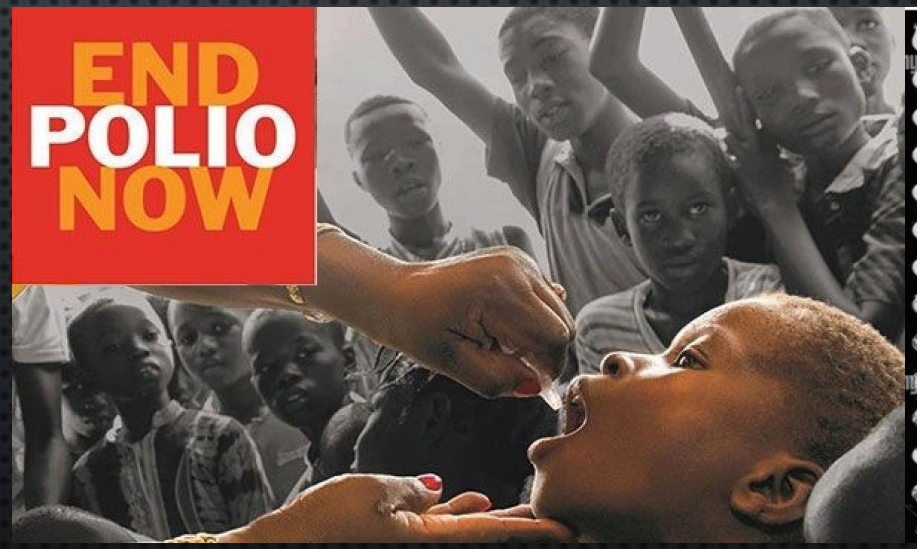
PASSANDO PELA IDADE MÉDIA
(ATÉ PIETER BRUGEL, 1525-1569)

ETAPAS HISTÓRICAS IMPORTANTES I

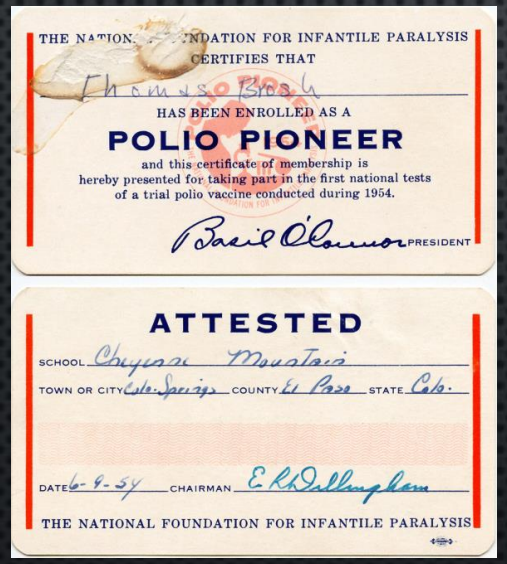
A CULTURA DO VÍRUS (NOBEL 1954)
(JOHN ENDERS, 1897-1985)



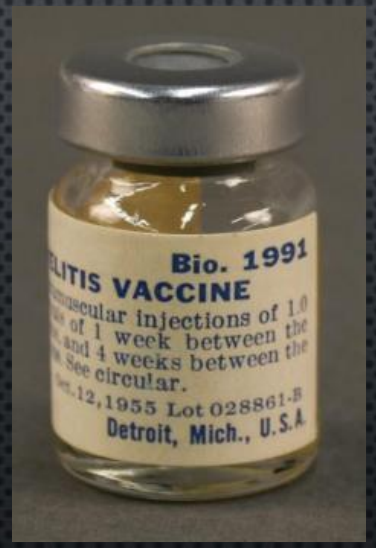
VACINAÇÃO (ALBERT SABIN- 1906-1993)



ETAPAS HISTÓRICAS IMPORTANTES II
JONAS SALK (1914-1995)

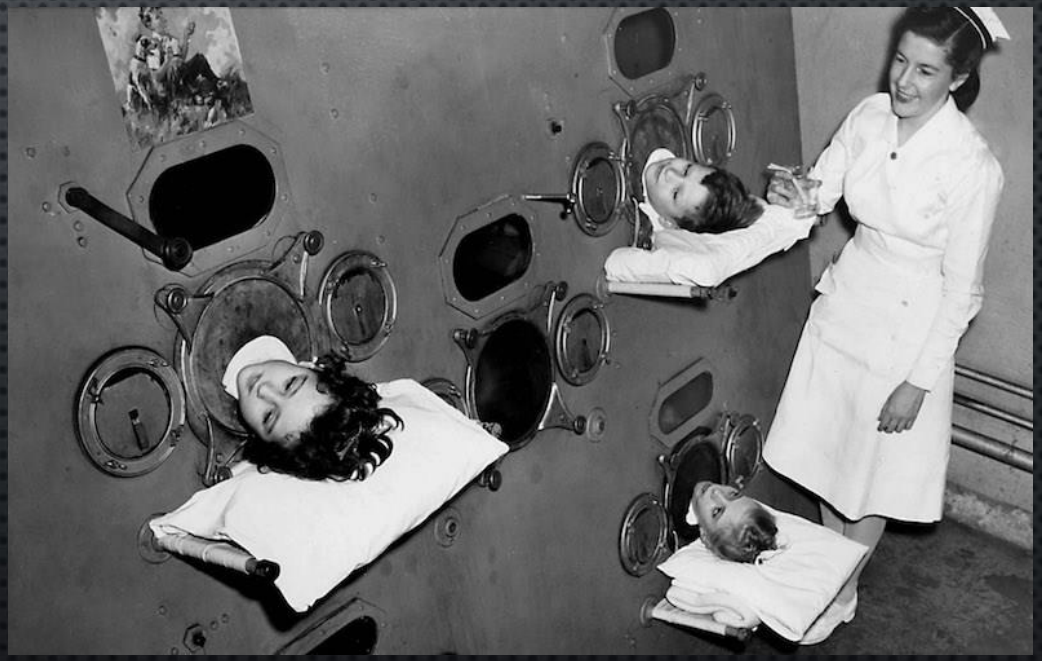

THE NATIONAL FOUNDATION FOR INFANTILE PARALYSIS
CERTIFIES THAT
Thomas Brosh
HAS BEEN ENROLLED AS A
POLIO PIONEER
and this certificate of membership is
hereby presented for taking part in the first national tests
of a trial polio vaccine conducted during 1954.
Basil O'Connor PRESIDENT

ATTESTED
SCHOOL Cheyenne Mountain
TOWN OR CITY Colo. Springs COUNTY El Paso STATE Colo.
DATE 6-9-54 CHAIRMAN E. R. Dillingham
THE NATIONAL FOUNDATION FOR INFANTILE PARALYSIS



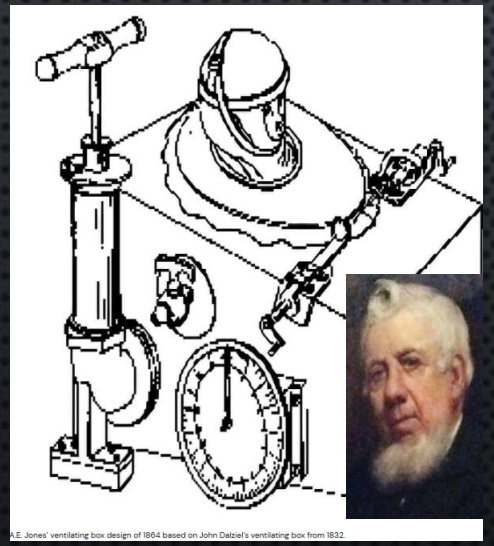
PULMÃO DE AÇO 1928
(PHILIP DRINKER, 1894-1972,
ENGENHEIRO QUÍMICO NORTE-AMERICANO)

O TRATAMENTO DAS FORMAS GRAVES DE PÓLIO NA DÉCADA DE 50 DO SEC. XX



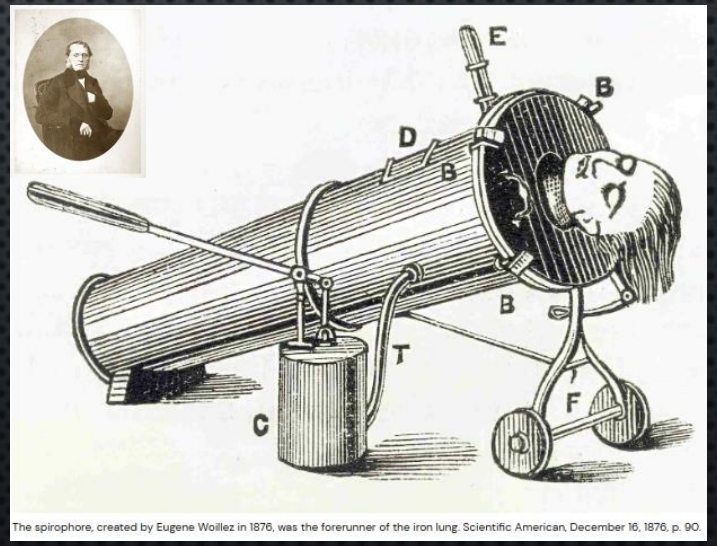
OS MODELOS QUE ANTECEDERAM O "PULMÃO DE AÇO"

JOHN DALZIE, 1832



A.E. Jones' ventilating box design of 1864 based on John Dalziel's ventilating box from 1832.

EUGENE WOILLEZ, 1876



The spirophore, created by Eugene Woillez in 1876, was the forerunner of the iron lung. Scientific American, December 16, 1876, p. 90.

PORQUE É QUE A PÓLIO AINDA NÃO FOI ERRADICADA

AS POSSÍVEIS EXPLICAÇÕES

HUMAN VACCINES & IMMUNOTHERAPEUTICS
2023, VOL. 19, NO. 1, 2199656
https://doi.org/10.1080/21645515.2023.2199656

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MINI-REVIEW

OPEN ACCESS Check for updates

Impact of the COVID-19 pandemic on routine vaccine landscape: A global perspective

Soumya Basu[a,b†], Gayathri Ashok[a,c†], Reetika Debroy[d], Sudha Ramaiah[a,c], Paul Livingstone[e], and Anand Anbarasu[a,b]

[a]Medical and Biological Computing Laboratory, School of Biosciences and Technology (SBST), Vellore Institute of Technology (VIT), Vellore, India; [b]Department of Biotechnology, SBST, VIT, Vellore, India; [c]Department of Biosciences, SBST, VIT, Vellore, India; [d]Department of Bio-medical sciences, SBST, VIT, Vellore, India; [e]School of Sports and Health Sciences, Cardiff Metropolitan University, Cardiff, UK

ABSTRACT

The coronavirus disease (COVID-19) threat is subsiding through extensive vaccination worldwide. However, the pandemic imposed major disruptions in global immunization programs and has aggravated the risks of vaccine-preventable disease (VPD) outbreaks. Particularly, lower-middle-income regions with minimal vaccine coverage and circulating vaccine-derived viral strains, such as polio, suffered additional burden of accumulated zero-dose children, further making them vulnerable to VPDs. However, there is no compilation of routine immunization disruptions and recovery prospects. There is a noticeable change in the routine vaccination coverage across different phases of the pandemic in six distinct global regions. We have summarized the impact of COVID-19 on routine global vaccination programs and also identified the prospects of routine immunization to combat COVID-like outbreaks.

ARTICLE HISTORY
Received 21 December 2022
Revised 16 March 2023
Accepted 2 April 2023

KEYWORDS
COVID-19; vaccines; disruption; routine immunization

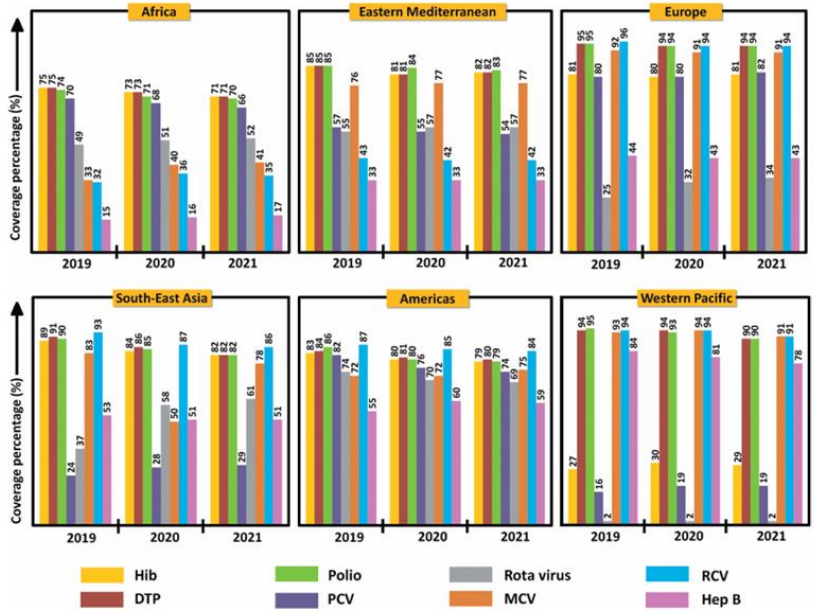
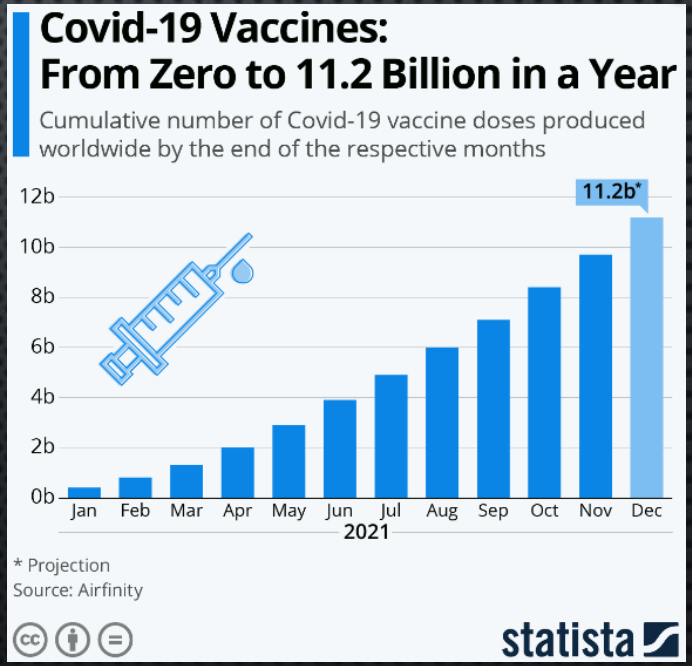
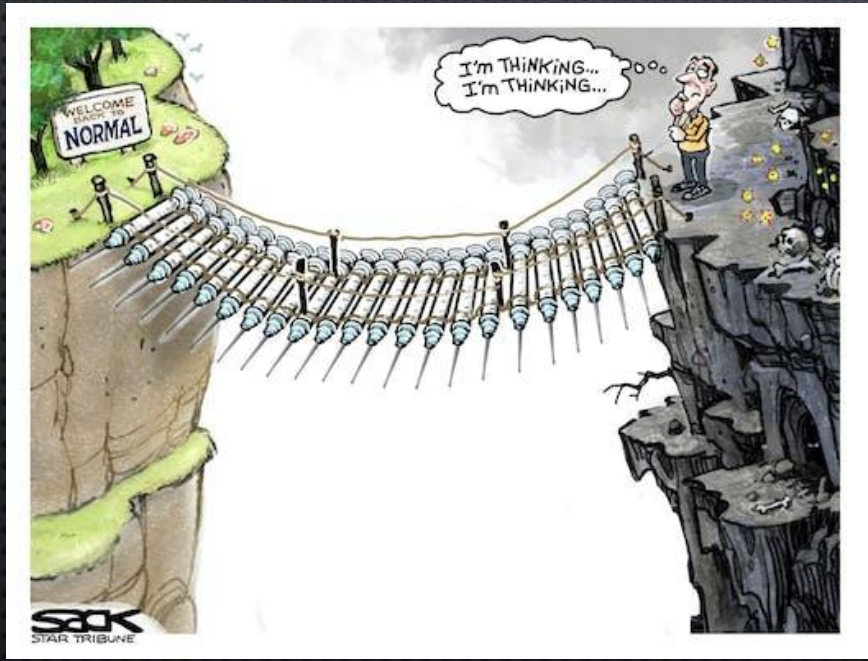


Figure 4. Trends in global vaccine coverage between 2019 and 2021.

A NECESSIDADE URGENTE DE PRODUZIR VACINAS



A DESCONFIANÇA RELATIVAMENTE AOS EFEITOS BENÉFICOS E O MEDO DOS EFEITOS ACESSÓRIOS DAS VACINAS



PLOS GLOBAL PUBLIC HEALTH

RESEARCH ARTICLE

What are the barriers and facilitators to polio vaccination and eradication programs? A systematic review

Obidimma Ezezika[1,2,3]*, Meron Mengistu[2,4], Eric Opoku[2,5], Aiman Farheen[2], Anuradha Chauhan[2], Kathryn Barrett[1,6]

A IMPORTÂNCIA DA DOENÇA PRODUZIDA PELA VACINA ORAL

Centers for Disease Control and Prevention
MMWR
Morbidity and Mortality Weekly Report

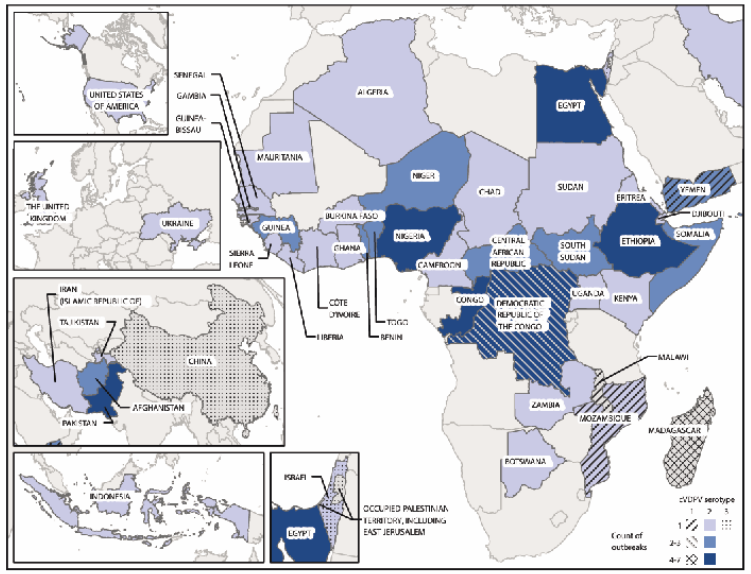
Morbidity and Mortality Weekly Report

Update on Vaccine-Derived Poliovirus Outbreaks — Worldwide, January 2021–December 2022

John Paul Bigouette, PhD[1]; Elizabeth Henderson[2]; Mohamed A. Traoré[3]; Steven G. F. Wassilak, MD[1]; Jaume Jorba, PhD[2]; Frank Mahoney, MD[1]; Omotayo Bolu, PhD[1]; Ousmane M. Diop, PhD[3]; Cara C. Burns, PhD[2]

Centers for Disease Control and Prevention
MMWR
Morbidity and Mortality Weekly Report

FIGURE. Circulating vaccine-derived poliovirus outbreaks (N = 88) — worldwide, January 2021–December 2022*



Abbreviation: cVDPV = circulating vaccine-derived poliovirus.
* Data current as of February 14, 2023.

TABLE 2. Circulating vaccine-derived poliovirus outbreaks (N = 149) and timeliness of outbreak control, by serotype and year of confirmation — worldwide, August 2016–December 2022

	Year of outbreak confirmation, no. (%)						
cVDPV type	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022***
Type 1	—†	—	1	4	1	3	1
Type 2	2	4	7	41	49	24	8
Type 3	—	—	1	—	—	2	1
Overall	**2**	**4**	**9**	**45**	**50**	**29**	**10**
Controlled within 120 days of outbreak confirmation (n = 85 [57%])							
Type 1	—	—	0 (—)	4 (100)	0 (—)	1 (33)	0 (—)
Type 2	2 (100)	3 (75)	1 (14)	24 (59)	27 (55)	16 (67)	4 (50)
Type 3	—	—	0 (—)	—	—	2 (100)	1 (100)
Overall	**2 (100)**	**3 (75)**	**1 (11)**	**28 (62)**	**27 (54)**	**19 (66)**	**5 (50)**

Abbreviation: cVDPV = circulating vaccine derived poliovirus.
* Data as of February 14, 2023. To account for potential low-level transmission continuing after the outbreak response and delayed detection, cVDPV outbreaks were suppressed if <6 months had elapsed from the 120th day following outbreak confirmation (April 20, 2022).
† Dashes indicate that no outbreaks were confirmed during that year.

ACONTECIMENTOS RECENTES I

The New York Times

Cancel or pause anytime.

GLOBAL HEALTH

Polio Was Almost Eradicated. This Year It Staged a Comeback.

Before its discovery in New York's wastewater, the virus made a series of ominous appearances around the world.

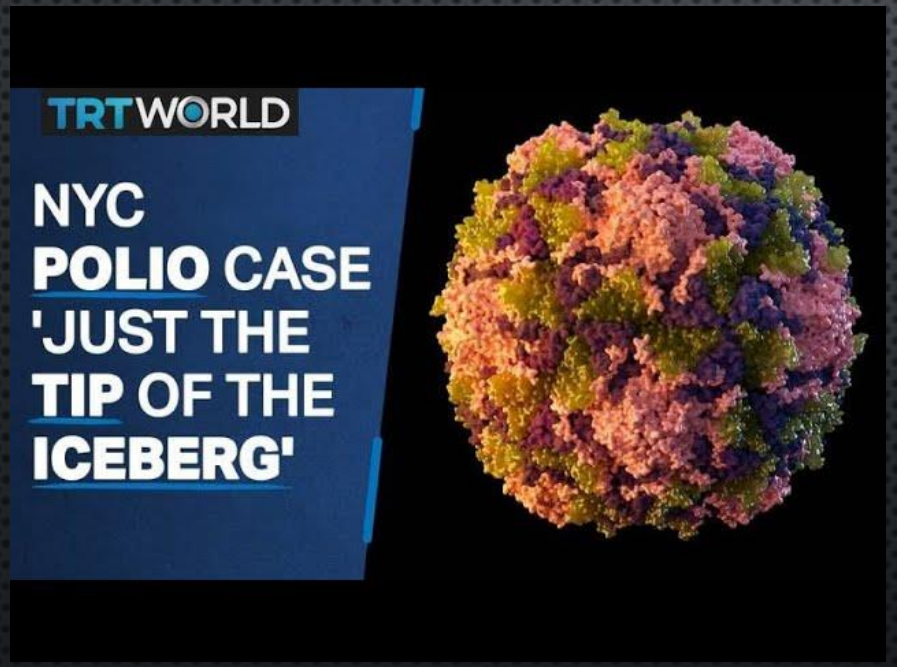
Think Global Health

GOVERNANCE

New Polio Cases Highlight the Urgency of Eradication

Global efforts need to finish the job

ACONTECIMENTOS RECENTES II



ACONTECIMENTOS RECENTES III

MOTIVOS DE PREOCUPAÇÃO ADICIONAIS I

frontiers | Frontiers in Neurology

TYPE Mini Review
PUBLISHED 20 December 2022
DOI 10.3389/fneur.2022.1034607

Acute flaccid myelitis a review of the literature

Darina Dinov[1]* and Jeffrey R. Donowitz[2]

[1]Department of Neurology, Children's Hospital of Richmond at Virginia Commonwealth University, Richmond, VA, United States, [2]Department of Pediatrics, Children's Hospital of Richmond at Virginia Commonwealth University, Richmond, VA, United States

West Nile Virus (WNV) Infection-Associated Acute Flaccid Paralysis With Ophthalmoplegia

2

Srikanth Adidam Venkata • Narek Hakobyan • David P. Lerner • Ramaswami Sundar • Arthur Kay

Published: April 26, 2023 **DOI:** 10.7759/cureus.38137

Enterovirus D68 and Acute Flaccid Myelitis

AMERICAN SOCIETY FOR MICROBIOLOGY

MOTIVOS DE PREOCUPAÇÃO ADICIONAIS II

GUERRA DA UCRÂNIA

Polio outbreak in Ukraine closed – a success story for public health despite extreme challenges of war

World Health Organization

GUERRA DO IÉMEN

Initiative pour l'éradication de la poliomyélite

Polio vaccination against the odds in Yemen: dispatches from the frontline of polio eradication

Organisation mondiale de la Santé
Région Méditerranée orientale

Muneera Abdo is one of thousands of vaccinators across Yemen working tirelessly to reach every last child with polio vaccine

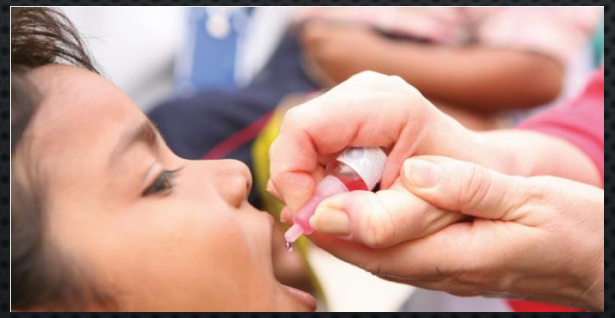
MOTIVOS DE PREOCUPAÇÃO ADICIONAIS III

VÍRUS DA PÓLIO CIRCULA EM JERUSALÉM

First Polio Case in Over 30 Years is Diagnosed in Jerusalem

Disease Surveillance 07/03/2022 · Maayan Hoffman

Health Policy Watch
Independent Global Health Reporting



O QUE IRÁ ACONTECER AGORA?

MOTIVOS DE PREOCUPAÇÃO ADICIONAIS IV

neurology international

MDPI

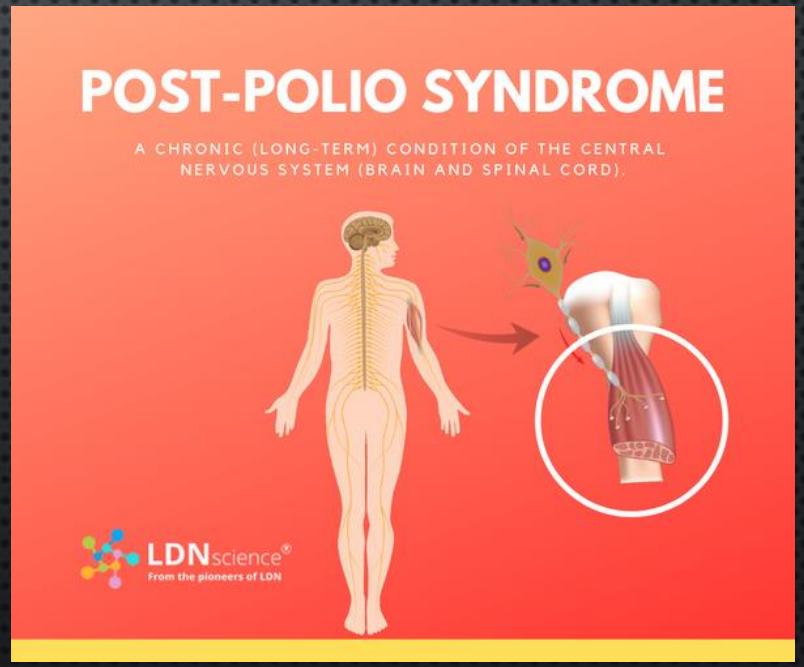
Case Report

Post-Polio Syndrome Revisited

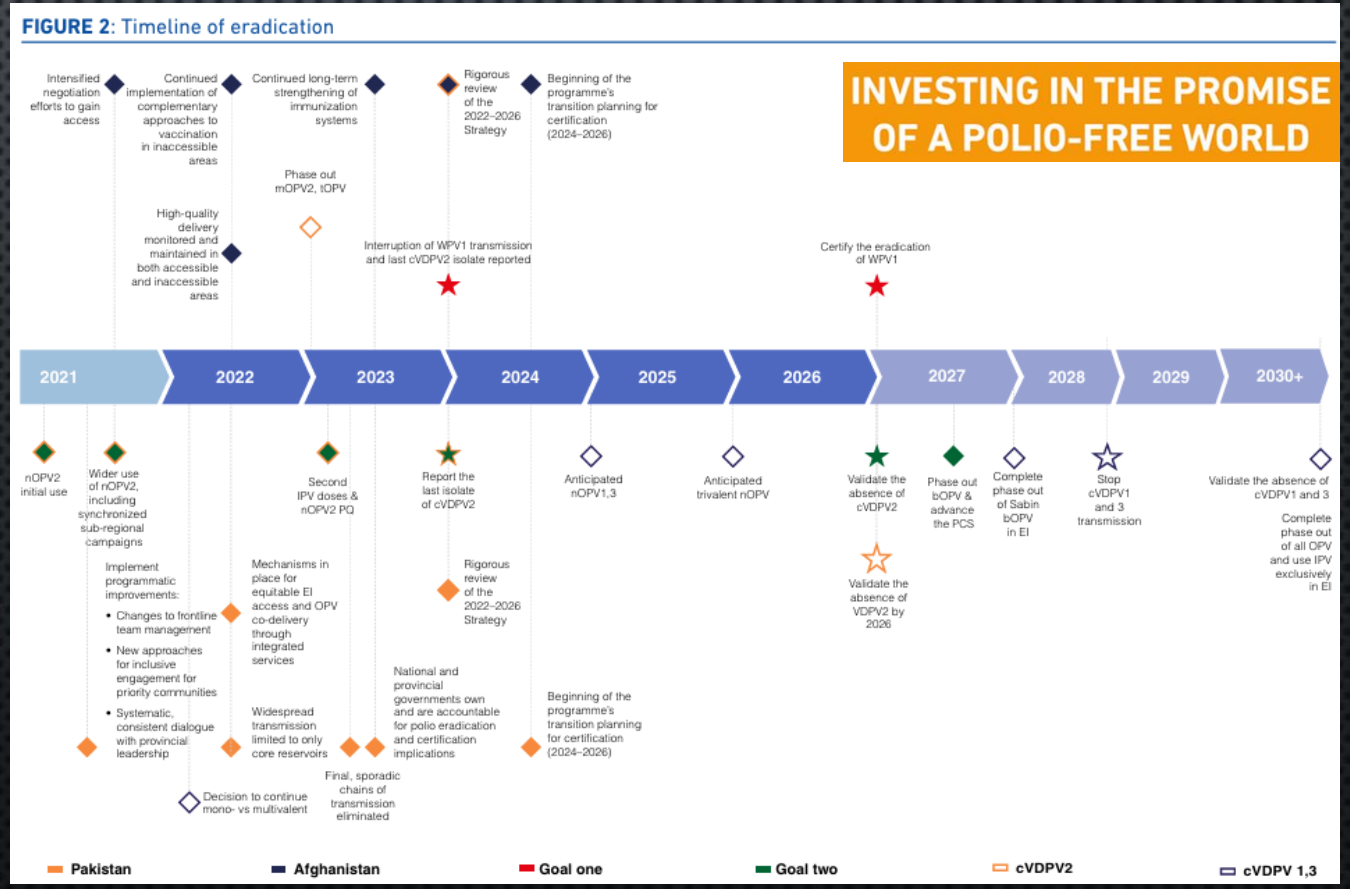
Michael Punsoni, Nelli S. Lakis, Michelle Mellion and Suzanne M. de la Monte *

Division of Neuropathology, Departments of Pathology and Laboratory Medicine, Neurology, and Neurosurgery, Rhode Island Hospital, Alpert Medical School of Brown University, Providence, RI 02903, USA; mpunsoni@gmail.com (M.P.); nlakis@kumc.edu (N.S.L.); mmellionmd@gmail.com (M.M.)

* Correspondence: suzanne_delamonte_md@brown.edu; Tel.: +1-401-444-7364; Fax: 401-444-2939



PRÓXIMOS OBJETIVOS COMUNS DAS ORGANIZAÇÕES INTERNACIONAIS



A ESTRATÉGIA QUE ESTÁ SENDO IMPLEMENTADA I

Goal 1: To permanently interrupt all wild poliovirus transmission

Political advocacy

- Gain and maintain access in Afghanistan through systematic advocacy with all
- Intensify advocacy with provincial governments in Pakistan

Community engagement

- Conduct multdisciplinary research into vaccine hesitancy and community mistrust
- Foster alliances with priority communities for co-design, ownership and delivery of gender-responsive programme innovatiions

Campaign

- Recruit, train, and appropriately support a motivated workforce that meets the needs of the community
- Introduce monitoring innovations to enable faster data feedback loops and improve quality
- Facilitate strengthening of essential immunization

Integration

- Deliver polio vaccines alongside basic public services to increase the reach of both essential and supplementary immunization, with a focus on high-risk areas
- Partner with governments, communities, and adjacent health programmes to support access and reduce missed communities and zero-dose children

Surveillance

- Improve timeliness for detection - from case onset to final results
- Establish pathway towards a sustainable integrated surveillance system

Enabling environment

- Increase the representation and empoverment of women at every level and across all areas of the programme
- Provide targeted assistance for country programme through the GPEI hub.

Goal 2: To stop vaccine-derived poliovirus transmission and prevent outbreaks in non-endemic countries

Political advocacy

- Engage government and political stakeholders via integrated health advocacy to esnure emergency posture, resourcing and joint accountability for timely and effective outbreak response

Community engagement

- Engage nomadic and settled communities both before and during outbreak campaigns

Campaign

- Deploy nOPV2 and improve campaign planning and execution through optimized response scope, mobile money payments, campaign digitalization and other innovations

Integration

- Ensure success of the Gavi zero-dose strategy and leverage multi-antigen campaigns.
- Support global health emergencies with a near term focus on COVID-19

Surveillance

- Implement technical and innovation surveillance and samply analysis to more rapidly detect, sequence and initiate response activities

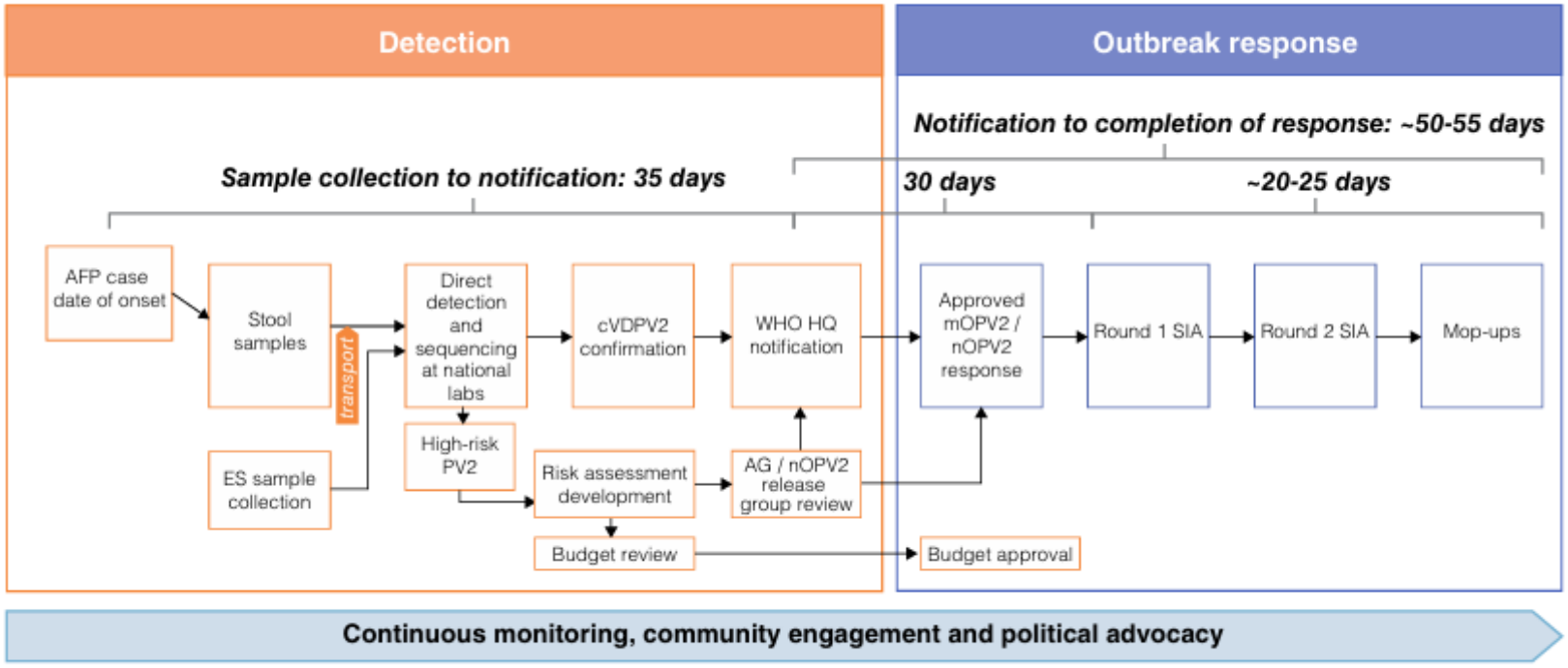
Enabling environment

- Pivot away from Sabin OPV2 to nOPV2 and ensure sufficient vaccine supply
- Move to a regional structure with global support that holds the GPEI and countries accountable for progress
- Utilize a rapide gender analysis to shape the outbreak response.

Source: WHO

A ESTRATÉGIA QUE ESTÁ SENDO IMPLEMENTADA II

Fig. 9. Desired future state for detection and outbreak response



AFP = acute flaccid paralysis; AG = Advisory Group; cVDPV2 = circulating vaccine-derived poliovirus type 2; ES = environmental surveillance; HQ = headquarters; mOPV2 = monovalent oral polio vaccine type 2; nOPV2 = novel oral polio vaccine type 2; PV2 = poliovirus type 2; SIA = supplementary immunization activity.

Source: WHO.

UMA INVESTIGAÇÃO QUE NÃO TEM PARADO

HUMAN VACCINES & IMMUNOTHERAPEUTICS
2023, VOL. 19, NO. 1, 2173905
https://doi.org/10.1080/21645515.2023.2173905

Taylor & Francis
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REVIEW

OPEN ACCESS Check for updates

Global trends in poliomyelitis research over the past 20 years: A bibliometric analysis

Qi Liu[a,b], Ze Liu[a,b], Biling Huang[c], Yuanyuan Teng[c], Mingliu Li[c], Shuqin Peng[c], Hongbin Guo[a,b], Min Wang[c], Jieyu Liang[a,b], and Yi Zhang[a,b]

[a]Department of Orthopaedics, Xiangya Hospital, Central South University, Changsha, Hunan, China; [b]National Clinical Research Center for Geriatric Disorders, Xiangya Hospital, Central South University, Changsha, Hunan, China; [c]Department of Endocrinology, Xiangya Hospital, Central South University, Changsha, Hunan, China

ABSTRACT

Poliomyelitis is an acute infectious disease caused by poliovirus. This bibliometric analysis aims to examine the status of poliomyelitis research in the past 20 years. Information regarding polio research was obtained from the Web of Science Core Collection database. CiteSpace, VOSviewer, and Excel were used to perform visual and bibliometric analysis with respect to countries/regions, institutions, authors, journals and keywords. A total of 5,335 publications on poliomyelitis were published from 2002 to 2021. The USA was the county with the majority of publications. Additionally, the most productive institution was the Centers for Disease Control and Prevention. Sutter, RW produced the most papers and had the most co-citations. *Vaccine* was the journal with the most polio-related publications and citations. The most common keywords were mainly about polio immunology research ("polio," "immunization," "children," "eradication" and "vaccine"). Our study is helpful for identifying research hotspots and providing direction for future research on poliomyelitis.

ARTICLE HISTORY
Received 10 November 2022
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KEYWORDS
Poliomyelitis; vaccine; acute flaccid myelitis; bibliometrics; Web of Science

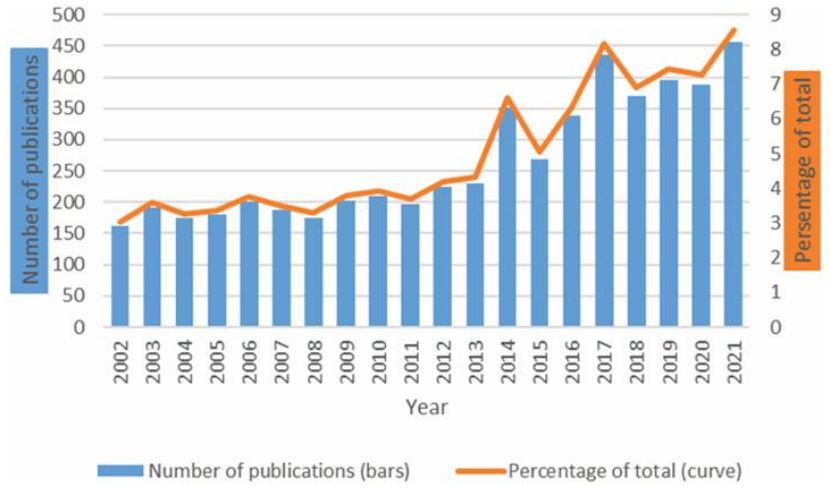

Figure 1. Trends of poliomyelitis-related publications over the past 20 years.

NOVAS METODOLOGIAS DE FABRICAÇÃO DE VACINAS

HUMAN VACCINES & IMMUNOTHERAPEUTICS
2022, VOL. 18, NO. 7, e2154100 (24 pages)
https://doi.org/10.1080/21645515.2022.2154100

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REVIEW

OPEN ACCESS Check for updates

Current and next-generation formulation strategies for inactivated polio vaccines to lower costs, increase coverage, and facilitate polio eradication

Prashant Kumar*, Christopher Bird[‡],*, David Holland[§], Sangeeta B. Joshi, and David B. Volkin

Department of Pharmaceutical Chemistry, Vaccine Analytics and Formulation Center, University of Kansas, Lawrence, KS, USA

ABSTRACT
Implementation of inactivated polio vaccines (IPV) containing Sabin strains (sIPV) will further enable global polio eradication efforts by improving vaccine safety during use and containment during manufacturing. Moreover, sIPV-containing vaccines will lower costs and expand production capacity to facilitate more widespread use in low- and middle-income countries (LMICs). This review focuses on the role of vaccine formulation in these efforts including traditional Salk IPV vaccines and new sIPV-containing dosage forms. The physicochemical properties and stability profiles of poliovirus antigens are described. Formulation approaches to lower costs include developing multidose and combination vaccine formats as well as improving storage stability. Formulation strategies for dose-sparing and enhanced mucosal immunity include employing adjuvants (e.g. aluminum-salt and newer adjuvants) and/or novel delivery systems (e.g. ID administration with microneedle patches). The potential for applying these low-cost formulation development strategies to other vaccines to further improve vaccine access and coverage in LMICs is also discussed.

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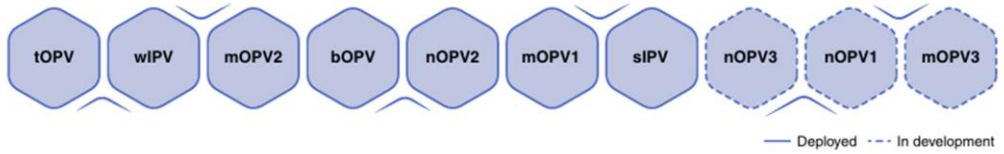
KEYWORDS
Inactivated polio vaccine; combination vaccines; formulation; stability; D-antigen ELISA; dose-sparing; adjuvants; vaccine delivery

Fig. 13. Polio vaccines, current and future, 2022–2026



bOPV = bivalent oral polio vaccine; mOPV1 = monovalent oral polio vaccine type 1; mOPV2 = monovalent oral polio vaccine type 2; mOPV3 = monovalent oral polio vaccine type 3; nOPV1 = novel oral polio vaccine type 1; nOPV2 = novel oral polio vaccine type 2; nOPV3 = novel oral polio vaccine type 3; sIPV = Sabin inactivated polio vaccine; tOPV = trivalent oral polio vaccine; wIPV = wild-strain inactivated polio vaccine.
Source: WHO.

MOTIVO DE ESPERANÇA

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Plant-made poliovirus vaccines – Safe alternatives for global vaccination

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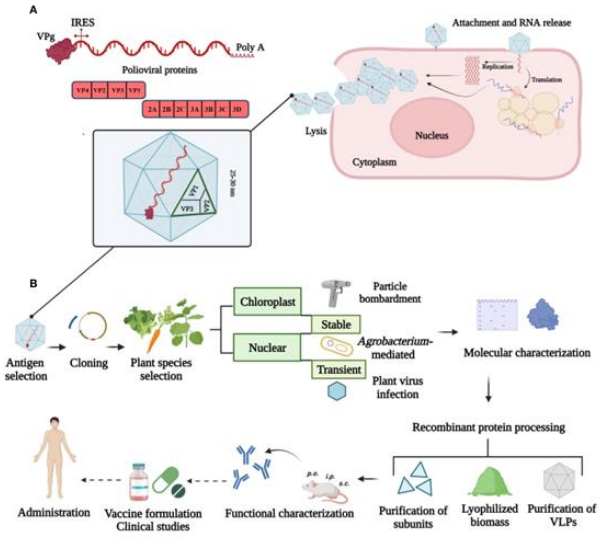


FIGURE 1
Overview of poliovirus cell infection and strategies to produce a plant-based vaccine. **(A)** Illustration of the viral genome and replication cycle in the cytoplasm. The small viral protein, VPg is attached at the 5′- and a poly-A tail at 3′-end of the ~ 7500 bp RNA. The 5′-untranslated region contains the internal ribosome entry site (IRES) for ribosome assembly. The single open reading frame encodes structural (VP1, VP2, VP3 and VP4) and non-structural (2ABC, 3ABCD) proteins. **(B)** Plant biotechnology approaches for poliovirus vaccine production. Current strategies comprise chloroplast and nuclear genome transformation using particle bombardment, *Agrobacterium*-mediated or plant virus-based expression. Unaccomplished steps towards a plant-made poliovirus vaccine are marked with dotted arrows. This figure was created with BioRender.com.

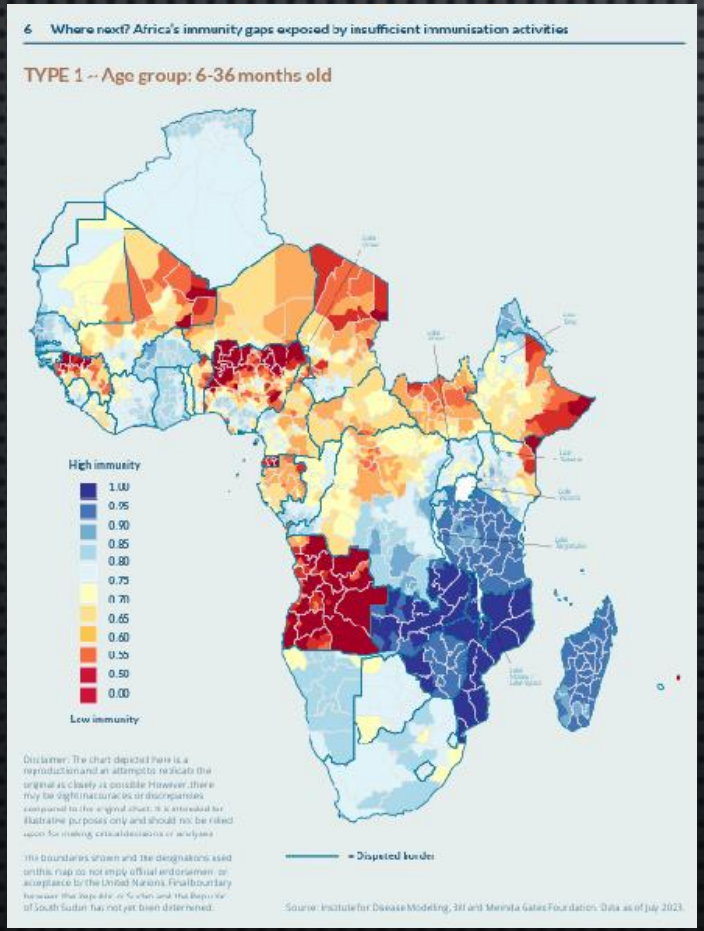
O POSSÍVEL PAPEL DOS ANTIVÍRICOS

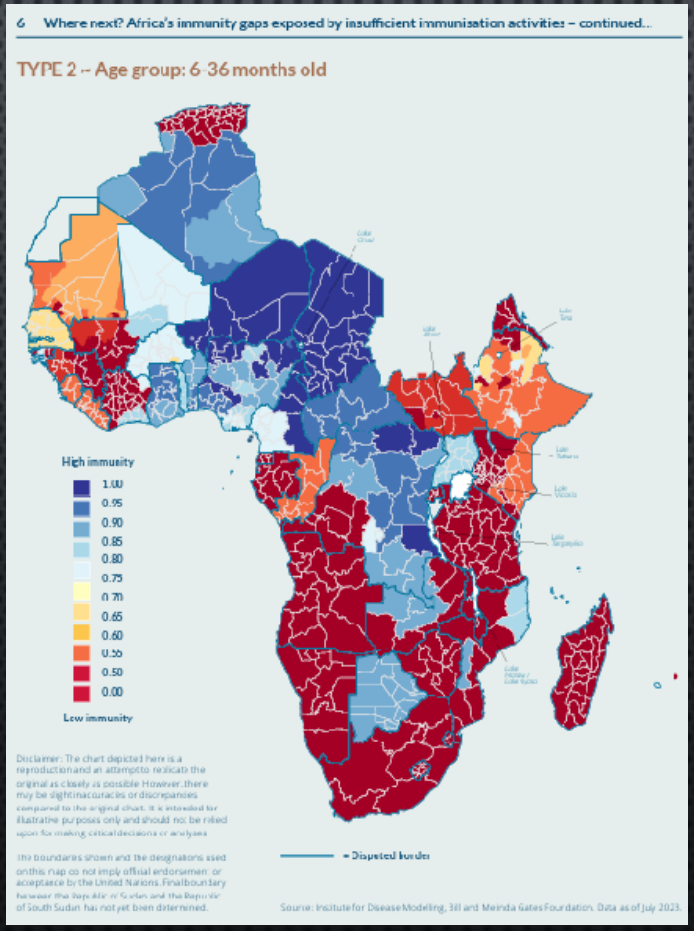
UMA AVALIAÇÃO INDEPENDENTE I

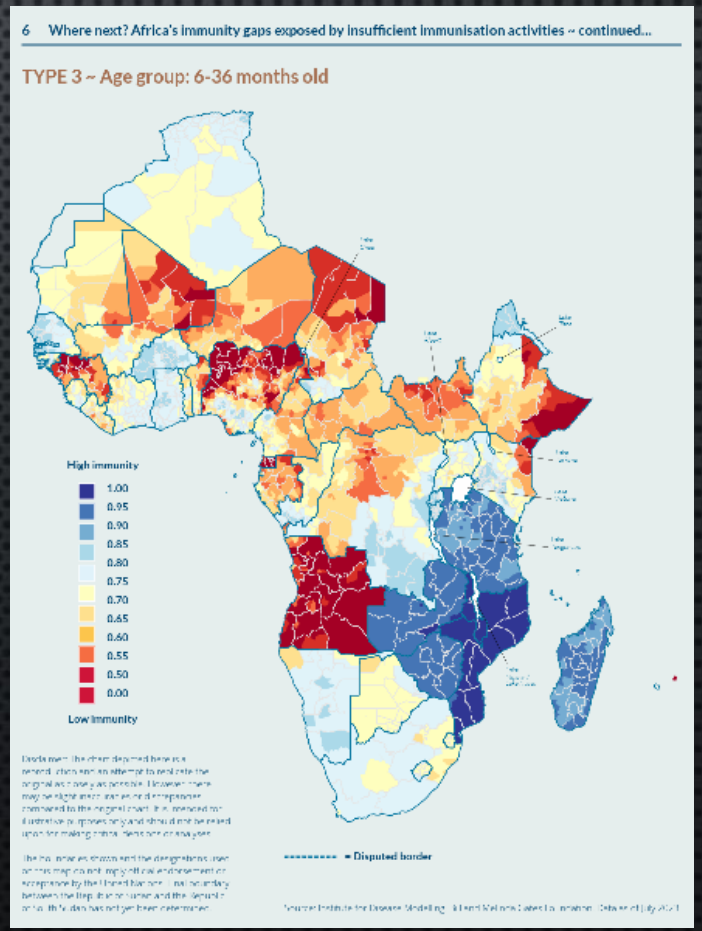
POLIO ERADICATION GOAL 1: OFF TRACK

POLIO ERADICATION GOAL 2: WILL BE MISSED

UMA AVALIAÇÃO INDEPENDENTE II







O RETORNO DO VÍRUS SELVAGEM SUBTIPO1 (SUBTIPOS 2 E 3 ERRADICADOS EM 2015 E 2019)

1988

2021-2023

A SÚMULA POSSÍVEL DO QUE É A REALIDADE ATUAL E O QUE SE PERSPETIVA PARA UM FUTURO PRÓXIMO…

microorganisms MDPI

Review

The Fight against Poliovirus Is Not Over

Chaldam Jespère Mbani [1,2], Magloire Pandoua Nekoua [1], Donatien Moukassa [2] and Didier Hober [1,*]

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REVIEW

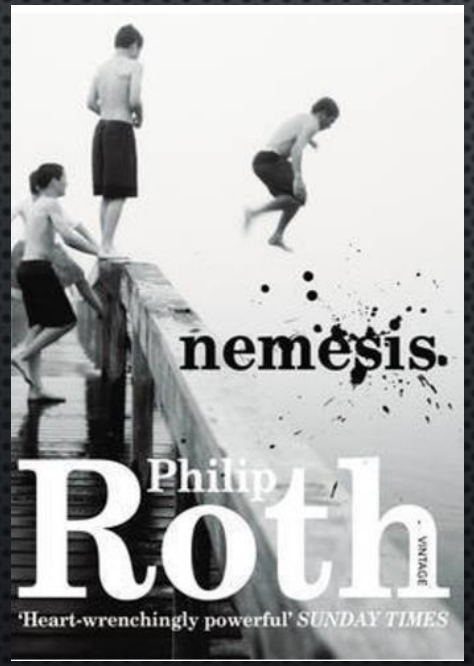
Check for updates

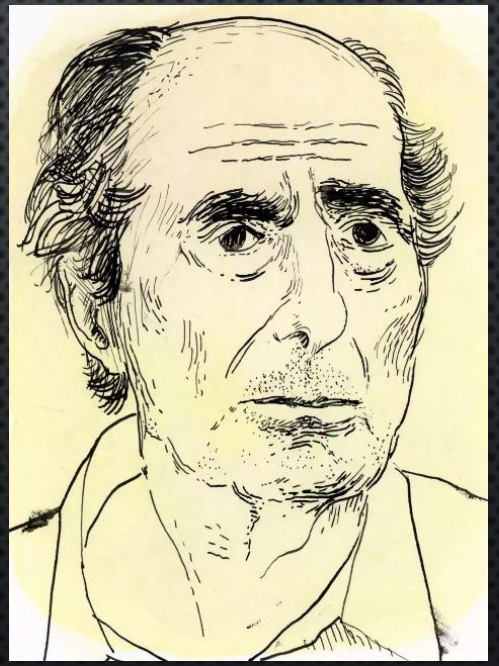
Poliomyelitis is a current challenge: long-term sequelae and circulating vaccine-derived poliovirus

Jorge Quarleri

CONCLUSÕES

E UM ROMANCE IMPERDÍVEL





UM CASO VERÍDICO QUE DÁ QUE PENSAR!!!

ELIANA ZAGUI
(ALTA HOSPITALAR EM 2019 AOS 43 ANOS)

"VILA FELIZ"

UM OUTRO TIPO DE MISSÃO ASSOCIADA À MENSAGEM QUE SE PRETENDE TRANSMITIR NA CRIAÇÃO ARTÍSTICA

"Triste Herança" de 1899
(Joaquim Sorolla, 1863-1923)

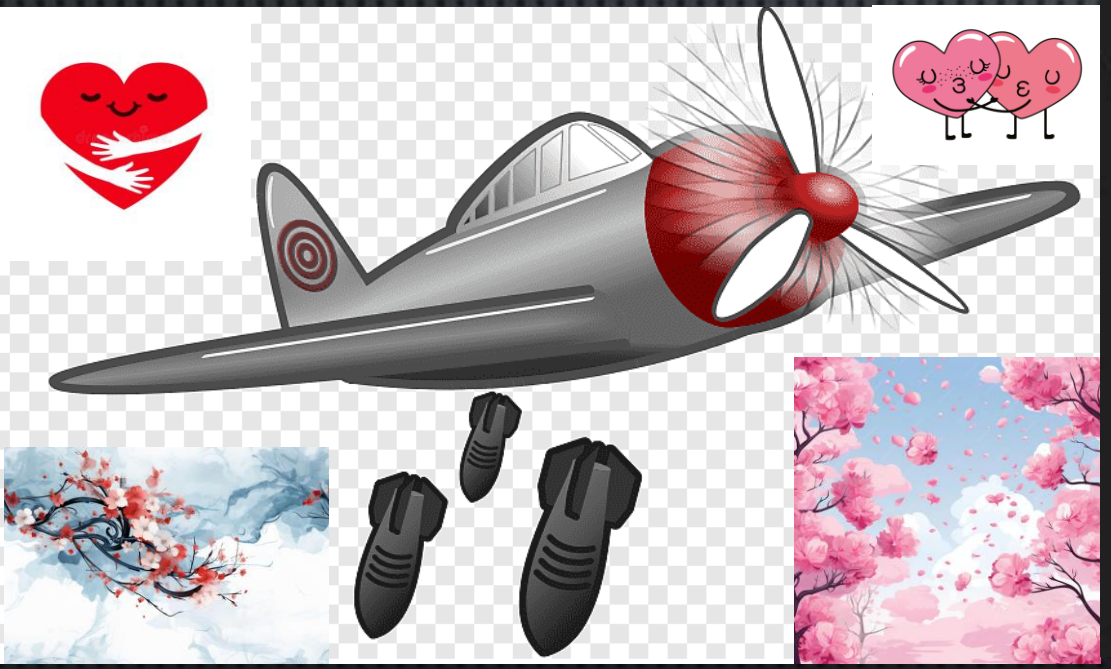
"Verão" de 1904
(Joaquim Sorolla, 1863-1823)

UMA POSTURA DE INTERVENÇÃO SOCIAL ATRAVÉS DE TRÊS INICIATIVAS RECENTES DE ÍNDOLE PESSOAL

HISTÓRIA A QUE FAÇO ALUSÃO NO MEU MAIS RECENTE LIVRO PARA CUJA APRESENTAÇÃO VOS CONVIDEI

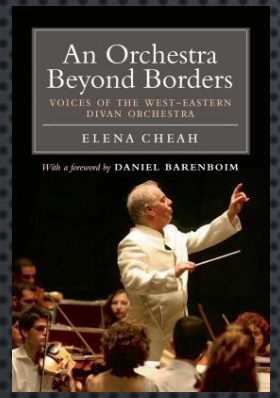
LIVRO QUE FALA DE OUTRA DOENÇA MÍTICA QUE ATINGIU A MINHA FAMÍLIA E QUE É, AINDA, CAUSA DE GRANDE SOFRIMENTO PARA A HUMANIDADE: A TUBERCULOSE

QUANDO TERÁ O MUNDO JUÍZO???!!!...

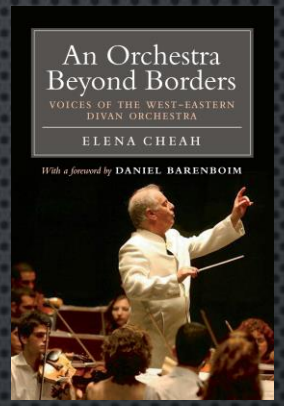


Ame seus inimigos, faça o bem para aqueles que te odeiam, abençoe aqueles que te amaldiçoam, reze por aqueles que te maltratam. Se alguém te bater no rosto, ofereça a outra face.

Jesus Cristo



WEST-EASTERN
DIVAN
ORCHESTRA



Edward Said e Daniel Barenboim

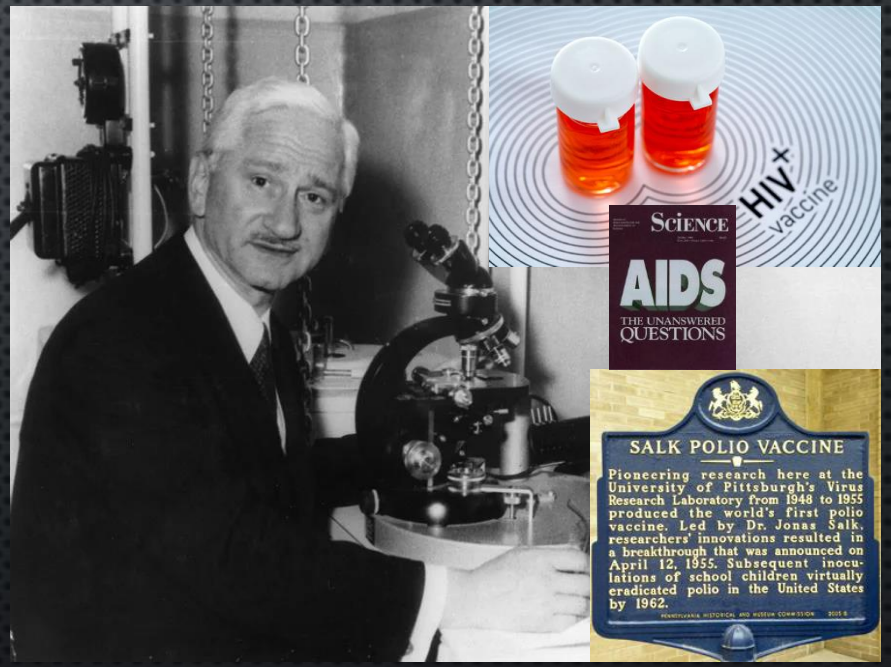
A Orquestra

TRIPLE CONCERTO

FINALIZANDO COM UMA MENSAGEM DE ESPERANÇA E DE ADVERTÊNCIA

- Six pharmaceutical companies were licensed to produce IPV, and Salk did not profit from sharing the formulation or production processes.
- In a 1955 interview, when asked who owned the patent for IPV, he replied: "Well, the people, I would say. There is no patent. Could you patent the sun?"

(Jonas Salk, introdutor da biofilosofia: "*Somos coautores com a natureza do nosso destino*")



O QUE É NECESSÁRIO É UM MUNDO EM PAZ, EM QUE A ÚNICA GUERRA LEGÍTIMA QUE EXISTA SEJA A QUE SE FAZ CONTRA AS DOENÇAS INFECIOSAS

VENCEDOR DO CONCURSO DE PINTURA DO LION´S CLUB SOBRE A PAZ NO MUNDO

In the Fight against Infectious Disease, Social Changes Are the New Medicine

SCIENTIFIC AMERICAN

UM EXEMPLO DO QUE NÃO FOI FEITO, E DEVÊ-LO-IA SER SEMPRE…!!!