

Situation de la poliomyélite dans le monde en 2010

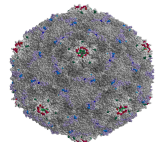


Bruno LINA
CNR des entérovirus
Laboratoire de virologie EST, GHE, HCL
FRE 3011 CNRS – UCBL, Lyon

Liens d'intérêts : Argene, BioMérieux, Sanofi Pasteur

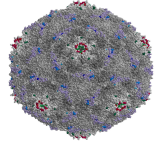
CEMI 15 – 17 et 18 mai 2010 Institut Pasteur Paris

Entérovirus : historique

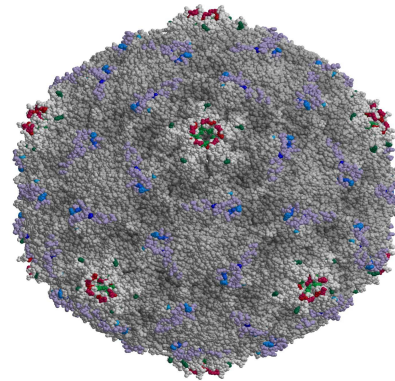


- **Poliomyélite** : connue depuis 3500 ans
 - épidémies de paralysie infantile au XIX è
 - culture de poliovirus en 1949
 - vaccin inactivé (Salk, 1955), vaccin atténué (Sabin, 1963)
 - poliomyélite quasi-éradiquée à ce jour
- Année 50 : découvertes dans les selles des **Coxsackievirus**, à Coxsackie, ville de l'Etat de New York
 - paralysies flasques (Coxsackievirus A) ou spasmodiques (Coxsackievirus B) chez le souriceau nouveau-né
- Années 60 : découverte des **Echovirus** (acronyme de *enteric, cytopathic, human, orphan*) dans le tube digestif de sujets asymptomatiques

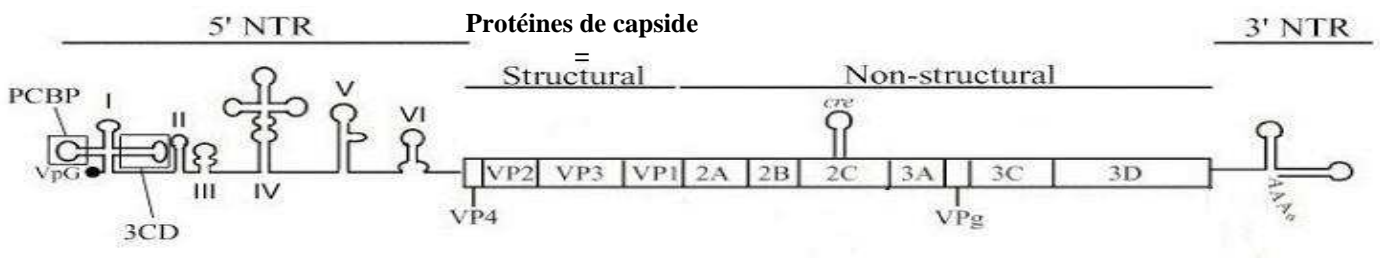
Entérovirus



- Famille *Picornaviridae*, genre Entérovirus
- Génome ARN (+) monocaténaire linéaire
taille génome 7,5 kb
- Capside icosaédrique
- Virus nus = pas d'enveloppe
résistance dans le milieu extérieur : transmission fécale-orale
- Petits virus : 28 à 30 nm



Entérovirus : organisation génomique



D'après Stanway et Hyypiä, 1999

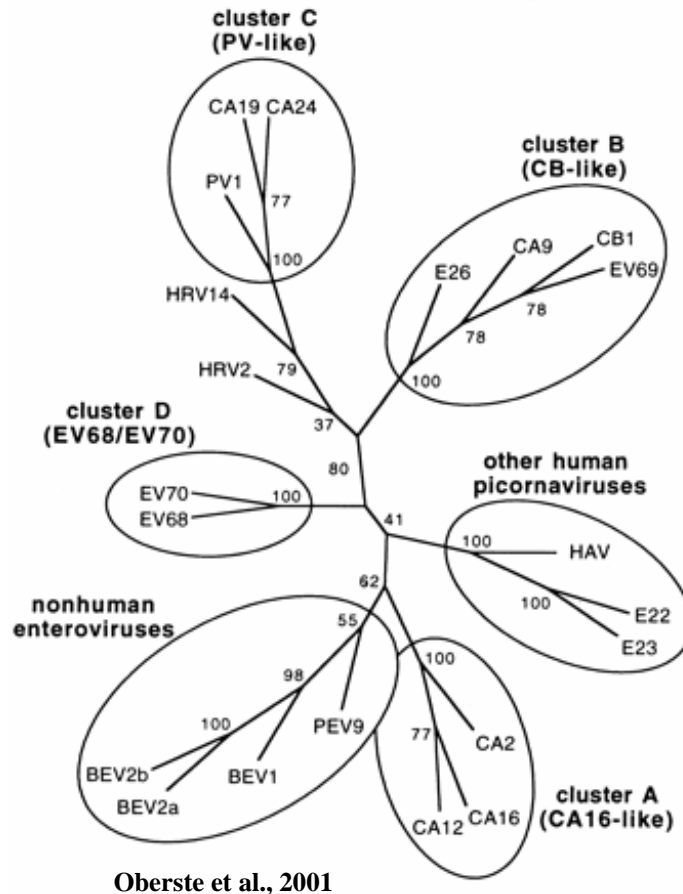
Entérovirus : phylogénie

Entérovirus humains C

14 sérotypes
poliovirus 1-3
 coxsackievirus A 1, 11, 13,
 15, 17-22, 24

Entérovirus humains D

2 sérotypes
 entérovirus 68 et 70



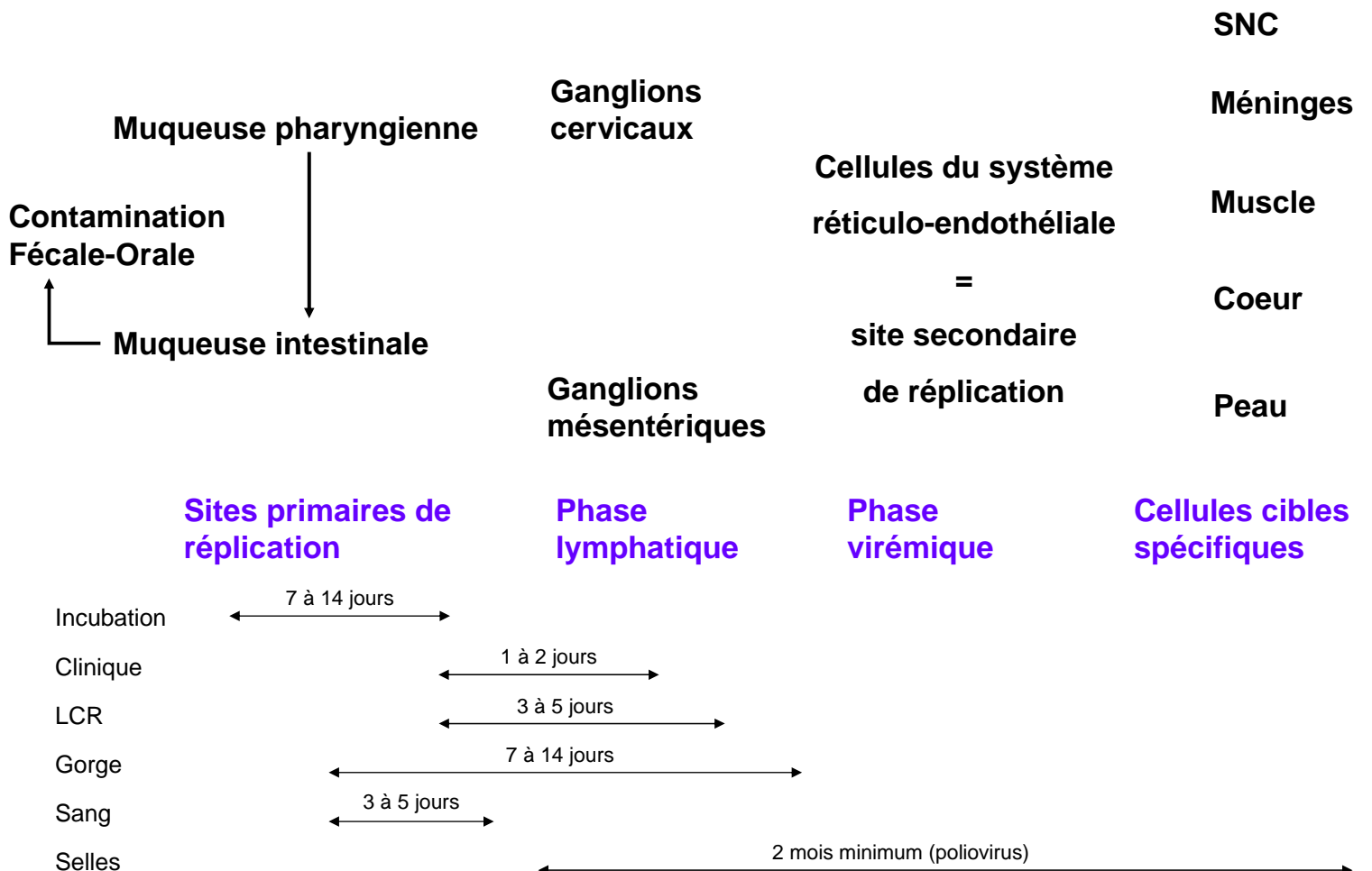
Oberste et al., 2001

Entérovirus humains B

36 sérotypes coxsackievirus B
 1-6, A9,
 echovirus 1-7, 9, 11, 21, 24-
 27, 29-33,
 entérovirus 69

Entérovirus humains A

12 sérotypes
 coxsackievirus A 2-8, 10, 12,
 14, 16,
 EV 71



Poliovirus : épidémiologie

En France : vaccination depuis 1944

- disparition de la poliomyélite en 1990
- en 1995 : dernier cas d'importation
adulte venant de Côte d'Ivoire, admis en réa pour tétraplégie et détresse respiratoire

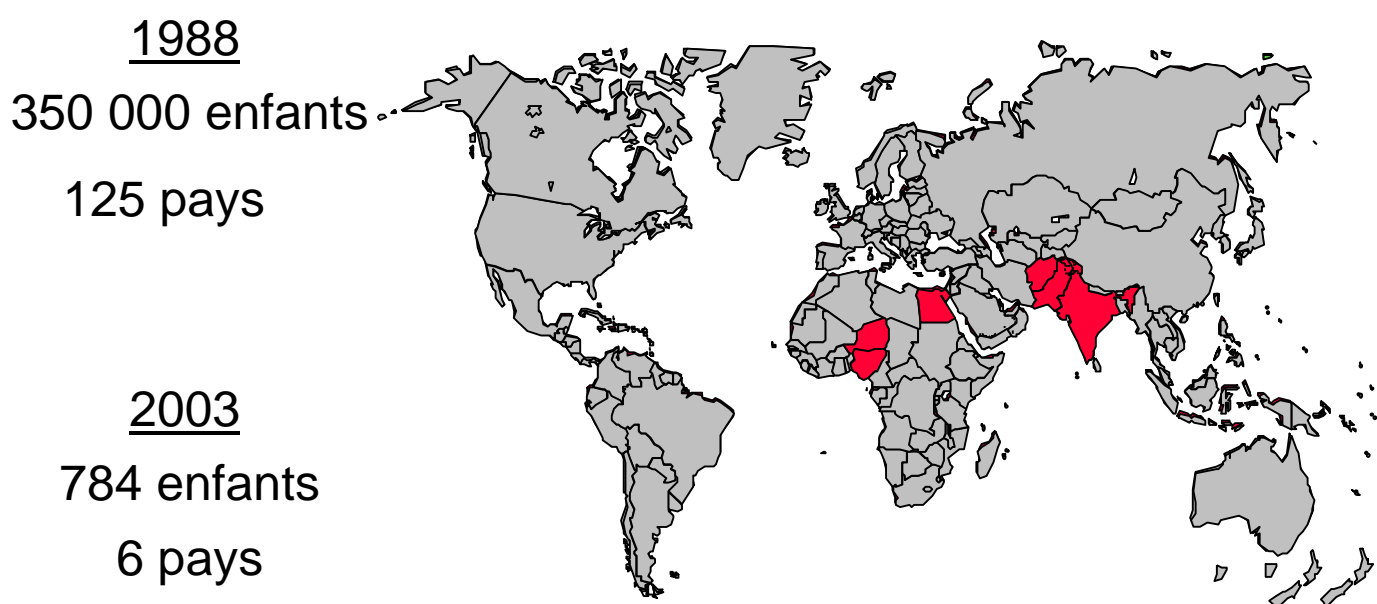
Stratégies vaccinales mondiales depuis 1975

- disparition de la maladie dans la majorité des pays
- dernier cas américain en 1991, dernier cas Européen en 1998
- 1997 cas déclarés en 2006
- en 2000 derniers cas avec un virus polio de type 2

Vaccin trivalent efficace et réservoir humain: éradication possible

- Maintenir un niveau très élevé de couverture vaccinale: **nécessité de rappels!**

Progrès de l'éradication de la poliomyélite 1988 - 2003

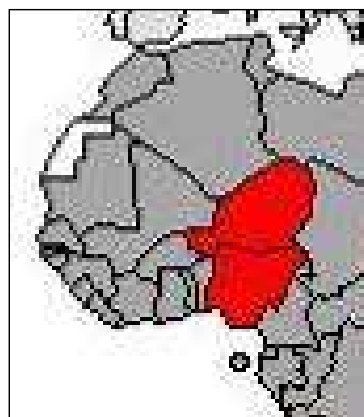


Impact des campagnes de vaccination synchronisées en Afrique

14 pays avec des Journées Nationales d'Immunisation synchronisées, 2000



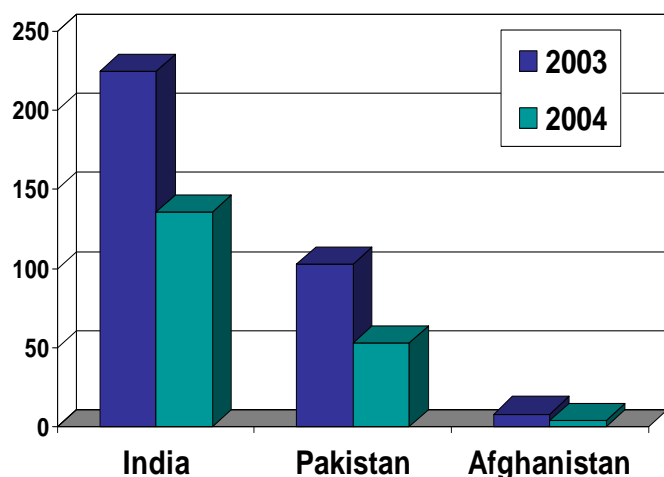
1999



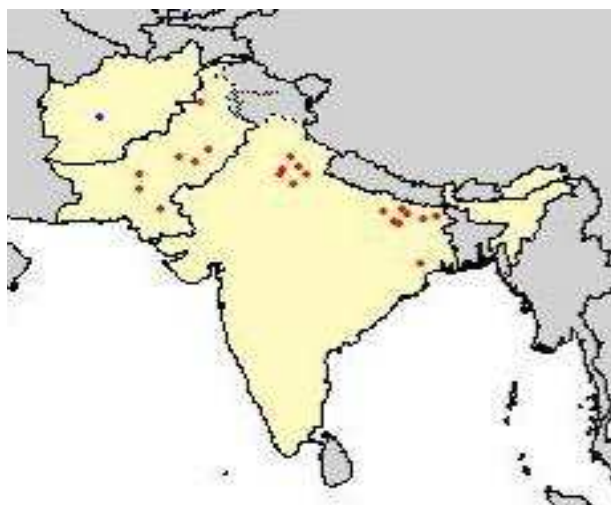
2001

Impact de l'intensification de la vaccination en Asie

Reported Polio Cases, 2003-2004



Reported Polio Cases, 2005



Perspectives d'éradication en 2003

	Wild Virus Eradication & Regional Cert. Phase	OPV Cessation & Verification Phase	'Post OPV' Phase
Priority Activities	<ul style="list-style-type: none"> • Interrupt wild virus • Contain wild viruses • Regional Certification • Develop stockpile • Enhance surveillance • Prepare to stop OPV 	<ul style="list-style-type: none"> • Stop OPV • verify no cVDPVs • integrate into <i>IHR</i> 	
Earliest Dates	2005 2006 2007 2008	2009 2010 2011	2012 2013



Mais ...

1 - Suspension de l'immunisation au Nigeria, Août 2003

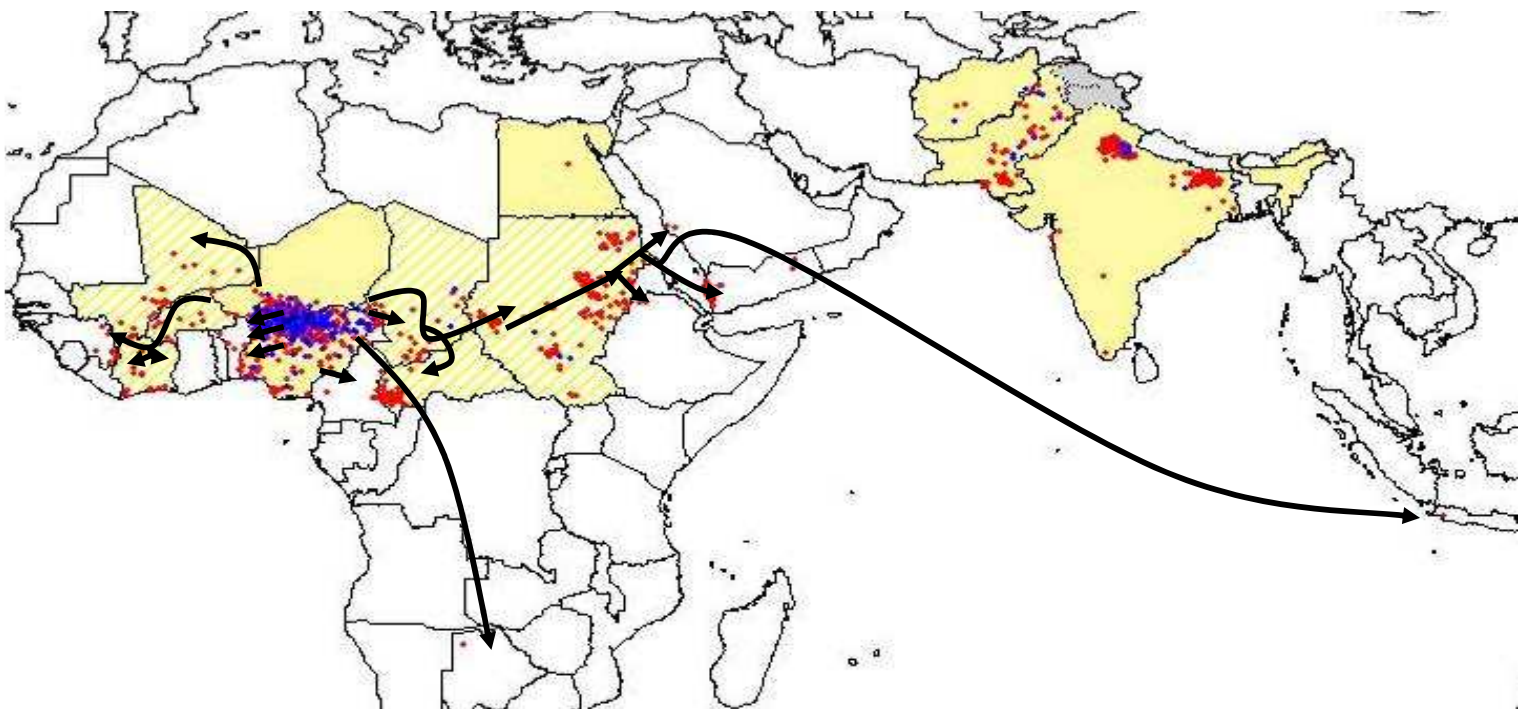
Polio Vaccines – ‘Western Countries Exploit Developing Ones’ Says Kano State Governor Shekarau



BYLINE: Daily Trust

“The Kano State governor, Malam Ibrahim Shekarau, has asserted that the people's objections to polio vaccines confirmed the exploitative actions of western nations towards developing countries.”

Recirculation du virus polio sauvage en 2004-2005

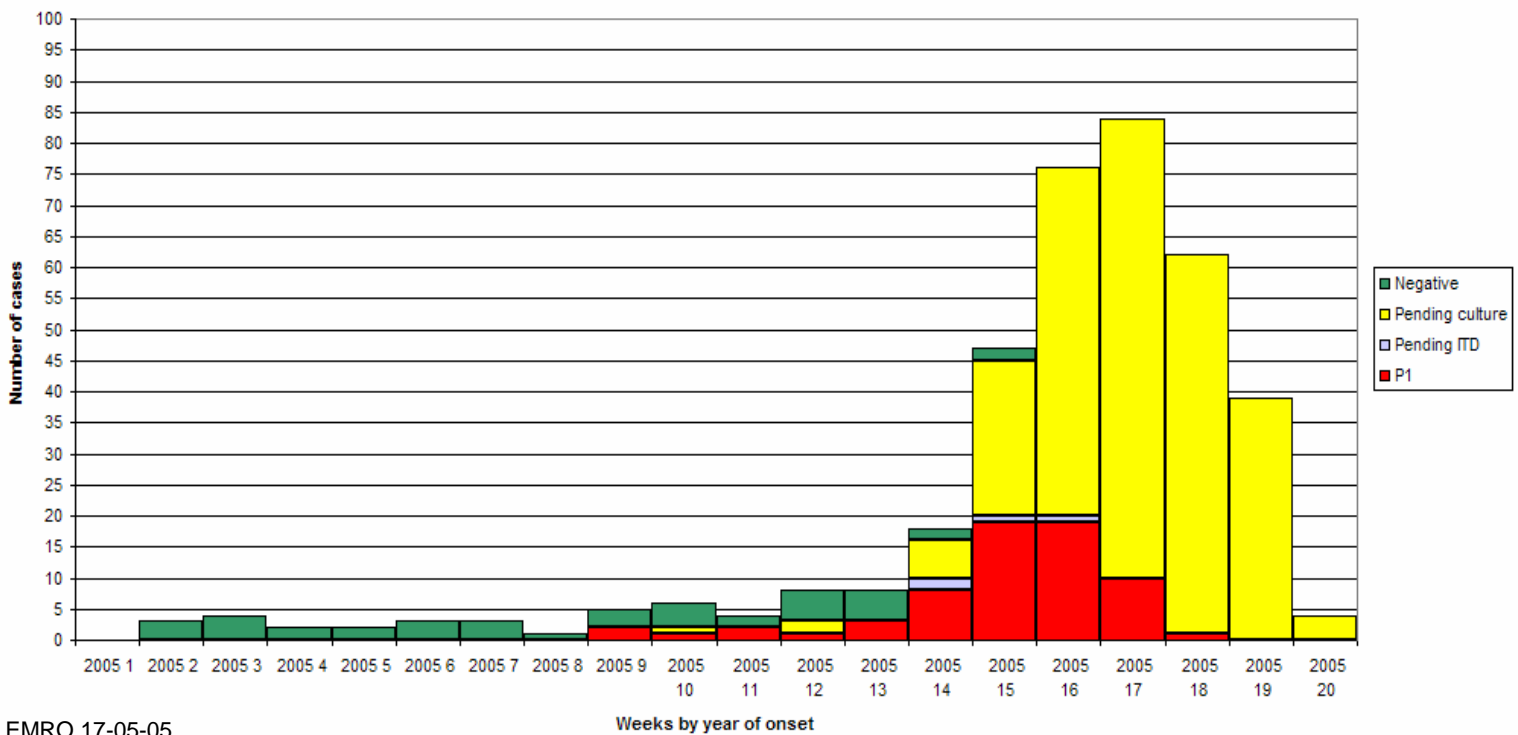


16 pays “polio-free” ont eu des importations venant du Nigeria
La transmission du virus polio a été ré-établie dans 6 pays “polio-free”

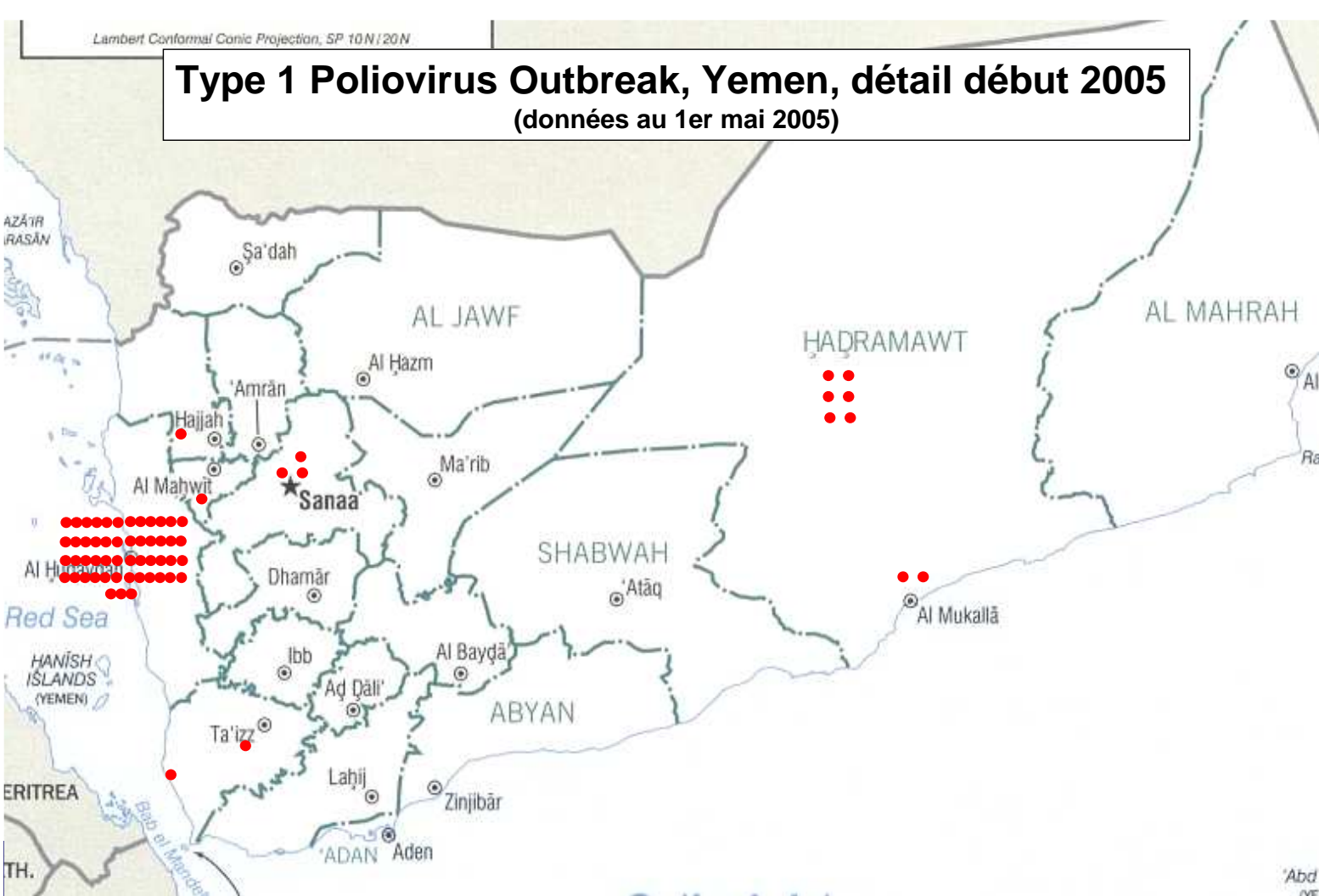
Réintroduction en Indonésie



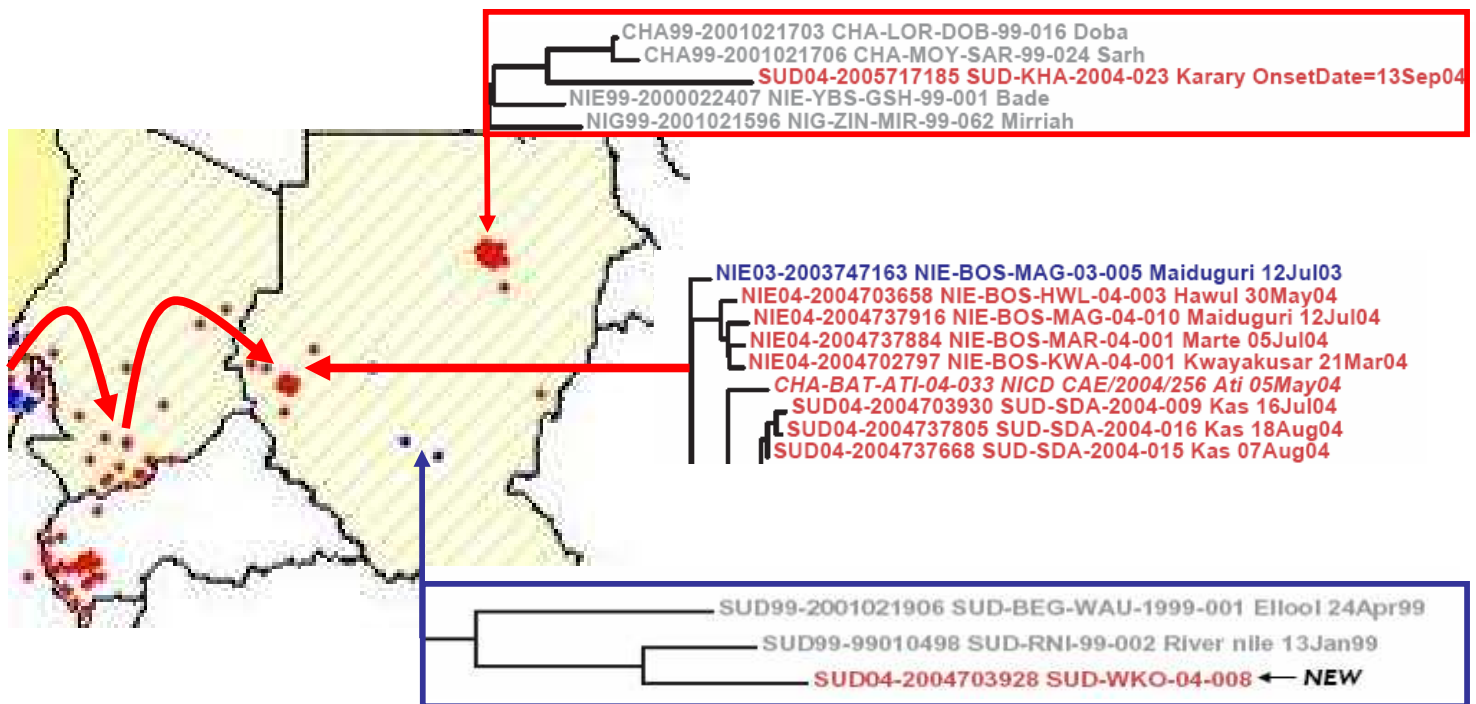
Réintroduction au Yémen, 2005

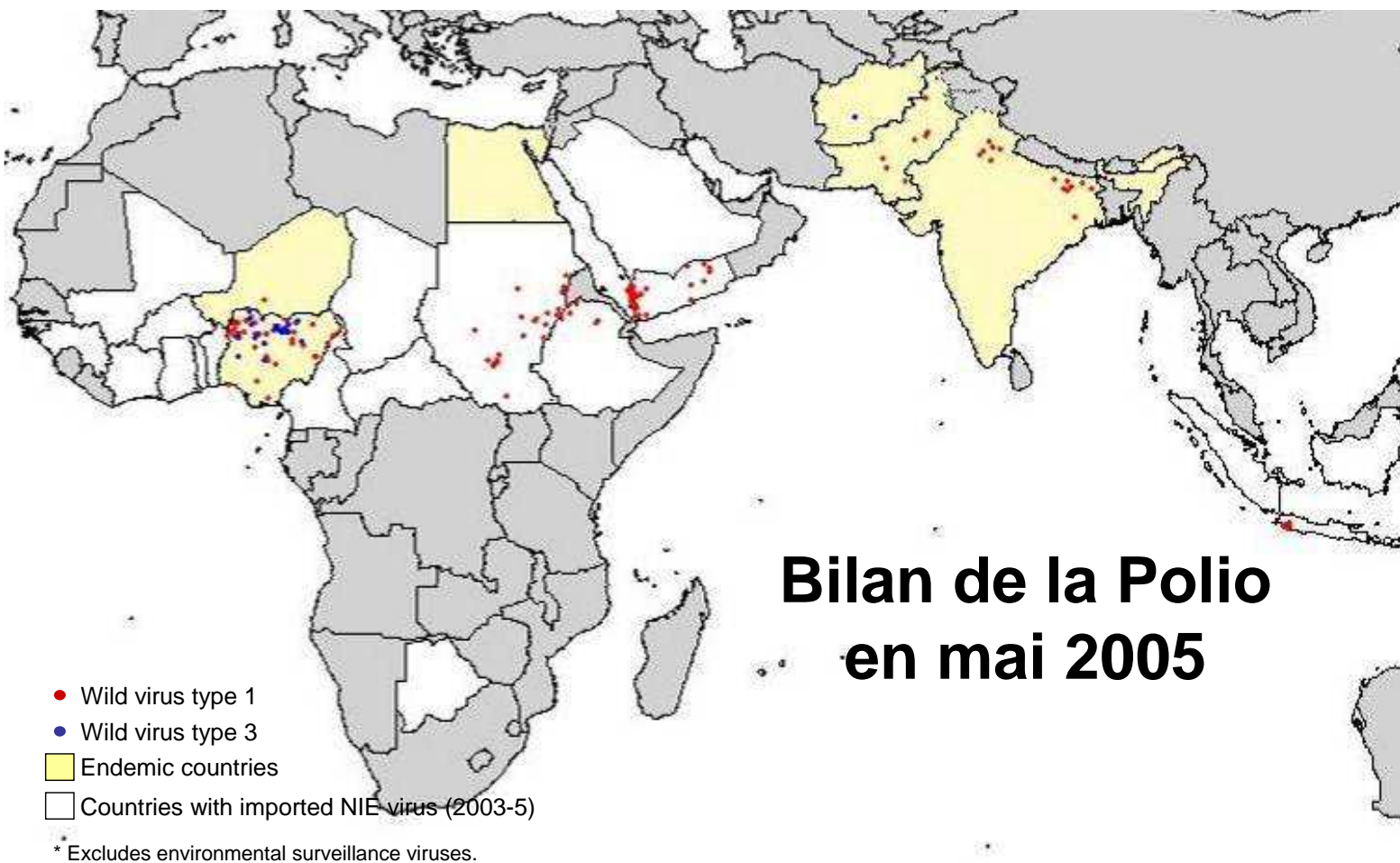


Type 1 Poliovirus Outbreak, Yemen, détail début 2005 (données au 1er mai 2005)



2 - Risques de défaut de surveillance : Des virus éliminés 'redécouverts' en 2004



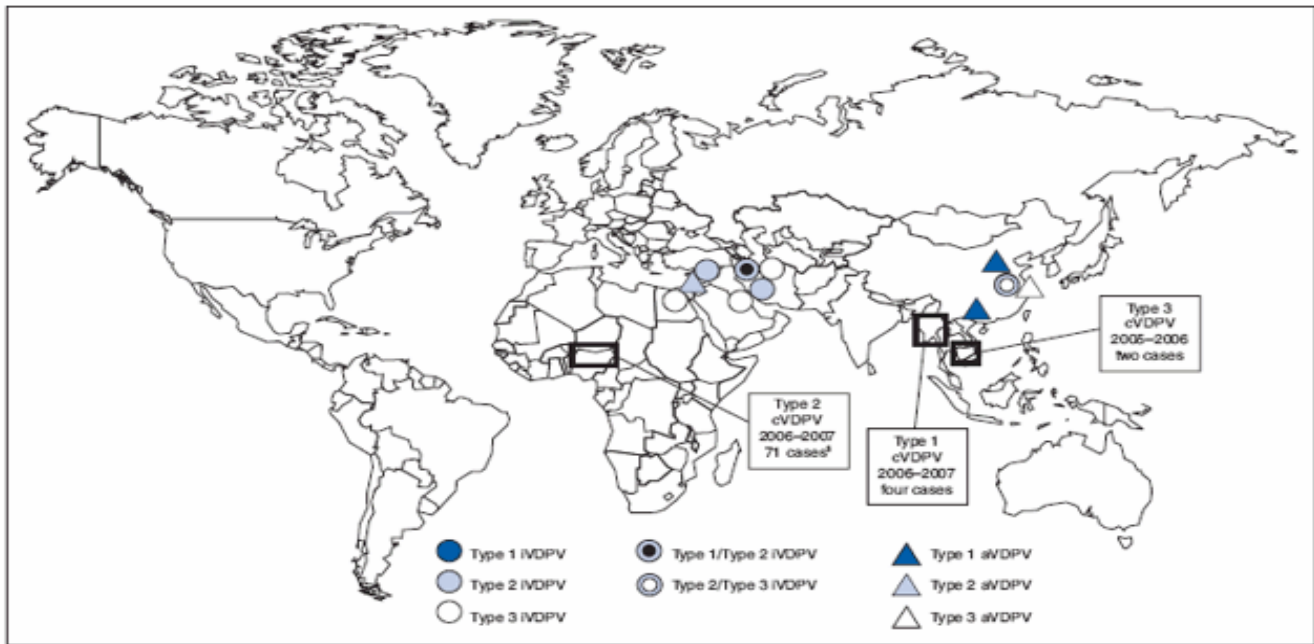


3 – L'évolution des virus polio par recombinaison génétique : les VDPVs

- Les isolats sont classés en 3 catégories en fonction de la séquence de VP1 :
 - 1) Sabin vaccine--like viruses (<1% divergent),
 - 2) VDPVs (1%--15% divergent),
 - 3a) circulating VDPVs (cVDPVs), which emerge in areas with inadequate OPV coverage;
 - 3b) immunodeficient-associated VDPVs (iVDPVs), which are isolated from persons with primary immunodeficiencies who have prolonged VDPV infections after exposure to OPV; and
 - 3c) ambiguous VDPVs (aVDPVs), which are either clinical isolates from persons with no known immunodeficiency or environmental isolates whose ultimate source has not been identified
 - 3) WPVs (>15% divergent) .

vDPV 2000-2007 : les différentes épidémies détectées

FIGURE. Locations of polio outbreaks* associated with cVDPVs, persons excreting IVPVs, and isolations of aVDPVs† — worldwide, 2005–2007

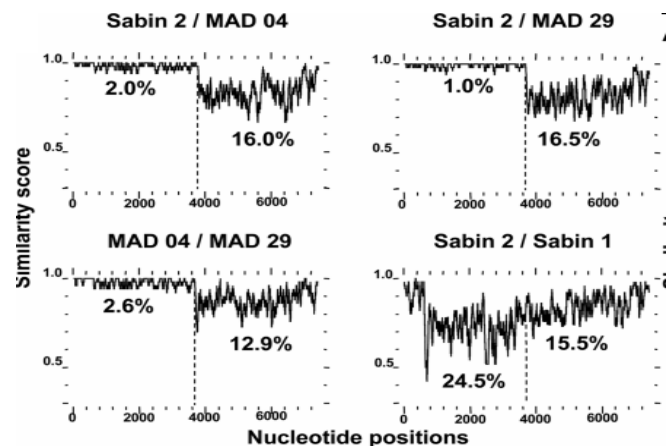
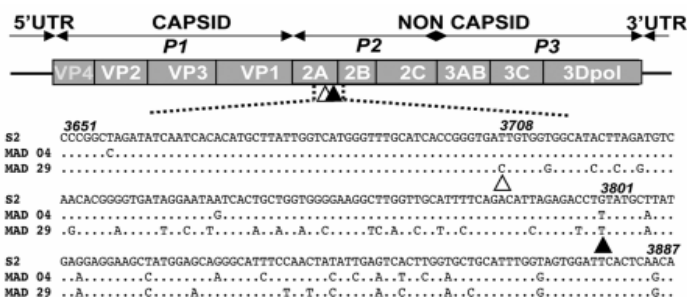


* All of the outbreaks were detected first by laboratory confirmation, using sequence data and evolutionary analyses, and followed elimination of the corresponding serotype of indigenous wild poliovirus, but with continued introduction of oral poliovirus vaccine (OPV) into communities with growing immunity gaps.

† Vaccine-derived polioviruses (VDPVs) are categorized as 1) circulating VDPVs (cVDPVs), which emerge in areas with inadequate OPV coverage; 2) immunodeficient-associated VDPVs (IVDPVs), which are isolated from persons with primary immunodeficiencies who have prolonged VDPV infections after exposure to OPV; and 3) ambiguous VDPVs (aVDPVs), which are either clinical isolates from persons with no known immunodeficiency or environmental isolates whose ultimate source has not been identified.

§ The 2006–2007 outbreak in Nigeria included 69 cases associated with type 2 cVDPVs and 24 additional cases associated with type 2 viruses that were closely related to cVDPVs. Two other cases associated with cVDPVs were imported into Niger from Nigeria.

Exemple de caractéristiques génétiques des isolats vDPV détectés à Madagascar



Virulence des souches vDPV

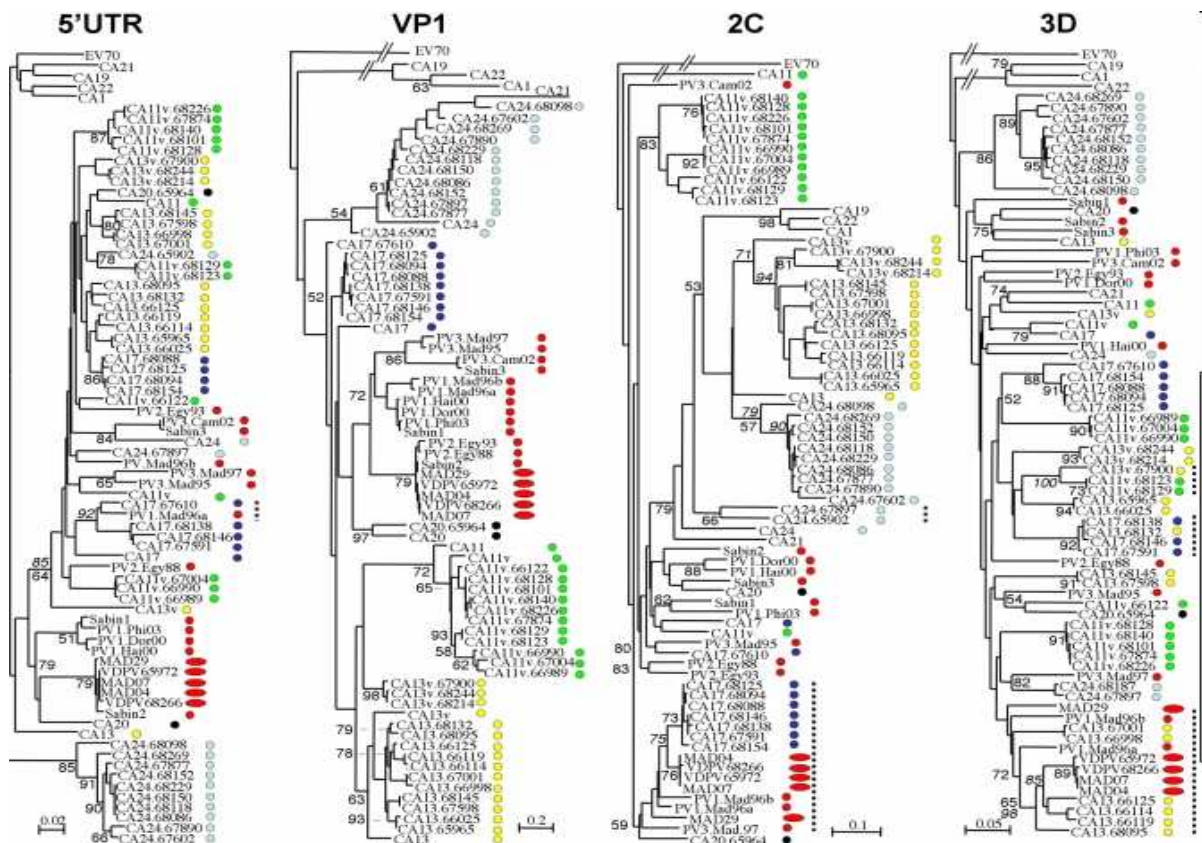
Virus Strain	Plaque Sizes ^a , mm	RCT $\Delta \log_{10}$ TCID ₅₀ /ml (36.0 °C – 40.2 °C)	Paralytic Dose 50' (log ₁₀ TCID ₅₀ /Mouse)
Sabin 2	0.5 (0.2)	4.2	> 6.6
52/4568	1.1 (0.4)	0.9	< 3.3
MAD 04	2.2 (0.6)	0.0	3.5
MAD 05	1.8 (0.6)	0.3	ND ^b
MAD 06	1.8 (0.7)	0.5	ND
MAD 07	0.9 (0.4)	0.9	ND
MAD 29	2.2 (1.1)	1.3	4.6

^aMean plaque diameters (mm) following incubation at 34 °C for 72 h on HEp-2c cells are indicated; the standard deviation is shown in brackets.

^bND: not done.

doi:10.1371/journal.ppat.0030191.t003

Phylogenetic Trees Depicting Genetic Relationships between Nucleotide Sequences of Enteroviruses of the HEV-C Species



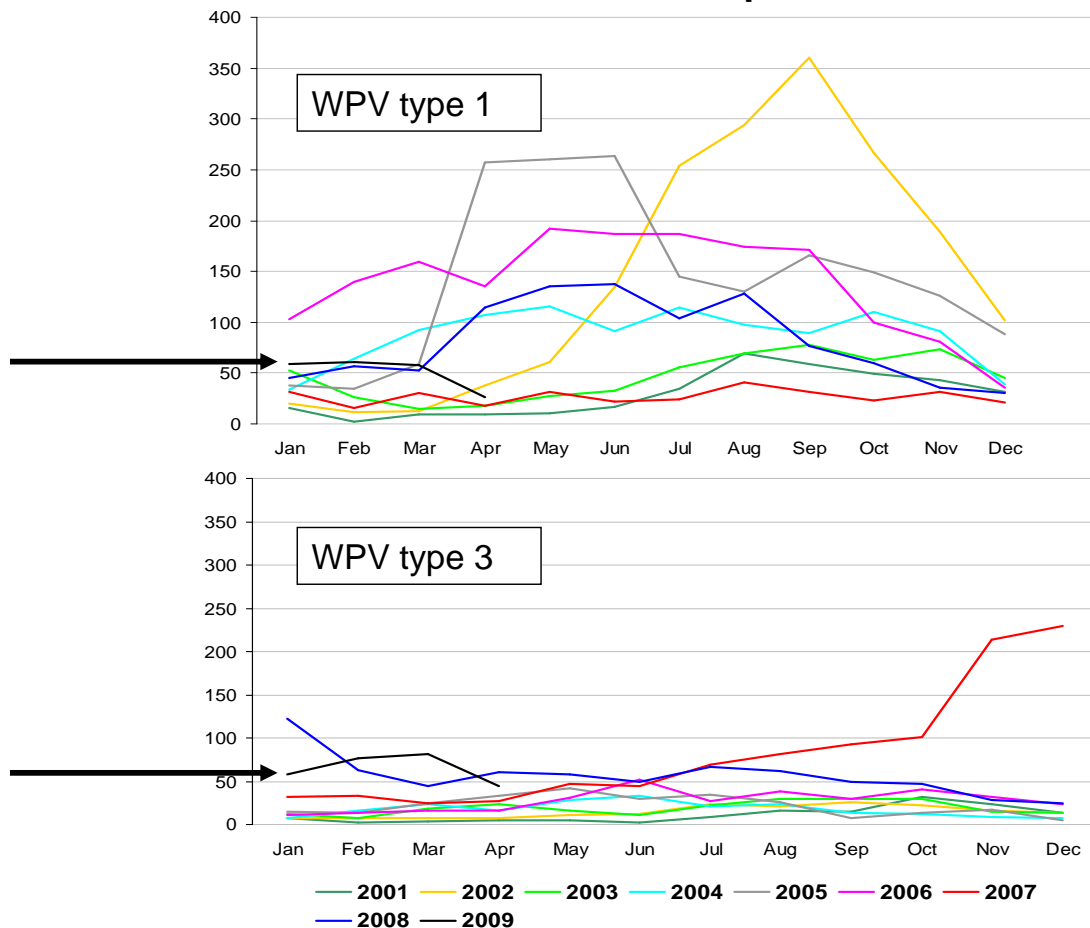
Et aujourd'hui?

- Réduction ou pas?.
- Nigéria OK ou pas.
- Ré-émergence ou nouvelles introductions ou pas?
- VDPV ou pas?
- Des sous ou pas?.

May 2005

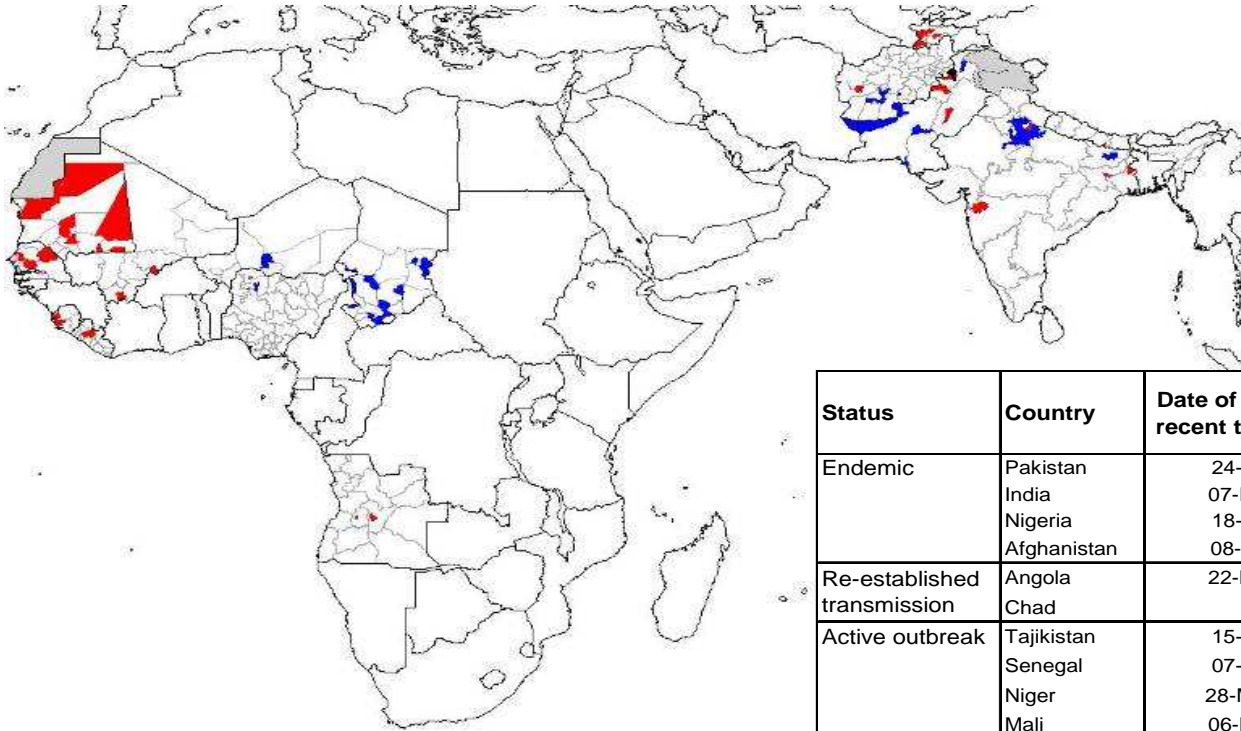
Polio Eradication Initiative 25

Distribution mensuelle des cas de polio de 2001 a 2009



Data in WHO/HQ as of 26 May 2009. WPV type 1 includes 1 case in 2009, 1 case in 2008, 3 cases in 2007, 2 cases in 2006, 3 cases in 2005, 2004, 2002 and 4 cases in 2001 with a mixture of W1W3 virus. For 2009, cases with onset in May will be reflected end of June

Wild Poliovirus infected districts*, 12 Nov 2009 – 11 May 2010



- District infected with wild polio virus type 1
- District infected with wild polio virus type 3
- District infected with more than one type of wild poliovirus

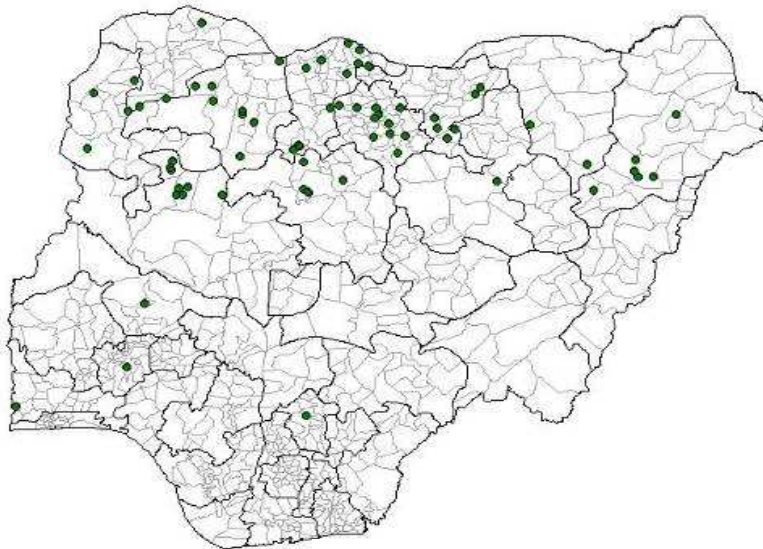
*Excludes viruses detected from environmental surveillance and vaccine derived polioviruses. 1 WPV1 in Jammu and Kashmir, date of onset of 07 Feb 2010, does not appear on the map.

Status	Country	Date of most recent type 1	Date of most recent type 3
Endemic	Pakistan	24-Apr-10	16-Apr-10
	India	07-Feb-10	21-Apr-10
	Nigeria	18-Apr-10	12-Mar-10
	Afghanistan	08-Jan-10	08-Apr-10
Re-established transmission	Angola	22-Mar-10	NA
	Chad	NA	16-Mar-10
Active outbreak	Tajikistan	15-Apr-10	NA
	Senegal	07-Apr-10	NA
	Niger	28-May-09	01-Apr-10
	Mali	06-Mar-10	NA
	Liberia	03-Mar-10	NA
	Sierra Leone	28-Feb-10	NA
	Mauritania	22-Feb-10	NA
Nepal	19-Feb-10	NA	

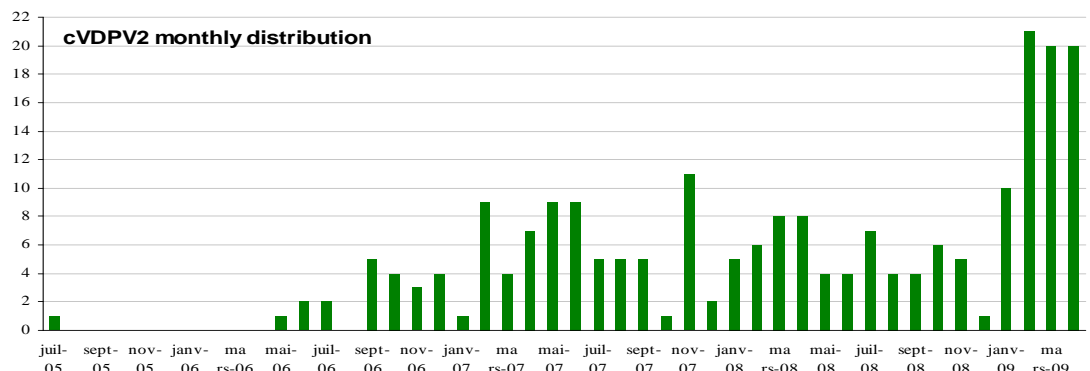
NA. Date of onset is prior to rolling 6-month period

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.
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Circulating Vaccine-derived Polioviruses in Nigeria, 2009



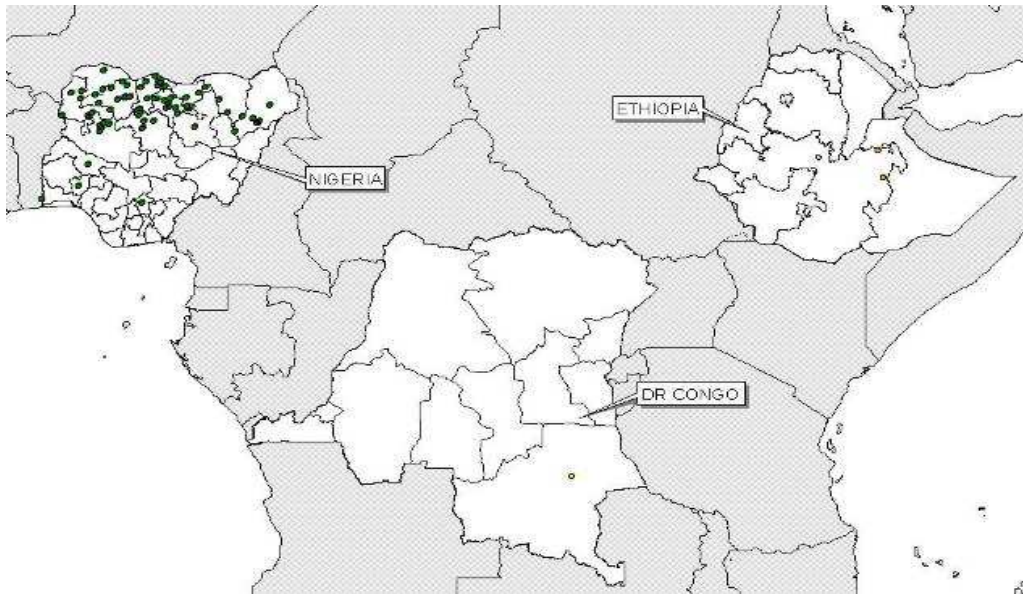
● cVDPV2 (71 cases)



dots are randomly placed within districts

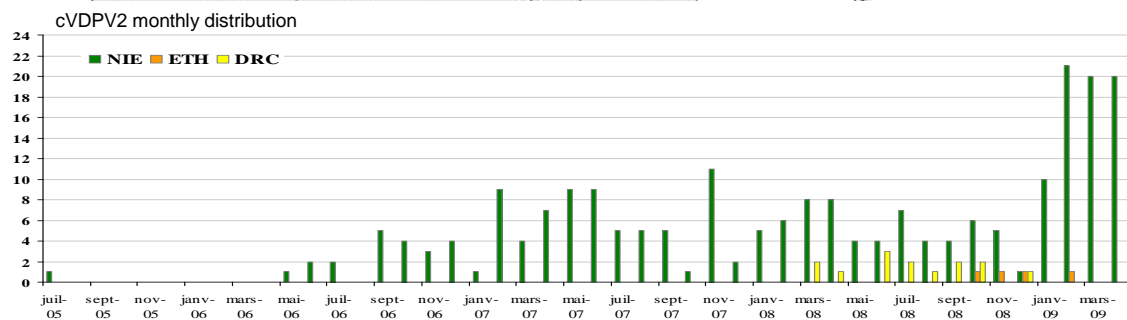
Data in WHO HQ as of 26 May 2009

Circulating Vaccine-derived Polioviruses



Rolling 6 months
27 Nov 2008 – 26 May 2009

- NIE - cVDPV2 (73 cases)
- DRC - cVDPV2 (1 case)
- ETH - cVDPV2 (2 cases)



Data in WHO/HQ as of 26 May 2009

Restons optimistes !