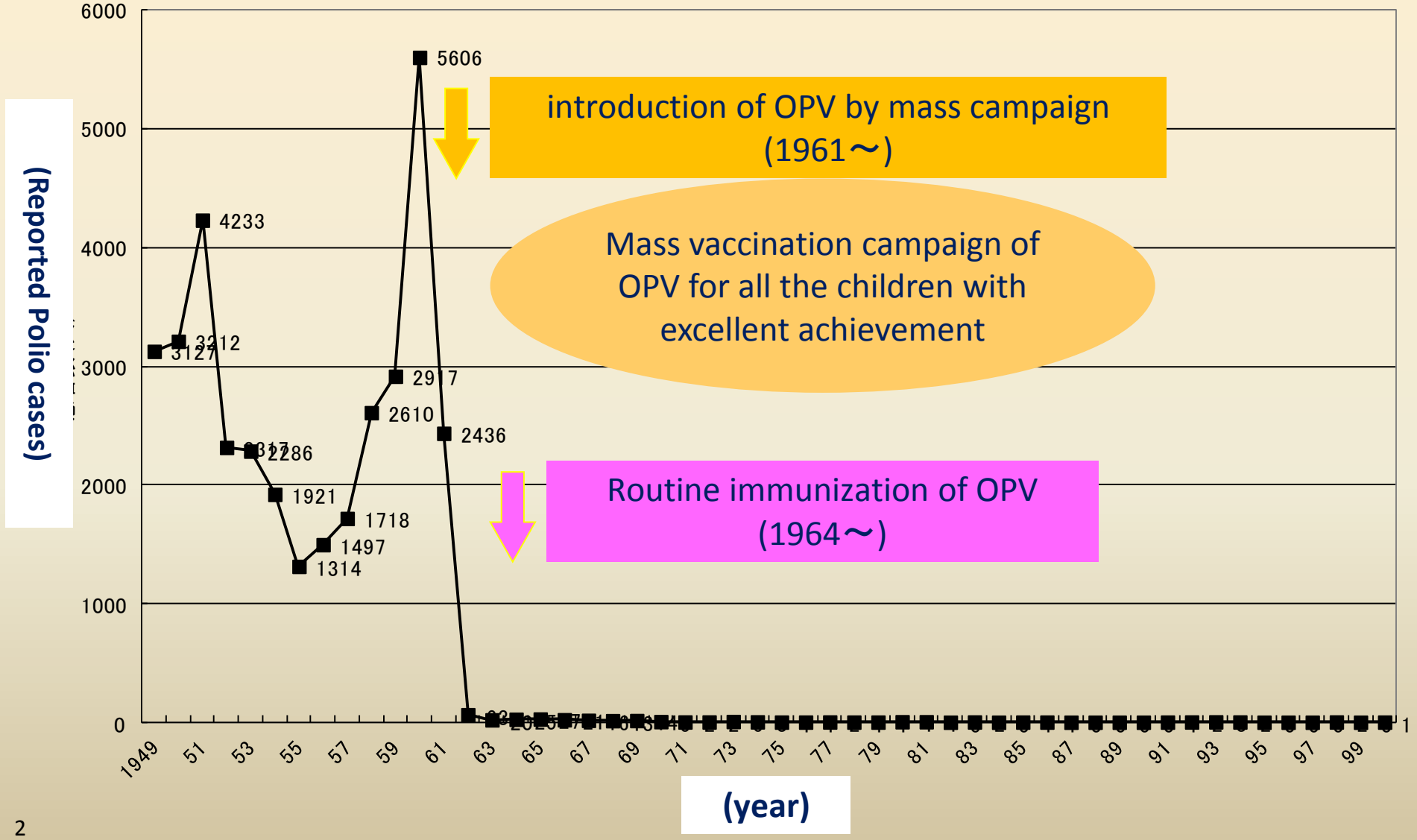
“Asian Pacific Vaccinology Meeting 2015”
30 November – 3 December in Bangkok, Thailand

Two IPVs in Japan
- Salk vs. Sabin

December 2 , 2015

Takashi Nakano, MD. PhD.
Dep. of Pediatrics, Kawasaki Medical School, Japan

History of OPV and reported polio cases in Japan



OPV ⇒ IPV

Between 1960's and 1990's, Sabin live vaccine largely replaced Salk killed vaccine everywhere in the world.

However, because the live virus in the vaccine occasionally became strong enough to cause actual disease, Salk killed-type vaccine has replaced the live type in the United States, and also other countries.

Source：Smithsonian
National Museum of American History
http://amhistory.si.edu/polio/virusvaccine/vacraces.htm

Milestone of the introduction of IPV in Japan

Year	IPV			OPV
	cIPV	Standalone sIPV	DTaP-sIPV	
1958	Pilot production of Salk cIPV			
1960	Large-scale production of cIPV			Japan Live Poliovaccine Research Commission established
1961	Introduction of cIPV for routine immunization			Importation of tOPV from USSR and Canada for mass immunization campaign
1962～1963				Mass immunization campaigns with imported mOPV and bOPV
1964				Introduction of domestic tOPV for routine immunization
late 1970s		sIPV development initiated by JPRI		
1998		Clinical studies of sIPV launched by JPRI		
2001		Applied sIPV for manufacturing by JPRI		
2002			DTaP-sIPV development started by domestic manufactures	
2005		Withdrew sIPV application due to GCP problems		
2010			Call for urgent development of IPV by MHLW	
2011	Clinical studies of cIPV launched by Sanofi Pasteur			
2012	Standalone cIPV introduced for routine immunization		Two DTaP-sIPV products introduced for routine immunization	Withdrew from routine immunization
2014	DTaP-cIPV approved for manufacturing			
2015	DTaP-cIPV product will be introduced for routine immunization			

(Shimizu H, et al, 21th Regional Commission for the Certification of Poliomyelitis Eradication in the Western Pacific. Nov 2015, Japan)

How many doses of polio vaccine totally ?
- from OPV to IPV transitional period -

- **OPV 2 dose in the past**

  ⇒ already completed

- **Starting with IPV**

  ⇒ 4 doses of IPV

- **OPV 1 dose in the past**

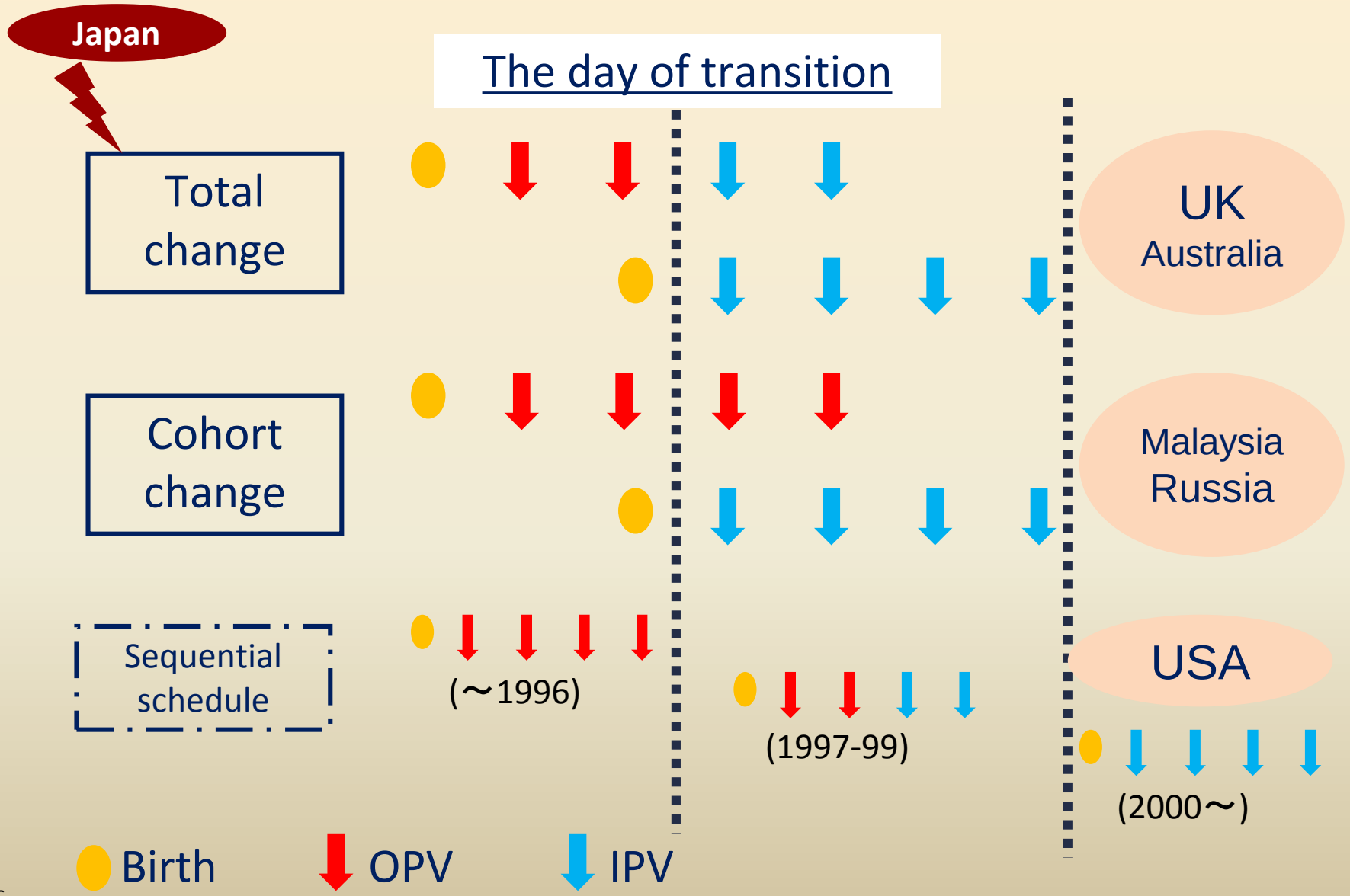
  ⇒ additional 3 doses of IPV

  (4 doses of polio vaccine, totally)

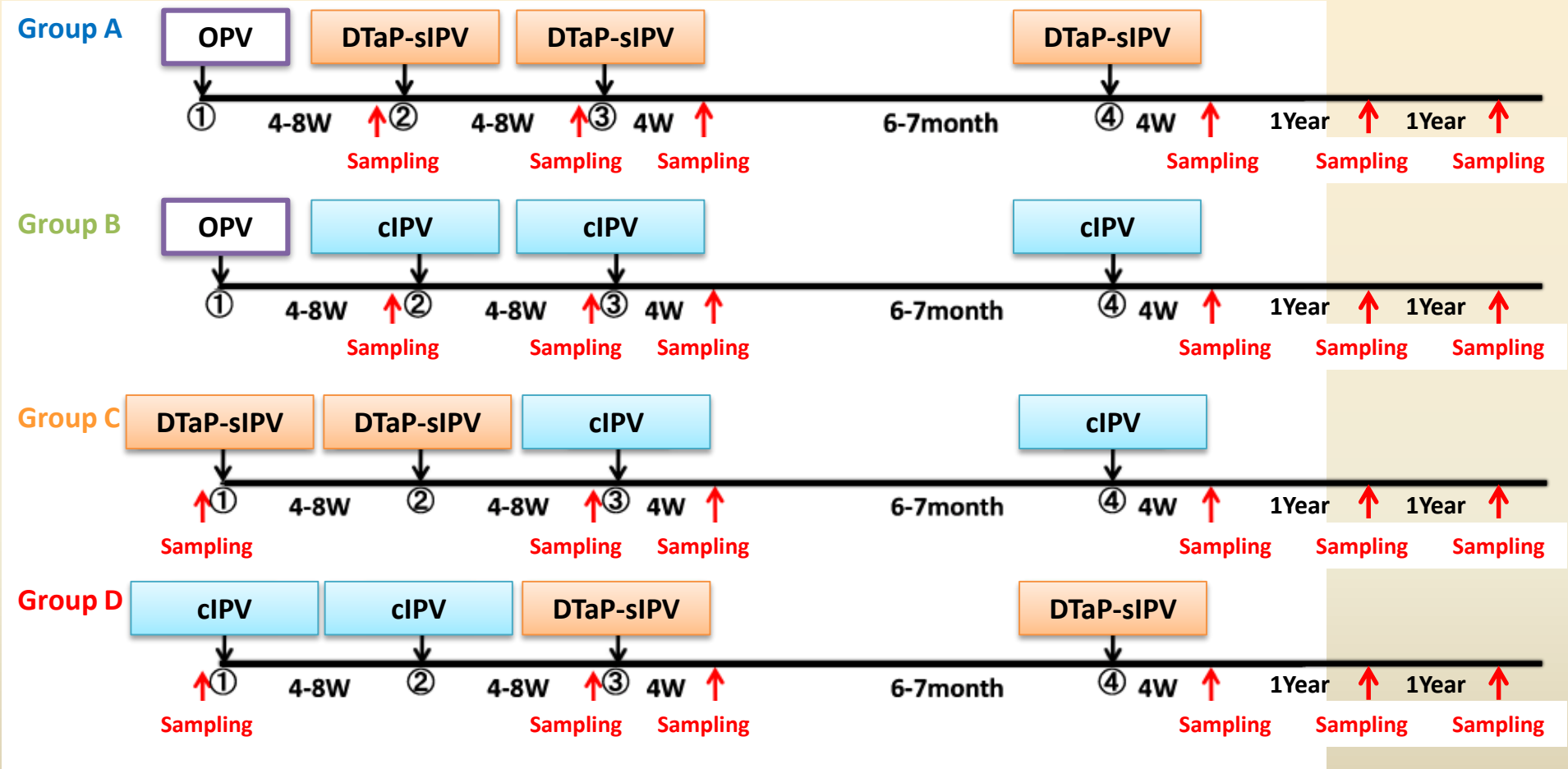
  ∗ when final dose vaccination?

  ⇒ 6 months interval after 3rd

Two types of method for transition from OPV to IPV

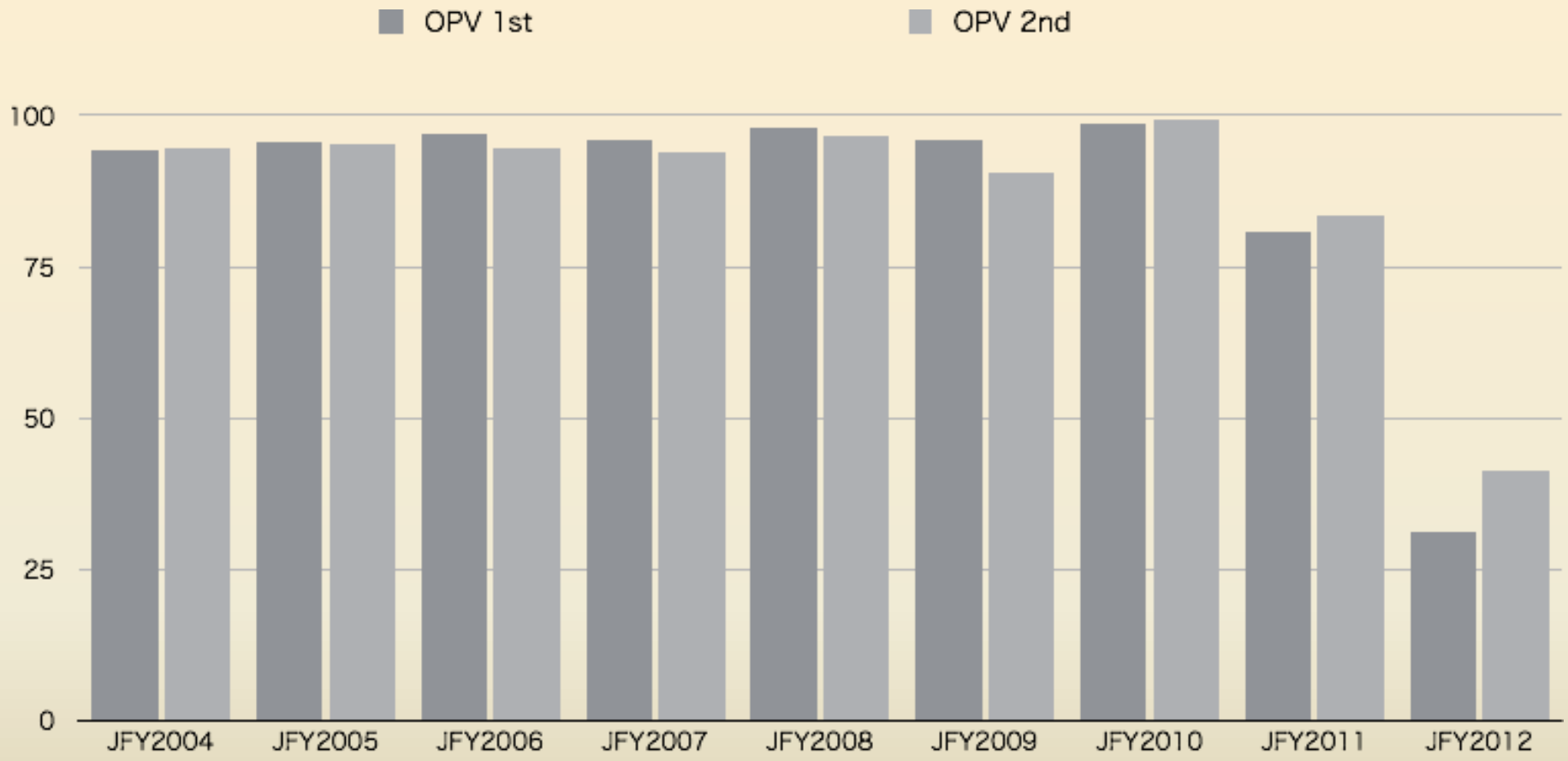


Interchangeability in different polio vaccines



Created based upon data from the Research Group of Analytical Epidemiologic Study on the Effectiveness and Safety of Vaccines (Principal Investigator: Dr.Yoshio Hirota) , organized by the Ministry of Health, Labor and Welfare, Japan.

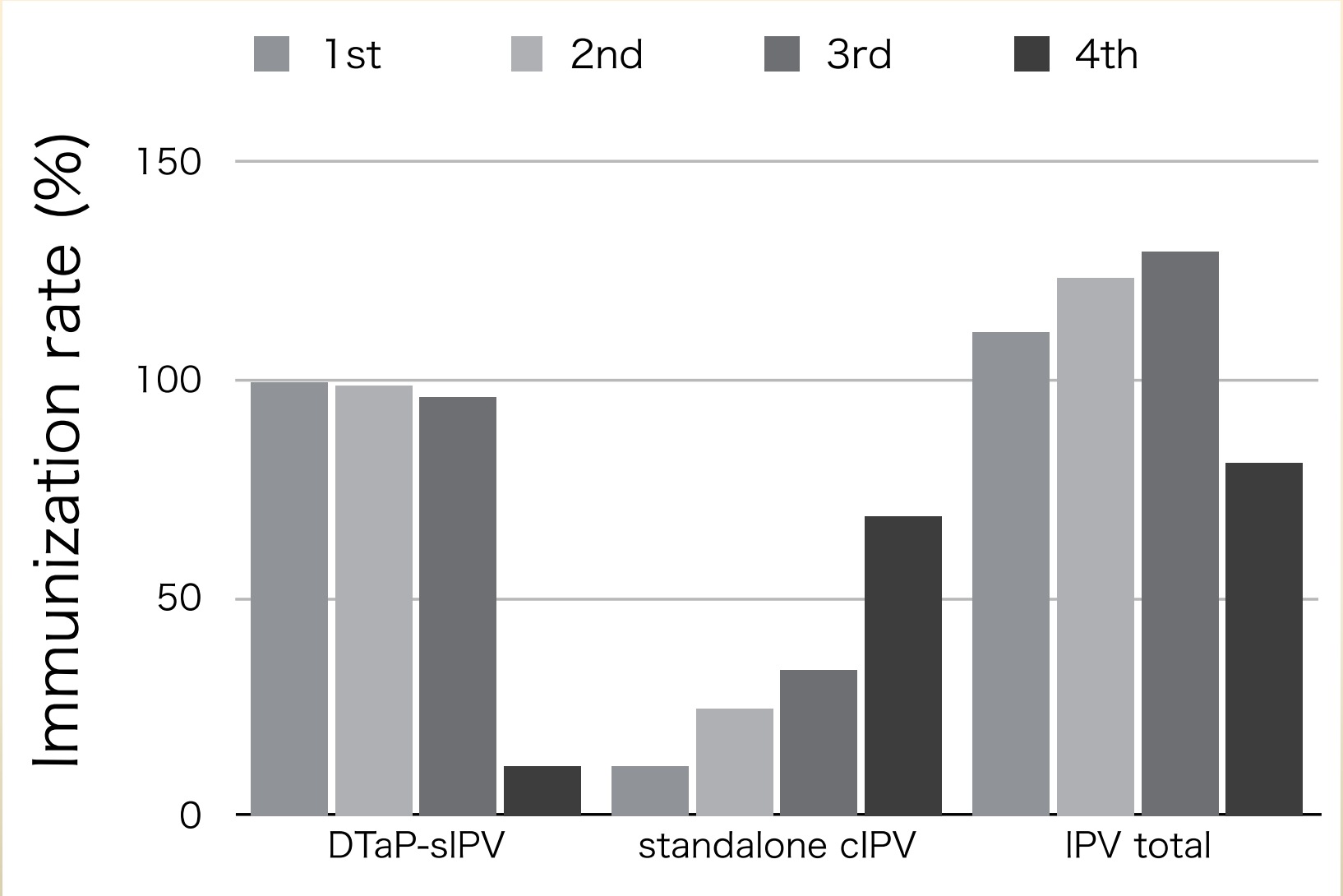
Routine OPV immunization coverage (Nationwide survey, JFY2004 - 2012)



MHWL. Routine OPV immunization rates. 2012. http://www.mhlw.go.jp/file/05-Shingikai-10601000-Daijinkanboukouseikagakuka-Kouseikagakuka/0000051457.pdf.

(Shimizu H, et al, 21th Regional Commission for the Certification of Poliomyelitis Eradication in the Western Pacific. Nov 2015, Japan)

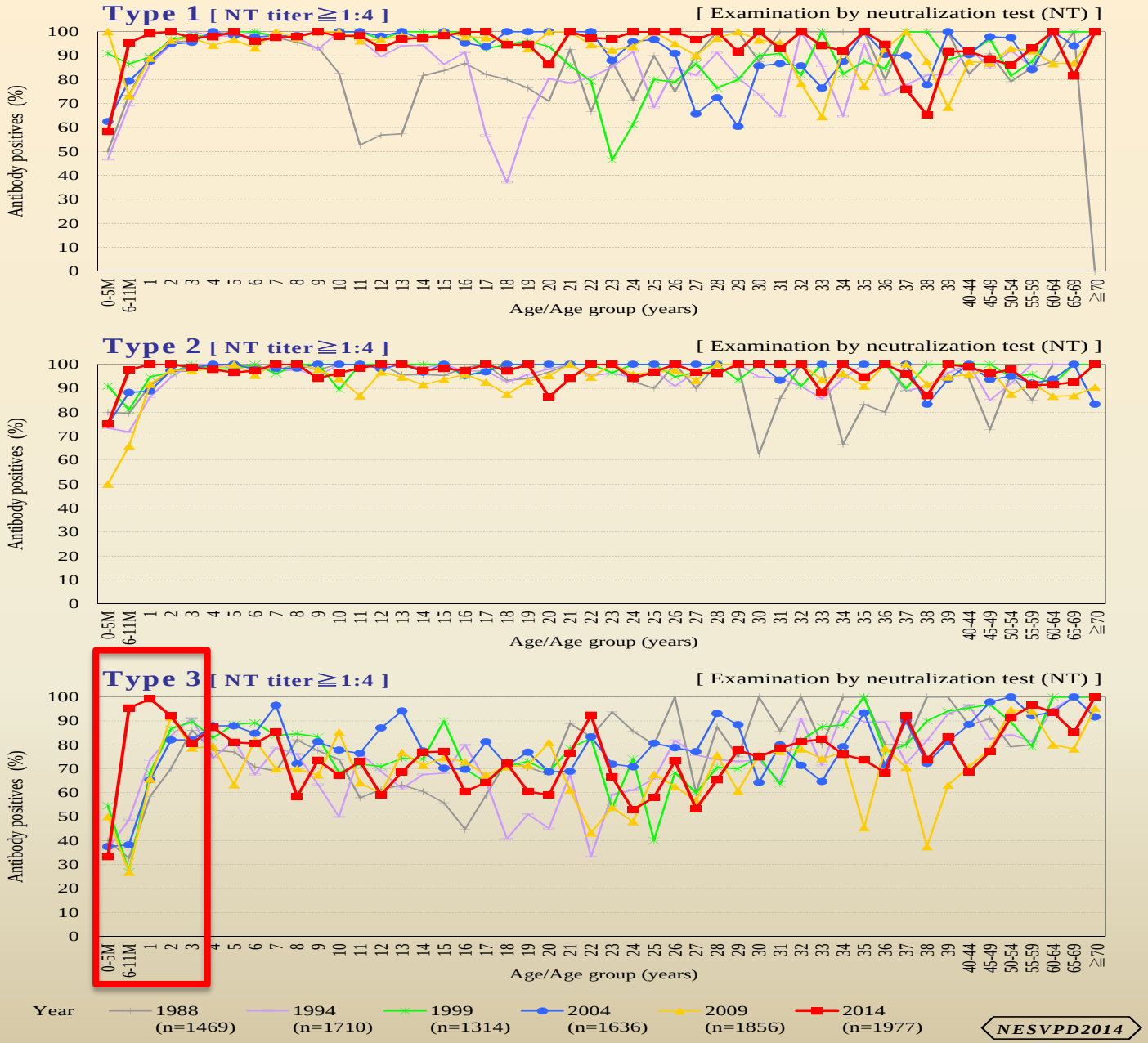
Immunization rates for different poliovirus vaccines in 2013



MHWL. Routine polio immunization rates, 2013

(Shimizu H, et al, 21th Regional Commission for the Certification of Poliomyelitis Eradication in the Western Pacific. Nov 2015, Japan)

Seroprevalence in different survey years, 1988～2014



 (Shimizu H, et al, 21th Regional Commission for the Certification of Poliomyelitis Eradication in the Western Pacific. Nov 2015, Japan)

IPV products in Japan

Product (Brand name)	Vaccine: Antigen	IPV antigen content/ dose (D antigen unit; DU)	Manufacture	Status
IMOVAX POLIO subcutaneous	cIPV	Type 1: 40 cDU Type 2: 8 cDU Type 3: 32 cDU	Sanofi K.K	Application submitted (Feb 23, 2012) Approved for manufacturing (Apr 27, 2012) Introduced for routine immunization (Sept 1, 2012)
Quattrovac Subcutaneous Injection Syringe	DTaP-sIPV	Type 1: 1.5 sDU Type 2: 50 sDU Type 3: 50 sDU	Kaketsuken	Application submitted (Jan 27, 2012) Approved for manufacturing (July 27, 2012) Introduced for routine immunization (Nov 1, 2012)
Tetrabik Subcutaneous Injection Syringe	DTaP-sIPV	Type 1: 1.5 sDU Type 2: 50 sDU Type 3: 50 sDU	Biken	Application submitted (Dec 27, 2011) Approved for manufacturing (July 27, 2012) Introduced for routine immunization (Nov 1, 2012)
Squarekids Subcutaneous Injection Syringe	DTaP-cIPV	Type 1: 40 cDU Type 2: 8 cDU Type 3: 32 cDU	Kitasato	Application submitted (Feb 20, 2013) Approved for manufacturing (July 4, 2014) Introduce for routine immunization (Dec 14, 2015)
	DTaP-sIPV		Takeda	**Dec 9** Withdraw

Note: cIPV: conventional inactivated poliovirus vaccine, cDU: D-antigen unit for cIPV, sIPV: Sabin-derived inactivated poliovirus vaccine, sDU: D-antigen unit for sIPV, DTaP-sIPV: sIPV-containing diphtheria–tetanus–acellular pertussis combination vaccine, DTaP-cIPV: cIPV-containing diphtheria–tetanus–acellular pertussis combination vaccine, Kaketsuken: Chemo-Sero-Therapeutic Research Institute, Biken: Research Foundation for Microbial Diseases of Osaka University, Kitasato: Kitasato Daiichi Sankyo Vaccine Co., Ltd., and Takeda: Takeda Pharmaceutical Company Limited.

(Shimizu H, et al, 21th Regional Commission for the Certification of Poliomyelitis Eradication in the Western Pacific. Nov 2015, Japan)

The 14th Conference of the International Society of Travel Medicine
Quebec City, Canada, 24-28 May 2015

Immunogenicity of booster doses of the inactivated polio vaccine(cIPV) among Japanese adult travelers

Shinji Fukushima[1], Takashi Nakano[2], Hiroyuki Shimizu[3], Atsuo Hamada[1]

1) Travelers' Medical Center, Tokyo Medical University Hospital , Tokyo, Japan
2) Department of Pediatrics, Kawasaki Medical University , Okayama, Japan
3) Department of Virology II, National Institute of Infectious Diseases , Tokyo, Japan

Background

- ✓ A booster dose(s) of polio vaccine is recommended for adult travelers to polio-endemic or high-risk areas.
- ✓ According to the recommendation by WHO, one dose is given for adults who have previously received three or more doses of OPV or IPV.
- ✓ However, Japanese immunization program has been two doses of OPV, before the IPV introduction in Japan for routine immunization in 2012.
- ✓ Therefore, it is necessary to determine how many booster doses of IPV are required for Japanese adult travelers who have previously received OPV.

(Fukushima S, Nakano T, Shimizu H, et al, The 14th Conference of the International Society of Travel Medicine, Canada, 2015)

Methods

【Study Period】June 2011 ～ May 2013

【Subjects】Japanese healthy adults (≧20 years)

【Protocol】

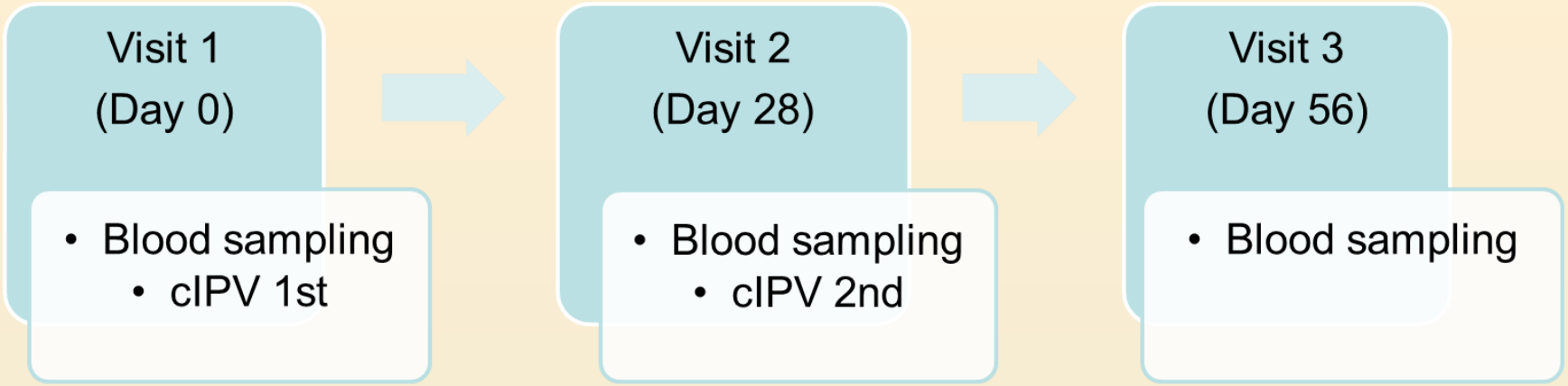
Imovax Polio (Sanofi Pasteur) was administered at Day 0 and 28.

【Serological Methods】

・Serum neutralizing (NT) antibody titers were evaluated before the first booster dose and 28 days after each dose.

・Serum NT titers were measured against Sabin 1, Sabin 2, Sabin 3, Mahoney, MEF-1, Saukett, and type 2 vaccine-derived poliovirus (VDPV) isolated in Vietnam and Nigeria (SV3128, SV3130, 11196, 11198).

(Fukushima S, Nakano T, Shimizu H, et al, The 14th Conference of the International Society of Travel Medicine, Canada, 2015)



Sabin strains	Sabin 1, Sabin 2, Sabin 3
Wild poliovirus reference strains (cIPV antigens)	Mahoney, MEF-1, Saukett
Type2 Vaccine-derived poliovirus (VDPV) (Vietnam)	SV3128, SV3130
Type2 Vaccine-derived poliovirus (VDPV) (Nigeria)	11196, 11198

(Fukushima S, Nakano T, Shimizu H, et al, The 14th Conference of the International Society of Travel Medicine, Canada, 2015)

Acknowledgment

Thank you for your attention!

We greatly appreciate Prof. Yoshio Hirota, Dr. Hiroyuki Shimizu, Dr. Shinji Fukushima, and all members for contributing to these studies and providing helpful advice.