Agenda

1:30	**John Modlin MD Dartmouth Medical School Lebanon, NH**	**Introduction**
1:40	**Tapani Hovi MD PhD National Public Health Institute Helsinki, Finland**	**Transmission of Polioviruses in IPV Immunized Populations**
1:50	**Neal Halsey MD Johns Hopkins University Baltimore, MD**	**Immunogenicity and Efficacy in Developing Nations**
2:00	**Emmanuel Vidor MD MSc DTMH Sanofi Pasteur Lyon, France**	**Review of Ongoing IPV Studies in Developing Nations and Comment on the Requirements for Vaccine Manufacturers to Produce IPV for Developing Nations in a Cost-Effective Manner**
2:10	**Dr. Lalit Kant Indian Council of Medical Research New Delhi, India**	**Update on India IPV Meeting, August, 2007**
2:20	**Open Discussion**	

Formulation of Inactivated Poliovirus Vaccines (IPV)

- Prepared by inactivation of wild-type poliovirus seed strains by Salk method:
  - 1:1000 formalin treatment for 12 to 14 days at 37°C
- Potency varied until minimum standards set in 1967
- New techniques in virus cultivation led to production of enhanced-potency inactivated vaccines, first introduced in 1970s and licensed in U.S. in 1987

Relative Potency of IPV Formulations Available in the U.S. Pre and Post 1987

Virus Type	IPV Pre 1987	IPV (enhanced-potency) Post 1987
1	20*	40
2	2	8
3	4	32

* D-antigen units

Assessment of IPV Immunity

- Primary Immunity Against Disease
  - Seroconversion and serum NT antibody titer
  - Efficacy against poliomyelitis
- Secondary Immunity Against Re-Infection and Transmission
  - Epidemiologic observations in IPV vaccinated populations
  - Field studies during wild poliovirus outbreaks
  - Mucosal immunity
    - Presence of secretory antibody at mucosal surfaces
    - Challenge studies

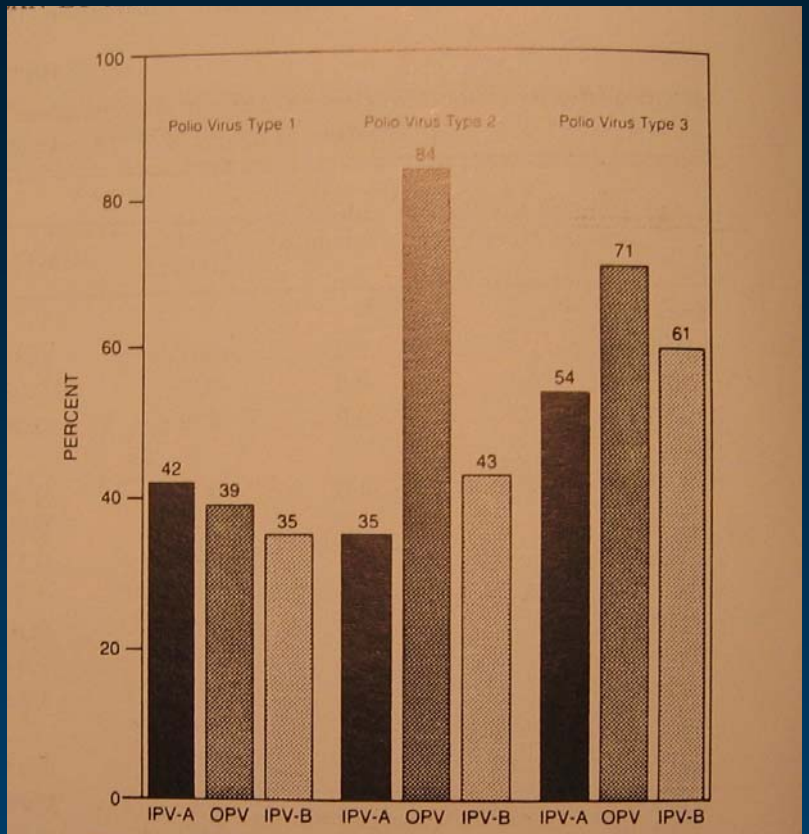


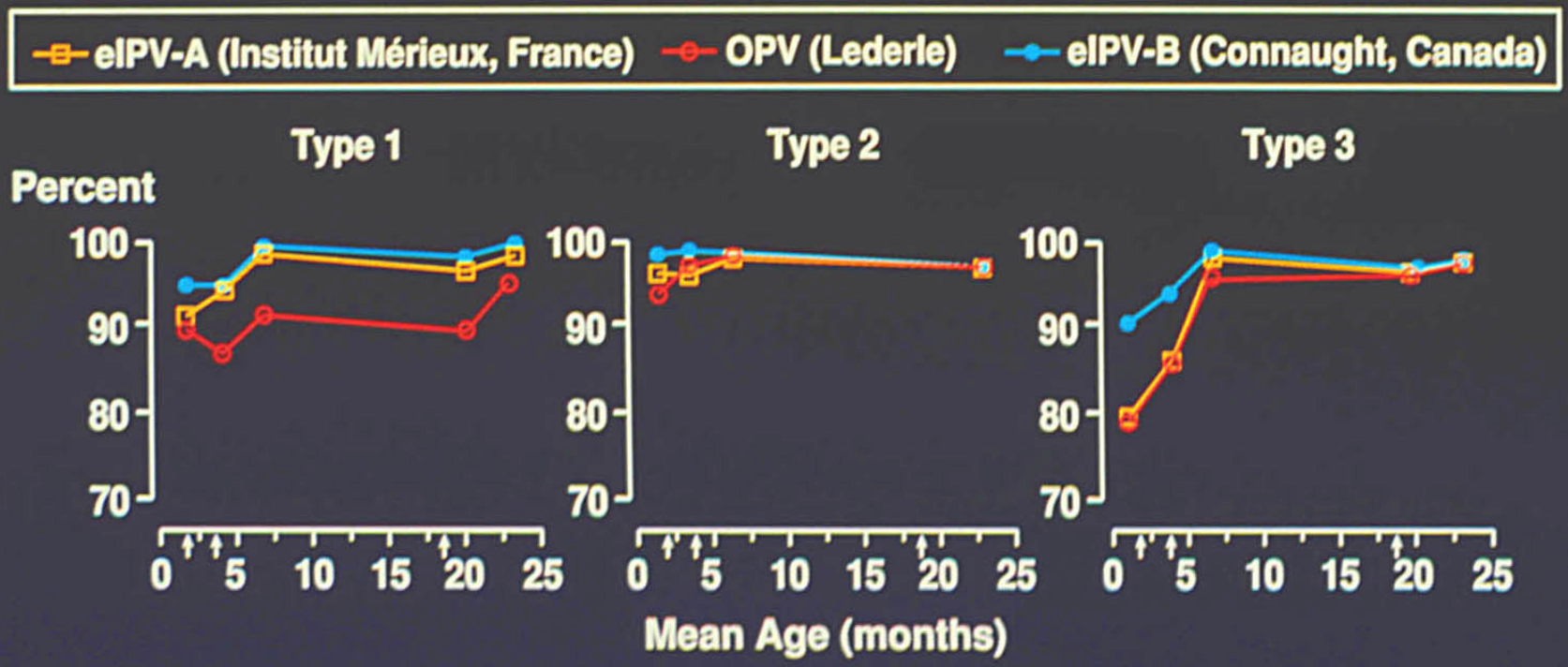
FIGURE 3. Percentage of children with seroconversion to one dose of either inactivated polio vaccine or oral polio vaccine given at two months of age: Baltimore City and Baltimore and Prince George's counties, Maryland, 1980–1983. See text for definition of seroconversion. IPV-A, trivalent enhanced-potency inactivated polio vaccine produced by the Institut Merieux, France; OPV, trivalent oral polio vaccine; IPV-B, trivalent enhanced-potency inactivated polio vaccine produced by Connaught Laboratories Ltd., Canada.

McBean AM, et al. Am J Epidemiol 1988; 128:615

POLIOMYELITIS

Seroconversion Rates

Neutralizing Antibody Response to OPV and eIPV

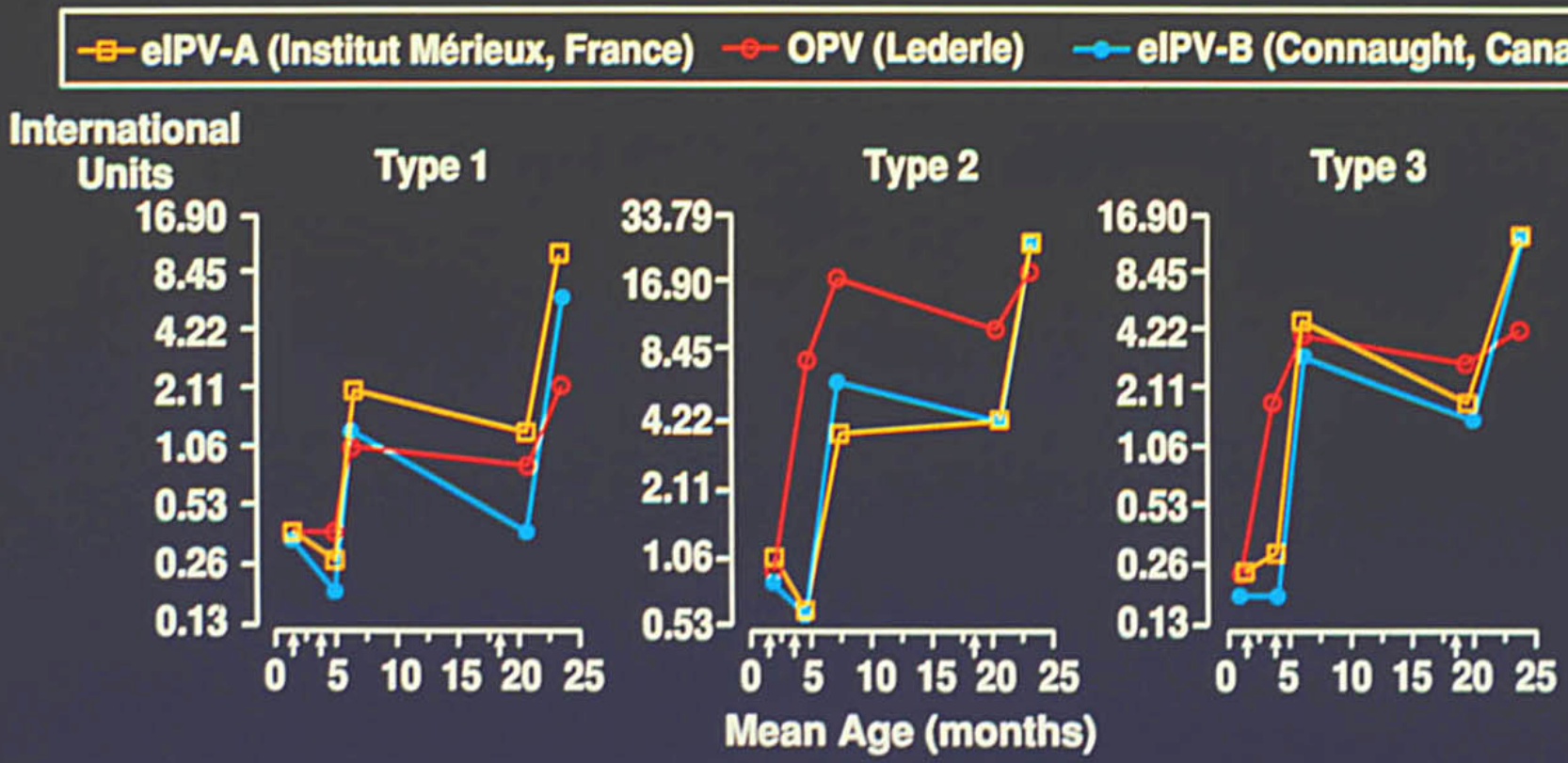


Ref: McBean AM, et al: Am J Epidemiol 128:615-628, 1988.

POLIOMYELITIS

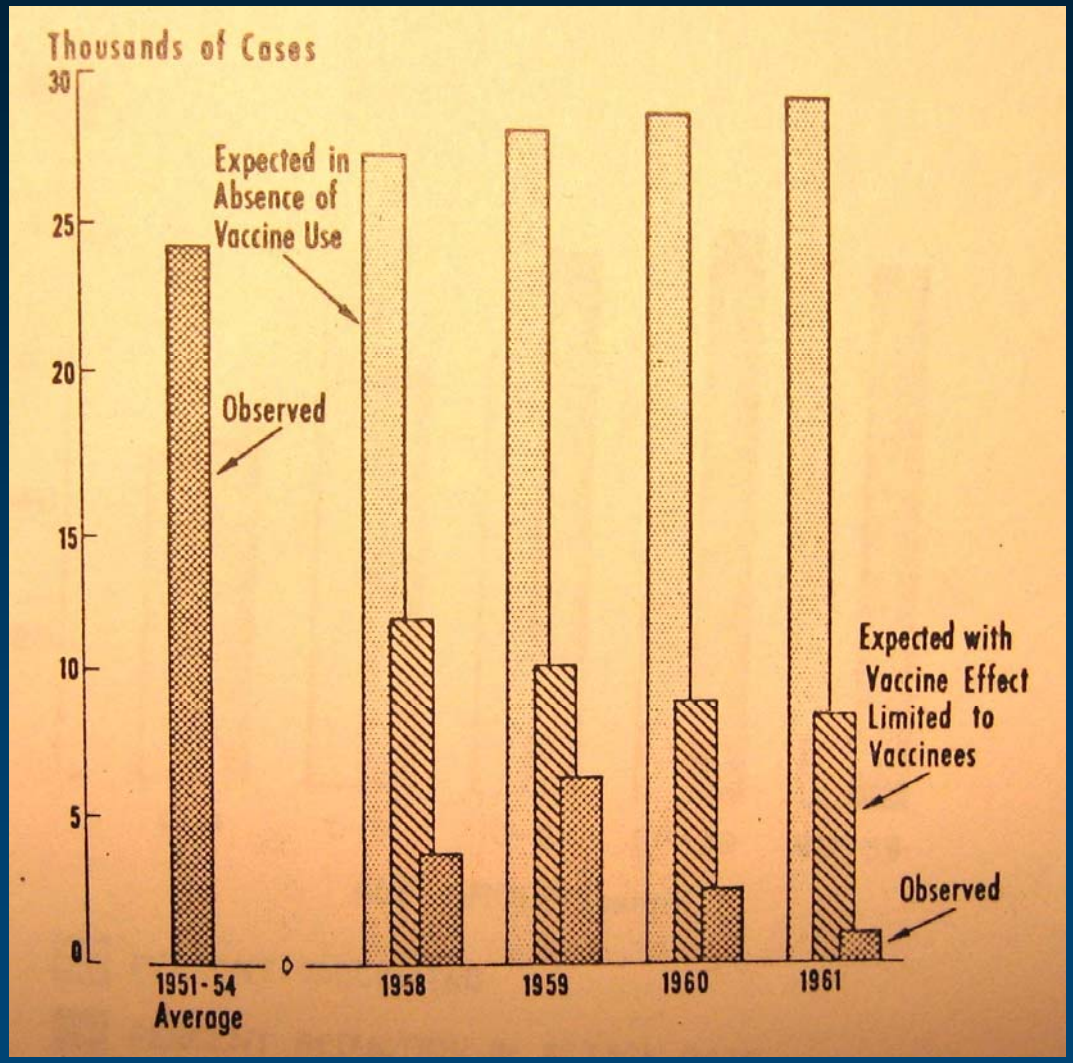
Antibody Titers

Neutralizing Antibody Response to OPV and eIPV



Ref: McBean AM, et al: Am J Epidemiol 128:615-628, 1988.

Poliomyelitis Surveillance United States, 1958-1961



Stickle G. Am J Pub Health 1964; 54:1222.

Field Studies During Wild Poliovirus Outbreaks

- Prior IPV immunization limits pharyngeal excretion, but not fecal excretion of wild poliovirus
- Duration of fecal excretion same or slightly less than primary natural infection
- Transmission of wild polioviruses within households unaffected by IPV

Lipson J, et al. J Clin Invest 1956; 35:722

Gelfand HM, et al. Am J Pub Health 1957; 47:421.

Wehrle PF, et al. Pediatrics 1958; 21:353.

Fox JP, et al. Am J Pub Health 1958; 48:1190.

Gelfand, HM, et al. Am J Hygiene 1959; 70:312

Marine WM, et al. Am J Hygiene 1962; 76:173

Field Studies During Wild Poliovirus Outbreaks

- Herd immunity limited to high socioeconomic area
- Pharyngeal excretion may be dominant mode of transmission in high income communities
- Fecal excretion is major mode of transmission within households

Marine WM, et al. Am J Hygiene 1962; 76:173

OPV Challenge Studies

- Salk IPV
  - Sabin A. JAMA 1956; 162:1589.
  - Henry JL, et al. J Hygiene Camb 1966; 64:105.
- Enhanced potency IPV
  - Onorato, et al. J Infect Dis 1991; 163:1.
  - Modlin JF, et al. J Infect Dis 1997; 75 (Suppl-1):S228.

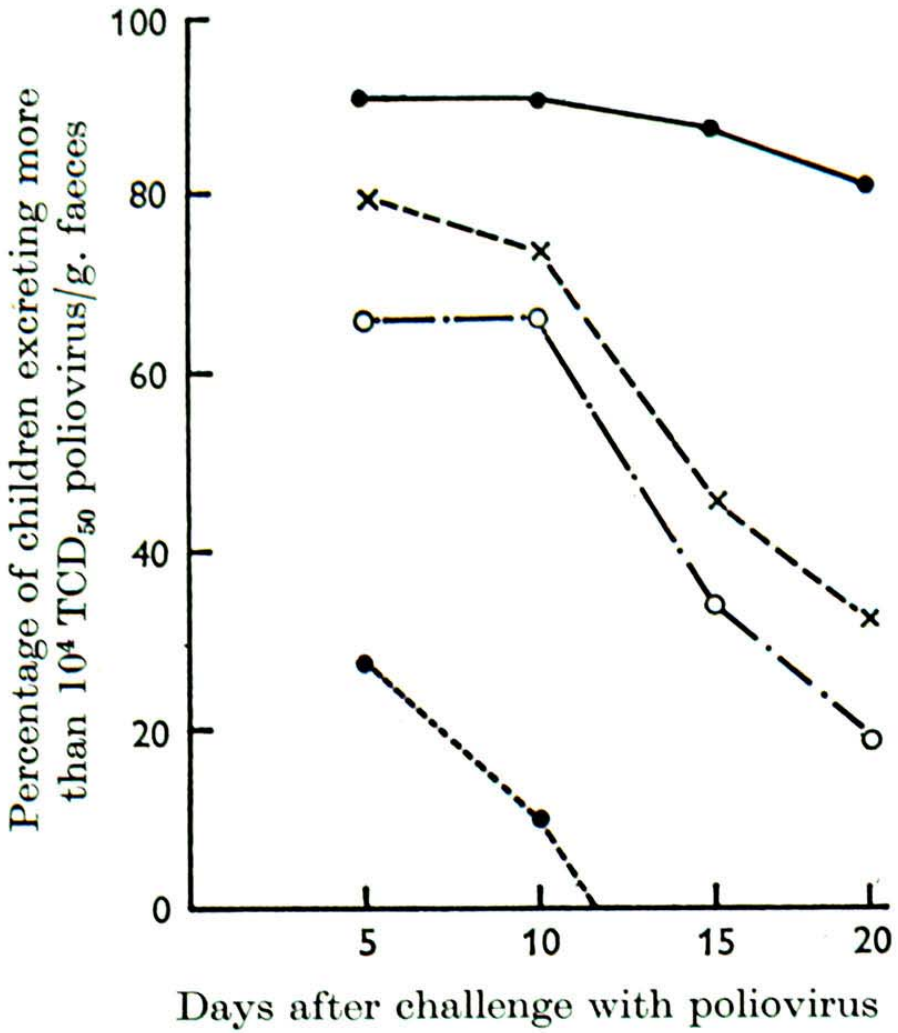


Fig. 2. Effect of vaccination schedules on potential infectivity of children. ●—●, Group B, triple antigen. ×— —×, Group A, primary course, quadruple vaccine. ○—·—○, Group C, primary and booster dose, quadruple vaccine. ●- - - - -●, Group D, attenuated poliovaccine.

OPV 1 CHALLENGE STUDY

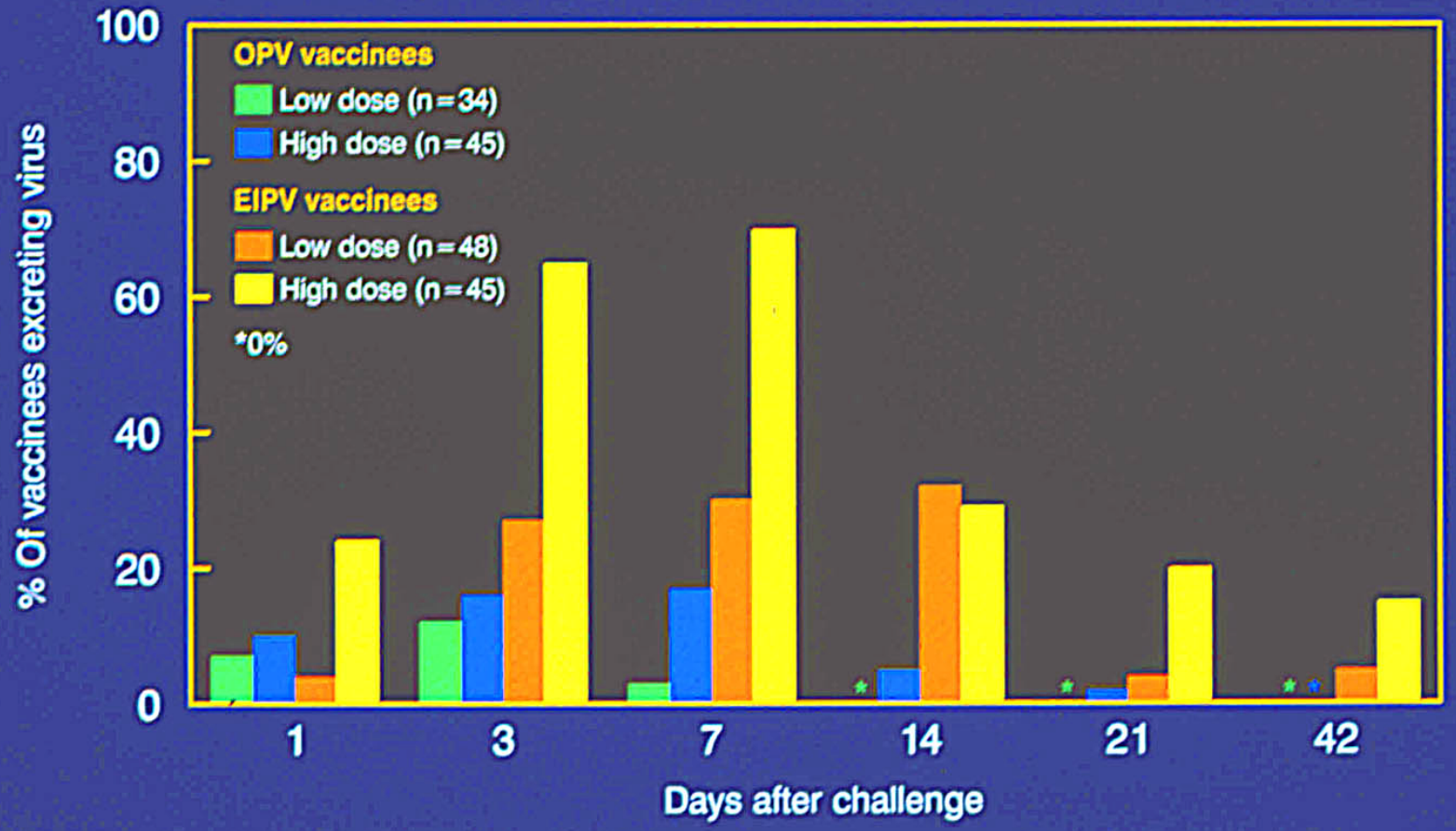
Study Population

Children receiving routine well child care in public clinics in Baltimore and Prince George's County, Maryland

Study Design

No.	2 mon	4 mon	18 mon	20-30 mon
93	IPV	IPV	IPV	OPV1 challenge
79	OPV	OPV	OPV	OPV1 challenge

Comparison of Mucosal Immunity Induced by EIPV and OPV

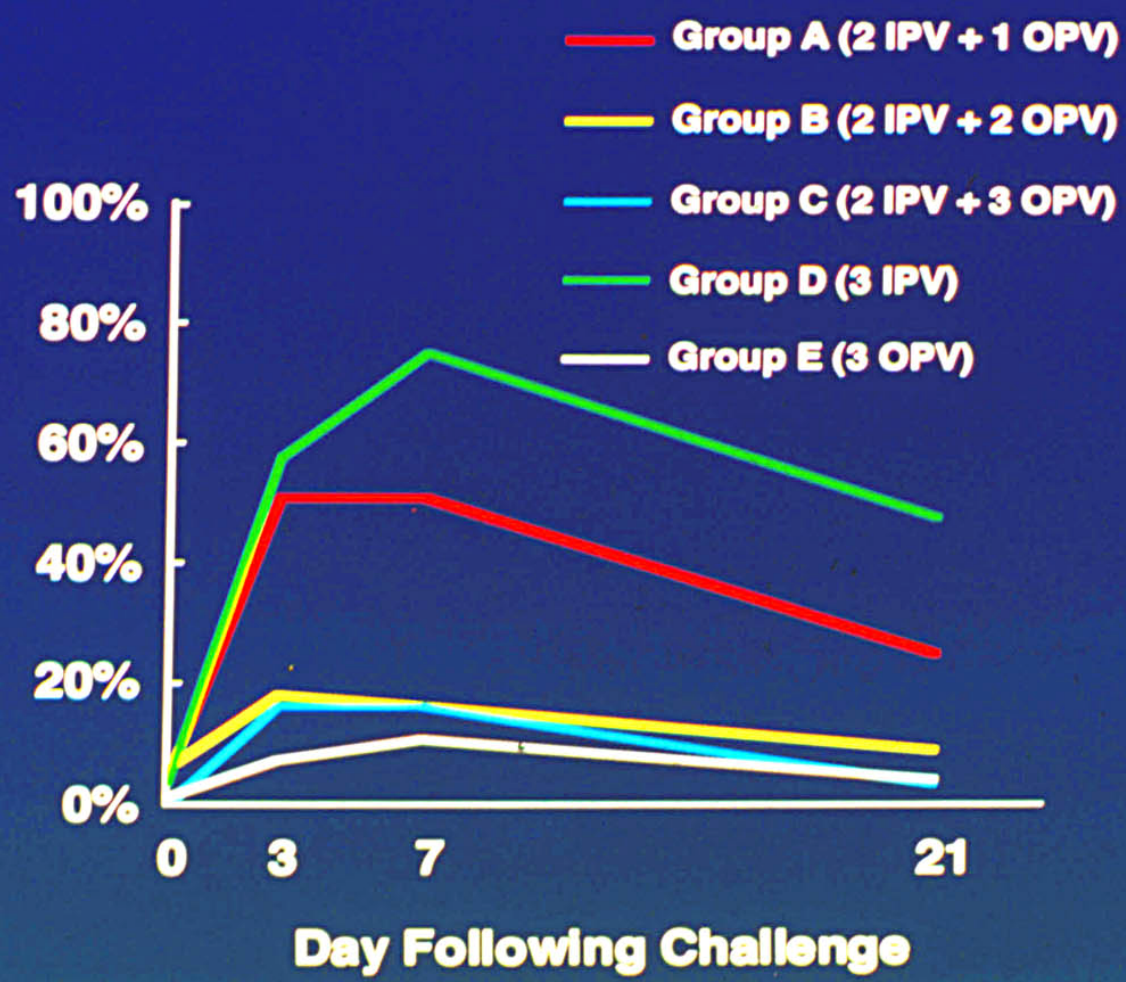


Onorato IM, et al. *J Infect Dis.* 1991;163:1-6.

Agenda

1:30	**John Modlin MD Dartmouth Medical School Lebanon, NH**	**Introduction**
1:40	**Tapani Hovi MD PhD National Public Health Institute Helsinki, Finland**	**Transmission of Polioviruses in IPV Immunized Populations**
1:50	**Neal Halsey MD Johns Hopkins University Baltimore, MD**	**Immunogenicity and Efficacy in Developing Nations**
2:00	**Emmanuel Vidor MD MSc DTMH Sanofi Pasteur Lyon, France**	**Review of Ongoing IPV Studies in Developing Nations and Comment on the Requirements for Vaccine Manufacturers to Produce IPV for Developing Nations in a Cost-Effective Manner**
2:10	**Dr. Lalit Kant Indian Council of Medical Research New Delhi, India**	**Update on India IPV Meeting, August, 2007**
2:20	**Open Discussion**	

Fecal Excretion Of OPV Challenge Virus at 3, 7, and 21 Days After Challenge



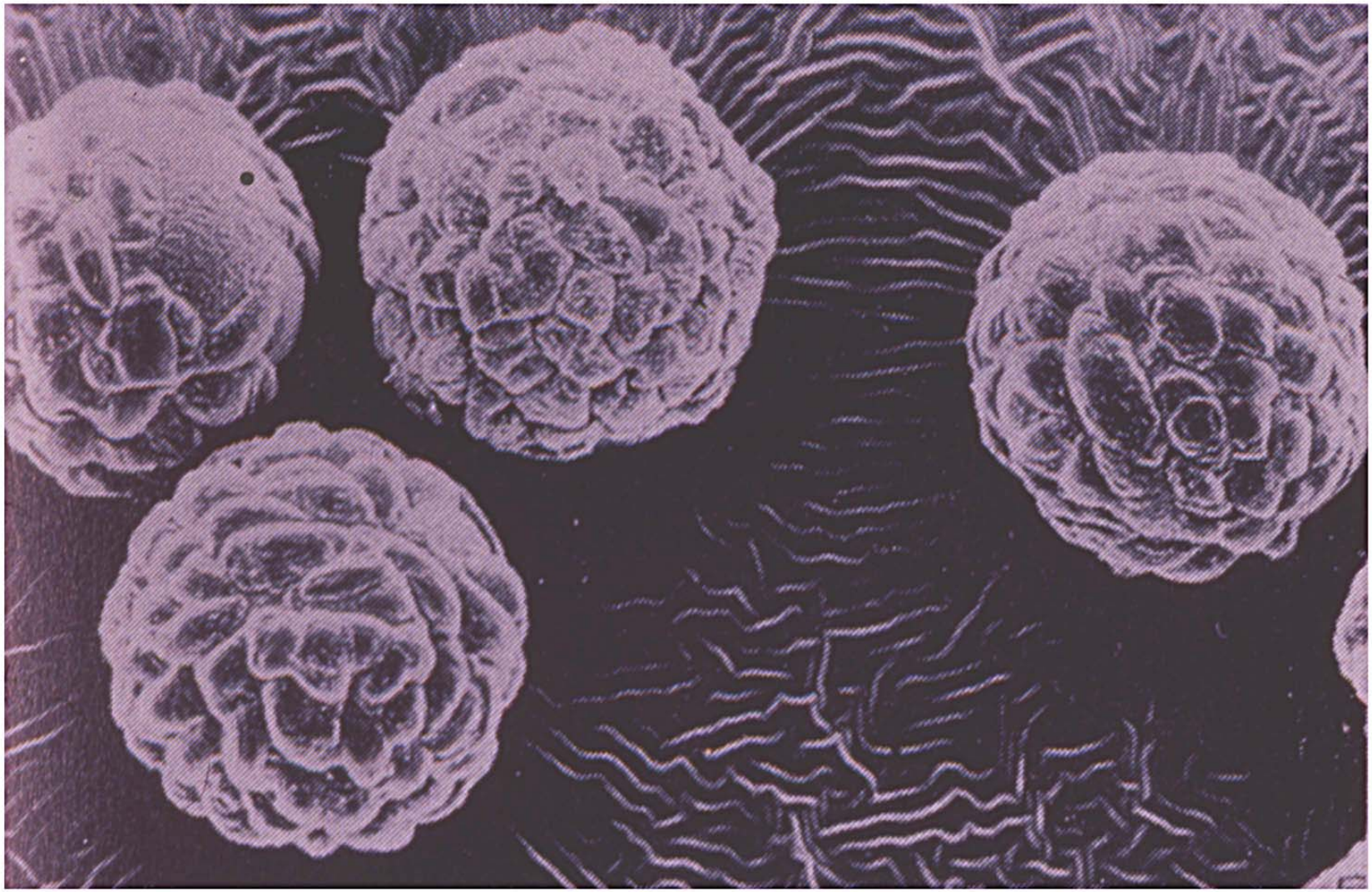


Figure 8–4. Monkey kidney cells (Vero) growing on microcarrier beads in cultivation. (Courtesy of Dr. B. Montagnon, Institut Mérieux, Lyon.)