

## Polio vaccines. Grading tables

Table V: Sequential administration IPV-OPV

**Settings:** Global

**Question:** What is the quality of scientific evidence that 1) sequential immunization schedules starting with two or more doses of IPV\* and followed by two or more doses of OPV induce protective immune responses to all three poliovirus serotypes in  $\geq 90\%$  of vaccines, (i.e. responses comparable to those induced by the same number of doses of either OPV or IPV alone

\* At least two doses of IPV are necessary to induce  $>90\%$  protective antibody against polioviruses before the first dose of OPV is administered (McBean AM et al 1988; Faden H et al 1993; Asturias EJ et al (2007).

**Conclusion:** 1) Moderate level of scientific evidence that sequential immunization schedules starting with two or more doses of IPV and followed by two or more doses of OPV induce protective immunological responses to all three poliovirus serotypes in  $\geq 90\%$  of vaccines.

Quality assessment						Summary of Findings
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Quality
Sequential administration of IPV-OPV induces protective immune responses						
1	Randomised, controlled	No serious	No serious	No serious	No serious	Moderate
5	Observational	No serious	No serious	No serious	No serious	

<sup>1</sup> With observational studies, the level of scientific evidence will not normally exceed “low”, according to the Grade system

### Immunological impact of sequential administration:

*Modlin JF et al (1997)* showed in a randomized controlled study of 510 infants, that for each of the 3 IPV-OPV experimental sequential schedules, the first OPV dose significantly enhanced seroconversion rates and geometric mean micro-neutralization antibody titers. Three months after the final dose, 96%-99%, 99%-100%, and 81%-100% of infants had antibodies to poliovirus types 1, 2, and 3, respectively, and subjects with two or more prior OPV doses were significantly less likely than those with none or one prior OPV dose to excrete virus in feces after an OPV challenge. It was concluded that the optimal schedule consists of two IPV doses followed by two OPV doses.

*Faden H et al (1990)* showed that incorporation of at least one dose of IPV at the start of the immunization schedule tends to increase systemic as well as local antibody production.

*Faden H et al (1993)* showed that as compared to OPV-OPV-OPV, eIPV-eIPV-eIPV, eIPV-OPV-OPV, and eIPV-eIPV-OPV those receiving the eIPV-eIPV-OPV schedule maintained the highest antibody levels throughout the observation period, including the response to OPV challenge at 5 years of age.

*Swartz TA et al (1998)* assessing the effectiveness of an intercalated IPV-OPV vaccine programme in Israel concluded that the programme offered high individual protection throughout the first 5 years of life.

*von Magnus H et al (1984)* reported that in Denmark, where a sequential 3-dose IPV-3 dose OPV immunization programme had been practiced since 1968, greater than 95% of the population had antibodies to poliovirus, and the geometric mean titer of serum antibodies exceeded 10 IU for all three types.

*Lu CY et al (2001)* showed that protective antibodies were present in all infants at the age of 6 months, 2 months after the second IPV dose, and that the antibody titers were augmented at the age of 19 months, 1 month after the booster dose of OPV.

### **\*Literature (at least two doses of IPV are necessary...)**

McBean AM, Thoms ML, Albrecht P, Cuthie JC, Bernier R. Serologic response to oral polio vaccine and enhanced-potency inactivated polio vaccines. *Am J Epidemiol* 1988;128:615–28.

Faden H, Duffy L, Sun M, Shuff C. Long-term immunity to poliovirus in children immunized with live attenuated and enhanced-potency inactivated trivalent poliovirus vaccines. *J Infect Dis.* 1993 Aug;168(2):452-4.

Asturias EJ, Dueger EL, Omer SB, Melville A, Nates SV, Laassri M, Chumakov K, Halsey NA. Randomized trial of inactivated and live polio vaccine schedules in Guatemalan infants. *J Infect Dis.* 2007 Sep 1;196(5):692-8.

### **Literature: Immunogenicity of sequential IPV-OPV administration**

Modlin JF, Halsey NA, Thoms ML, et al. Humoral and mucosal immunity in infants induced by three sequential inactivated poliovirus vaccine–live attenuated poliovirus vaccine immunization schedules. *J Infect Dis* 1997;175(suppl 1):S228–34.

Faden H, Modlin JF, Thoms ML, McBean A, Ferdon MB, Ogra PL. Comparative evaluation of immunization with live attenuated and enhanced-potency inactivated trivalent poliovirus vaccines in childhood: systemic and local immune responses. *J Infect Dis* 1990;162:1291–7.

Faden H, Duffy L, Sun M, Shuff C. Long-term immunity to poliovirus in children immunized with live attenuated and enhanced-potency inactivated trivalent poliovirus vaccines. *J Infect Dis.* 1993 Aug;168(2):452-4.

Swartz TA, Handsher R, Manor Y, Stoeckel P, Barkay A, Mendelson E, Leventhal A. Immune response to an intercalated enhanced inactivated polio vaccine/oral polio vaccine programme in Israel: impact on the control of poliomyelitis. *Vaccine.* 1998 Dec;16(20):2090-5.

von Magnus H, Petersen I. Vaccination with inactivated poliovirus vaccine and oral poliovirus vaccine in Denmark. *Rev Infect Dis.* 1984 May-Jun;6 Suppl 2:S471-4.

Lu CY, Kao CL, Lee CY, Lee PI, Huang LM. Immunogenicity and fecal poliovirus excretion in sequential use of inactivated and oral poliovirus vaccines. *J Formos Med Assoc.* 2001 Aug;100(8):513-8.

