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Ending Polio Immunization

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The financial, logistical, and biological challenges of eradicating polio were recognized long before the goal of global polio eradication by the year 2000 was set in 1988 (*1*, *2*). During planning for the initiative, it was recognized, though, that answers to some issues would become apparent only as the initiative matured. Nine years later, the strategies have been clearly defined (*3*), and rapid progress is being made. Only 4000 polio cases were reported worldwide in 1996, which is a decline of nearly 90% from the 35,000 cases reported in 1988. Polio eradication in the Western Hemisphere was certified in 1994, and wild-type poliovirus (wild polio) circulation is now largely confined to South Asia and Africa (*4*). The initiative is entering a new phase. In addition to interrupting final chains of transmission, the initiative must now address concerns about what will happen after wild polio is eradicated.

Eventual cessation of control measures is inherent to the concept of disease eradication; it has always been anticipated that immunization against poliomyelitis would be stopped. Potential strategies for stopping immunization were reviewed at meetings of the World Health Organization (WHO) Technical Consultative Group held in 1996 and 1997. The WHO's Plan of Action for Global Polio Eradication calls for a specific strategy for cessation of immunization to be developed even before the world is certified as free of polio.

Dove and Racaniello question whether it will ever be possible to stop polio immunization (*5*). They cite three specific concerns: possible persistence of wild polio in the environment, potential for wild polio to escape from laboratories, and potential for continued circulation of vaccine viruses after use of the oral polio vaccine (OPV) is halted. In a review of potential environmental reservoirs of wild polio (*6*), Dowdle and Birmingham state, "The rate of poliovirus inactivation is dependent on numerous conditions, but survival in the environment is finite," with survival in the environment lasting months rather than years. They conclude that the only environmental source that presents a serious threat to the eradication initiative is laboratory stocks of wild polioviruses. An escape of a wild polio strain through a laboratory accident has recently been documented in the Netherlands (*7*).

Dove and Racaniello imply that inventory, control, and containment of all clinical materials, extracts, poliovirus isolates, and other potentially infectious materials are unmanageable tasks. However, the magnitude of these tasks and the international cooperation needed to achieve them pale when compared with tasks already accomplished (*4*, *8*, *9*). The formal process of containing wild polio stocks will begin with a consultation of vaccine manufacturers, technical organizations, and research institutions, which will be convened by the WHO in September 1997. The expected outcome of this meeting is a draft plan for containment procedures that will be widely circulated in the scientific community before implementation.

The potential for the Sabin strains to persist or revert to neurovirulence was debated even before the widespread introduction of the Sabin vaccine (*10*). Although some immunocompromised individuals have excreted vaccine strains for 2 years or more (*6*), there are no data to show that vaccine viruses persistently circulate in a general population or cause outbreaks of paralytic poliomyelitis. In 1961, Fox noted "the clearly limited ability of Sabin viruses to spread, as compared with that of the wild viruses . . ." in Louisiana (*11*). Data from Cuba (*12*) and Hungary (*13*), where OPV was given exclusively through mass campaigns, support Fox's findings. In these countries, Sabin viruses could be isolated from clinical and environmental specimens only in the months immediately after the campaigns.

However, given the importance of assessing this theoretical risk, the WHO is sponsoring studies to determine how and when immunization can be stopped. These include the prevalence and duration of excretion of vaccine virus in immunodeficient persons in both industrialized and developing countries (*14*). Nucleotide sequencing studies (*15*) of vaccine-derived virus isolates from paralyzed children in nonendemic developing countries are under way to estimate the interval between the administration of the original vaccine dose and collection of the stool sample.

Dove and Racaniello suggest that inactivated polio vaccine (IPV) should replace live OPV either on a permanent or an interim basis to guard against continuing circulation of the Sabin viruses after the eradication of wild viruses. Although the infrastructure exists to deliver IPV (*16*), such a decision cannot be made lightly. Operational IPV production capacity is quite limited and would have to be expanded for IPV to be used worldwide. Halting the use of OPV remains the simplest and most cost-efficient means for stopping immunization. This option should not be abandoned without compelling reasons to do so.

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