

Albert Sabin and the Coalition to Eliminate Polio From the Americas

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Albert B. Sabin, MD, developer of the oral polio vaccine, was also a major proponent of its use in annual vaccination campaigns aimed at the elimination of polio. Sabin argued that administering his vaccine simultaneously to every child in a country would break polio's chains of transmission. Although he was already promoting mass vaccination by the 1960s, Sabin's efforts expanded considerably when he became an adviser to groups fighting polio in the Americas in the 1980s. Sabin's experiences provide a window into both the formation of the coalition that eliminated poliomyelitis from the Western Hemisphere and what can happen when biomedical researchers become public health policy advisers. Although the polio elimination coalition succeeded in part because member groups often accommodated each other's priorities, Sabin was often limited by his indifference to the interests of those he was advising and to the shortcomings of his vaccine. (*Am J Public Health*. 2009;99:34–44. doi:10.2105/AJPH.2007.117952)

IN JANUARY 1980, ALBERT B.

Sabin, MD, developer of the oral polio vaccine, learned of an epidemic of poliomyelitis in Brazil and offered his assistance as an adviser to the Brazilian government.¹ The government, which had decided to mount a nationwide vaccination campaign in response to the epidemic, accepted Sabin's offer. That vaccination drive spurred the formation of a coalition of governments, international organizations, and nonprofits that ultimately eliminated polio from the Western Hemisphere. Sabin served as an adviser to several groups in the coalition.

The development and adoption of the oral polio vaccine and Jonas Salk's inactivated polio vaccine have been recounted,² as have the origins of the campaign against polio in the Americas,³ but no published accounts have looked in detail at the role played by polio vaccine developers in the creation of the international polio campaign. Records from Sabin's archives at the University of Cincinnati, along with documents and accounts from participating organizations such as the Pan American Health Organization (PAHO) and Rotary International, shed light on the development of the coalition against polio. The agendas of different groups had to be reconciled, particularly regarding how the vaccine would be administered and how polio vaccination would coexist with other programs. Sabin's contribution was strengthened by his fame and his expertise, but his effectiveness was frequently impaired by his stubbornness, an insufficient concern for the particular interests of the groups he was advising, and his inability to acknowledge shortcomings in his vaccine.

ALBERT SABIN AND MASS VACCINATION

Sabin entered the public arena after years of work on viruses in general and polio in particular. He began his research on infectious diseases while working his way through medical school in the late 1920s and subsequently focused on polio and other viruses as a researcher at the Rockefeller Institute (now Rockefeller University) and later the universities of Cincinnati and South Carolina. Sabin's creation of a live, attenuated poliovirus vaccine that could be taken orally made him internationally famous.⁴ In addition to producing the oral vaccine, Sabin oversaw several of the clinical trials that demonstrated that it was safe and effective, including a 1959 trial in Toluca, Mexico, that demonstrated its efficacy in tropical countries when given to children simultaneously through mass vaccinations.⁵

Sabin's vaccine quickly won acceptance around the world because of its low cost, ease of administration in drops or sugar cubes, ability to spread to unvaccinated contacts, inducement of a

strong immune response in the gut, and political acceptability (it was produced and endorsed by both democratic and communist countries). The oral vaccine was also welcomed as an alternative to Salk's competing inactivated polio vaccine, which had encountered suspicion because some early lots of commercial vaccine had been contaminated with live poliovirus.⁶

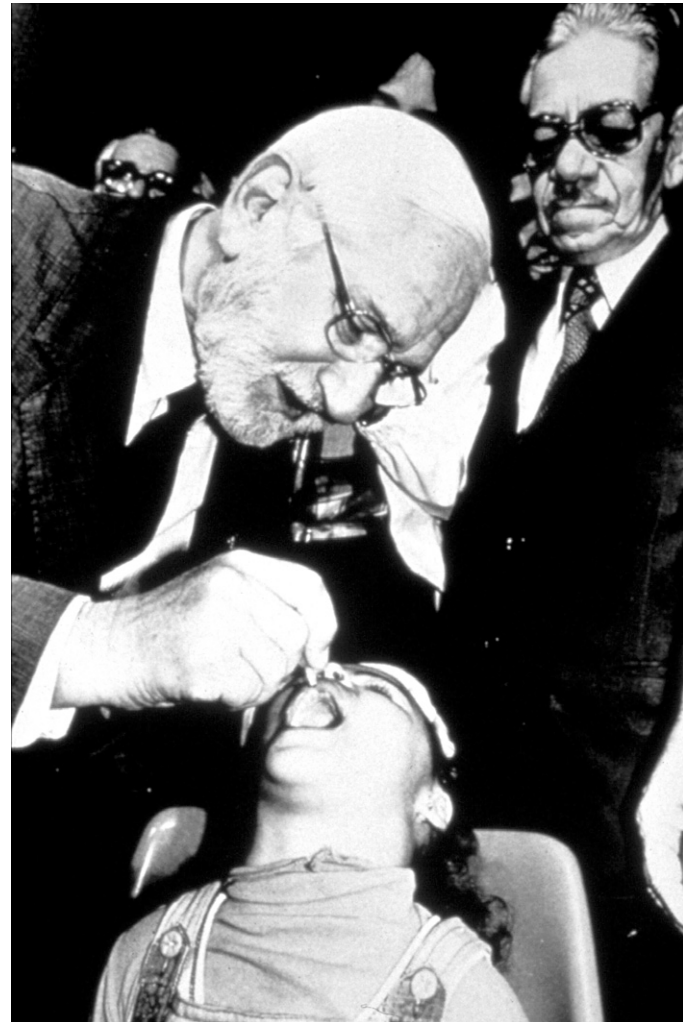
Sabin worked hard during the rest of his life to promote his vaccine, in part because he hoped it would be the instrument for the elimination of polio from, at a minimum, large portions of the planet.⁷ Sabin realized that eradication becomes possible "when the chain of transmission necessary for the survival of the infectious agent in nature is broken."⁸ He believed that the oral vaccine could break the poliovirus's chain of transmission because it prevented the reproduction of the virus in the intestinal tract and there was "no evidence at the present time of a cycle of transmission independent of the human alimentary tract."⁹ In 1960 he attempted, unsuccessfully, to interest the World Health Organization (WHO) in leading global efforts against polio by coordinating the distribution of his vaccine from developed country manufacturers to developing country consumers, encouraging countries to train polio elimination administrators, and generally assisting countries that could not eliminate polio on their own.¹⁰ Sabin even went so far as to license his oral vaccine strains to manufacturers at no cost to reduce vaccine prices, and in 1972 he donated his strains to WHO so that it could continue his approach.¹¹

Sabin's public work and research accomplishments earned

him the respect of his peers and numerous invitations to sit on medical and public health advisory bodies. Although many virologists viewed Sabin as "obnoxious . . . arrogant, egotistical . . . occasionally cruel . . . hypercompetitive and determined to punish those who invaded his turf,"¹² they also acknowledged his diligence, intelligence, and generosity to allies.¹³ Despite his reputation for irascibility, Sabin was frequently asked to serve as an adviser on infectious diseases by organizations such as the US military and WHO.¹⁴ Sabin also advised PAHO, the influential regional branch of the WHO, on polio immunization in 1968 and 1971, consistently advocating that countries annually immunize all of their children simultaneously, advice that PAHO and some member states partially adopted.¹⁵

NATIONAL IMMUNIZATION DAYS

Brazil had tried several different strategies for dealing with polio before outbreaks in its southern region prompted it to attempt a nationwide vaccination drive. As in many other countries, when the oral polio vaccine became available in 1961 it was greeted warmly in Brazil but distributed haphazardly. Until polio became a reportable disease in 1968, it was not even possible to track its incidence. After the successful completion of a national campaign to eliminate smallpox in 1971, and in keeping with PAHO recommendations, Brazil's federal government began working with most state governments to simultaneously vaccinate all preschool children living in urban areas against polio at least 3 times a year. In 1974, how-



ever, the government scrapped mass vaccination drives in favor of providing the oral vaccine only through routine visits to local primary health care centers.¹⁶

A surveillance system built on the methods used to monitor smallpox went into effect in 1975, providing improved data on polio incidence. Through the rest of the decade, sporadic polio epidemics occurred in various regions, but it took a well-publicized December 1979 outbreak in the affluent southern states of Parana and Santa Catarina to spur the federal government to try an expanded, nationwide

Albert Sabin vaccinates a child with the polio vaccine. Sabin was directly involved with many of the campaigns to distribute the oral polio vaccine. Source. World Health Organization.

version of the mass vaccination program of the early 1970s.¹⁷

The December 1979 polio outbreak occurred at a politically and economically difficult time for the Brazilian government, so a strong response was important for its leaders' credibility. The Brazilian military had run the government since 1964, but by the time of the outbreak its grip on power had weakened considerably. In the spring of 1979 a new president, General Jose Figueiredo, had assumed power in a planned move toward democratization. Brazil was also coping with high inflation, balance of trade problems, and labor unrest.¹⁸ A successful response to the outbreak could produce favorable publicity that might shore up support for the federal government.¹⁹ Federal officials were also eager to blunt criticism from state administrators, who complained that avail-

“The final plan, which reflected Brazil’s experiences with smallpox and polio as well as Sabin’s ideas, directed that every child younger than 5 years in the country should receive the oral polio vaccine on each of 2 national immunization days occurring 3 months apart, including children who had received the vaccine before.”

able resources and technology should have prevented such outbreaks.²⁰ Sabin, who was well known in Brazil and had often visited and offered advice, was welcomed by the government not only for his technical expertise but also for the public relations boost he could give to the immunization effort and by extension the federal administration.²¹

When his offer of help was accepted by the Brazilian government, Sabin dropped everything to go.²² First, he helped draw up

a detailed plan for the mass vaccination campaign, building on a Brazilian draft proposal that he deemed “excellent.”²³ The final plan, which reflected Brazil’s experiences with smallpox and polio as well as Sabin’s ideas, directed that every child younger than 5 years in the country should receive the oral polio vaccine on each of 2 national immunization days occurring 3 months apart, including children who had received the vaccine before. A small army of volunteers would do much of the fieldwork, and a major media campaign would prepare the population in advance of the vaccination days.²⁴ A positive meeting with President Figueiredo reassured Sabin that the plan would have the full backing of the entire government.²⁵

Sabin came to Brazil with a second goal: he wanted to test his beliefs about the prevalence of polio in tropical countries.²⁶ In the early years of his vaccine’s use, many experts thought that polio was a minor problem in tropical countries, particularly in the Eastern Hemisphere, although PAHO and many tropical countries in the Western Hemisphere had been taking it seriously for years. Beginning in 1974, however, studies of lameness prevalence in Africa and Asia showed that paralysis consistent with polio was far more common than previously appreciated.²⁷ Sabin believed that Brazil’s statistics similarly underreported the burden of polio, so he sought and received permission to carry out a national survey of lameness, to be conducted entirely with voluntary labor and services, to establish the prevalence of polio paralysis in Brazil.²⁸

Unfortunately, Sabin undermined his own accomplishments by becoming increasingly de-

manding and abrasive. After the trial stages of the lameness survey, Sabin found that, contrary to his earlier assurances, his project required government assistance. He requested that the federal Ministry of Health furnish a bilingual secretary, office space and supplies, official status for his collaborators, and help organizing a national meeting of state survey organizers. The government, however, was occupied in organizing the immunization drive.²⁹

The initial survey results also convinced Sabin that official data underestimated the burden of polio even more than he had expected, and he stepped up his criticism of Brazil’s existing polio surveillance system.³⁰ This raised the ire of Joao Baptista Risi, MD, a senior federal health official, smallpox eradication program veteran, and driving force behind the national vaccination campaign. Risi had been heavily involved in the development of the surveillance system and planned to use it to track the effects of the upcoming immunization drive. Sabin’s obsession with the surveillance system’s inadequacies helped alienate a key potential ally.³¹

Furthermore, after participating in an early statewide mass vaccination effort in Santa Catarina, Sabin harshly criticized the federal health officials involved and extolled the performance of the state health staff. The participating federal health officials were slated to be some of the chief organizers of the forthcoming national campaign, and Sabin essentially implied that they were unfit for the task. He proposed that the state head of the Santa Catarina vaccination effort should help run the national effort, and he offered himself as leader and spokesman for the national campaign.³² In addition to his obvi-

ous self-aggrandizement, Sabin thus placed himself squarely on the states' side in their rivalry with a federal government that was acutely concerned about its public image.

Yet Sabin was shocked when he was informed by the Brazilian federal health ministry not only that his services were no longer needed for the vaccination campaign but also that the remainder of the lameness survey would be canceled.³³ Predictably, the Brazilian ministry's assurances that the lameness survey was not needed given the already apparent scale of the polio problem in Brazil, the presence of the political will to do something about it, and the existence of an adequate although imperfect surveillance system for tracking changes in polio incidence did little to placate Sabin.³⁴ In addition to writing a letter to President Figueiredo denouncing the federal health officials as incompetent and uncaring, he issued a press release describing the minister of health and Risi as "untrustworthy."³⁵ To his credit, however, Sabin soon sought to correct erroneous claims in the press that the minister of health was ignoring polio, accurately describing the forthcoming mass vaccination program as a major response.³⁶

Fortunately, the polio national immunization days were extremely successful. Brazilians responded positively to the program, polio immunization rates in the target age groups jumped to greater than 90% throughout the country, and polio cases dropped from an average of 2330 per year in 1975 to 1980 to 122 cases in 1981.³⁷ Crucially, these gains were sustained and enhanced over the next several years.³⁸ Sabin described the Brazilian vaccination program as "a great success and a

tribute to the remarkable organization and excellent work of the thousands of persons in all the unidades da federacao [units of the federation]."³⁹

The Brazilian results impressed many scientists and policymakers besides Sabin. Several countries, including Morocco and Venezuela, expressed interest in adopting parts of Brazil's program. In 1983, the Dominican Republic went further: its very effective national immunization days used a plan written by Sabin and modeled on the Brazilian campaign.⁴⁰ Thanks to a large, well-organized force of volunteers and community health workers, all children younger than 36 months received 2 doses of oral polio vaccine 2 months apart, regardless of previous immunizations.⁴¹ The national immunization days in 1983 and 1984 led to the disappearance of polio from the Dominican Republic within a year.⁴² For Sabin, the Dominican experience was better than the Brazilian one, in part because the Dominicans adopted all of his suggestions and in part because his expectations for his own role were more modest, perhaps because at the time he was suffering intense back pain that limited his activities.⁴³

THE PAN AMERICAN HEALTH ORGANIZATION, PRIMARY HEALTH CARE, AND POLIO IMMUNIZATION

The Brazilian experience was also noticed by PAHO. Ciro de Quadros, MD, the organization's chief of immunization efforts and, like Risi, a Brazilian veteran of the smallpox eradication program, viewed the Brazilian experience as an important addition to the evidence that polio could be eliminated from the Americas

through mass vaccination drives.⁴⁴ In 1962, Cuba had shown that giving every child on the island 2 doses of the oral vaccine 4 weeks apart every year could eliminate polio from an entire subtropical developing country. Vaccines were administered

“The Brazilian national immunization day program showed that the methods that worked against polio in communist Cuba could probably be used to achieve the same hemispheric results as the successful drive against smallpox.”

exclusively on these 2 national immunization days.⁴⁵ Sabin had been so impressed by the Cuban approach that he used it as the basis for his subsequent mass vaccination proposals.⁴⁶

A regional drive led by PAHO in 1971 eliminated smallpox from the Americas.⁴⁷ This regional campaign was part of an effort coordinated by WHO that achieved the global eradication of wild smallpox in 1977.⁴⁸ These successes against smallpox not only demonstrated the feasibility of regional and global disease eradication but also provided a model for campaigns to conquer other diseases and experienced alumni interested in and capable of running such campaigns.⁴⁹ The Brazilian national immunization day program showed that the methods that worked against polio in communist Cuba could probably be used to achieve the same hemispheric results as the successful drive against smallpox. If national immunization days worked in Brazil, a huge noncommunist country with a large rural population and the Amazon rain forest, they would probably work anywhere in the Americas.⁵⁰ Before a regional effort could be



Rotary volunteers carry an ice chest containing vaccines. Rotary International has had an important role both in mobilizing popular and political support for polio immunization and in assisting with the logistics behind immunization campaigns. These workers are helping to operate the cold chain that keeps temperature-sensitive vaccines viable. Rotary made crucial contributions to the elimination of the disease from the Western Hemisphere, and it remains a central participant in the global coalition to eradicate polio. Source: World Health Organization.

mounted, however, political concerns had to be addressed.

A debate was raging among international health experts over how to use scarce public health resources. During the 1950s, WHO and PAHO had favored programs focused on specific diseases such as malaria, yaws, and smallpox. They advocated eradicating these diseases through mass campaigns organized by national governments with assistance from the international health agencies. Only the drive against smallpox was successful, however, and the other campaigns were canceled in the late 1960s.⁵¹ These failures, especially of the malaria program, contributed to a backlash against disease-specific projects, also known as vertical programs. Instead, the emphasis shifted to building up general health services in medically underserved areas, a strategy also referred to as primary health care or the horizontal approach.⁵² In the new climate, a proposal for a vaccination campaign against polio

would need to win support from public health agencies and donors by explaining how it would strengthen general health services instead of diverting resources from them.

The popular success of Brazil's national immunization days, coupled with PAHO's commitment to promoting vaccination, suggested a way to pursue polio elimination in the context of primary health care. In 1977 PAHO launched the regional component of the Expanded Program on Immunization (EPI), a global effort to improve immunization rates against common childhood diseases.⁵³ Although the EPI boosted immunization rates in the Americas from approximately 20% to 50% for the vaccines in its program,⁵⁴ by the early 1980s concerns were arising at PAHO and among its member nations about the EPI's ability to meet its goal of universal vaccination against the target diseases by 1990 and about the rates of EPI target diseases, which had not declined significantly since the late 1970s.⁵⁵

Part of the problem stemmed from relatively low rates of community interest and participation in vaccine programs.⁵⁶ De Quadros saw the Brazilian vaccination effort's massive volunteer turnout and popular reception as evidence of the enthusiastic response that a well-run disease-specific program could evoke. He concluded that a mass vaccination campaign to eliminate polio from the Americas could potentially increase political and public support for immunization and disease surveillance efforts throughout the region by providing an inspirational goal that people could rally around.⁵⁷ Such an effort would strengthen primary health care instead of undercutting it, because the 1978 Declaration of Alma-Ata, a manifesto for primary health care, listed immunization against major diseases and control of endemic diseases as central elements of primary care.⁵⁸ In late 1984 de Quadros convinced his superior, fellow Brazilian and PAHO director Carlyle Guerra de Macedo, MD, to support an effort to eliminate polio from the Americas.⁵⁹

The 1983 Polio Conference and Vaccine-Associated Paralytic Poliomyelitis

Not everyone shared de Quadros's confidence. In 1983 PAHO sponsored a conference on polio attended by many major researchers and policymakers.⁶⁰ Several participants, including Sabin, emphasized the benefits and technical feasibility of polio eradication and mass vaccination campaigns, but others argued that current administrative, social, and political hurdles made polio eradication impractical and that giving polio a higher priority than other diseases would be ill advised.⁶¹

The conference recommendations stressed the technical feasibility of reducing the global burden of polio through international cooperation but did not endorse global eradication efforts.⁶²

Another pressing concern was aired at this conference: the attenuated virus in the oral polio vaccine could, very rarely, regain the capacity to cause paralysis. This potential was first noted in the 1960s,⁶³ but use of the vaccine continued because public health officials concluded that its benefits outweighed its risks.⁶⁴ Sabin never accepted that his vaccine could paralyze some children and instead argued that other viruses were the culprits in published cases of paralysis.⁶⁵ Nevertheless, in a prescient presentation to the 1983 conference, Joseph Melnick, PhD, a virologist, cited the ability of the oral vaccine's virus to regain the capacity to cause paralysis as a major hurdle for an eradication program, because vaccine-derived paralytic virus strains could themselves create epidemics of polio among people without immunity to the virus.⁶⁶ Even after the last wild polio chain of transmission had been broken, Sabin's virus strains could spawn a new chain of polio transmission.

At the time, Melnick's concerns seemed largely theoretical because no epidemic of paralytic polio derived from Sabin's strains had yet been reported. Furthermore, the risk to polio-free areas from vaccine-derived strains would be much smaller than the risk from virus imported from areas where polio remained common until just before polio was eradicated from the globe. In 1983, reaching this state of nearly eradicating polio seemed like a very distant prospect. In 2000, however, Melnick's warn-

ing was borne out in the Americas when Hispaniola suffered at least 21 vaccine-derived polio cases. Although high immunization rates reduce the risk of vaccine-derived epidemics, the possibility of vaccine-derived paralytic polio shadows Sabin's vaccine wherever it is used, raising questions such as when to stop using the vaccine and which strains should be used to make it.⁶⁷

Rotary International and Polio 2005

While public health professionals grappled with the implications of smallpox eradication, primary health care, and the success of Brazil's national immunization days, a new group joined the fray and presented Sabin with another advising opportunity. Rotary International, a large nongovernmental organization focused on social events, humanitarian work, and international cooperation, was seeking ways to increase its international presence and mark its centennial in 2005. Rotary's interest in polio immunization began in the late 1970s when it funded a polio vaccination drive in the Philippines. John Sever, MD, a US Rotary leader and chief of infectious diseases at the National Institutes of Health, proposed going further and aiming for the eradication of polio by 2005. In 1982, "immunizing all the world's children against polio by the time of the 100th anniversary of Rotary International" became an official Rotary goal.⁶⁸ Businessmen, professionals, and community leaders around the world were Rotary members, and the leadership believed universal polio immunization was a goal that could unite them all.⁶⁹ In 1984, Rotary's incoming president, Carlos Canseco, MD, of Mexico, appointed Sever to head

the Polio 2005 planning committee and Sabin to advise it.⁷⁰

Sabin again jumped at the chance to implement his ideas about organizing annual mass polio vaccination efforts.⁷¹ He drew up a detailed plan for a three-person task force to publicize the effectiveness of annual national immunization days, assess countries' abilities to carry them out, identify and train indigenous campaign organizers, and assist local leaders in organizing the campaigns until outside help was no longer needed. Although



the task force would work either through the local government or with the government's blessing, its focus would be the creation of a volunteer "polio vaccination army."⁷² The polio task force would operate largely independently of WHO (just as Sabin had done in Brazil and the Dominican Republic), although Sabin described it as "an adjunct to the WHO Expanded Program of Immunization."⁷³ In addition, Sabin

Guerillas in El Salvador vaccinate a child against polio and 5 other diseases during a 3-day ceasefire in 1985. Some 20 000 vaccinators, including rebels, volunteers, and health professionals, gave vaccines to 250 000 children during the Days of Tranquility. Source. Pan American Health Organization

suggested that the volunteer vaccination armies could be used to deliver a variety of services besides polio vaccination, including immunization against other childhood diseases, vitamin A supplementation, oral rehydration therapy, and antihelminthic treatment.⁷⁴ After careful consideration and consultations with UNI-

besides national immunization days and promised that WHO and UNICEF would work closely with Rotary.⁷⁶ WHO director general Halfdan Mahler, MD, followed up with a December 1984 letter expressing concern that Rotary's projects would interfere with WHO's own efforts. WHO policy stated that countries

Rotary's leadership, particularly General Secretary Herbert Pigman, went to considerable trouble to reassure the leaders of WHO and PAHO of Rotary's desire to work with and not against them in the fight against polio.⁷⁹

Despite their agreement on addressing WHO's concerns, Sabin and Rotary's leadership soon came into conflict over who would staff Rotary's polio task force. Sabin wanted the head of the task force to be able to operate largely independently of the regular Rotary bureaucracy and for Rotary president Canseco to take the job, but Pigman pushed for the competitive selection of a task force leader who would report to him, a procedure in keeping with Rotary's traditional organization. The dispute simmered throughout the spring of 1985, complete with a resignation threat from Sabin.⁸⁰ In June, when he learned that Rotary's trustees had adopted Pigman's structure for the task force, Sabin bitterly resigned as Rotary's polio adviser.⁸¹

Rotary continued to encourage polio vaccination, but its efforts developed differently from Sabin's vision. Pigman remained centrally involved in planning the polio program and in December 1985 became the director of the Rotary International Immunization Task Force. By that time Rotary had moved closer to WHO's view that national immunization days were one tactic among many. In addition, the task force's mission had shifted from single-mindedly encouraging national immunization days toward focusing on the provision of financial assistance, the supply of a wide range of vaccines, and the mobilization of civic support for immunization, all in close cooperation with WHO and its regional



Luis Fermin Tenorio, a Peruvian boy who in 1991 developed the last known case of poliomyelitis in the Western Hemisphere during the campaign to eliminate polio. In 2000, a vaccine-derived paralytic poliovirus outbreak on Hispaniola temporarily reignited the indigenous transmission of paralytic polio in the Americas. Source. World Health Organization.

CEF, Rotary accepted Sabin's proposals in late 1984 and called for local Rotary clubs to work with their governments and persuade them to provide polio immunizations; Rotary aimed to raise \$120 million to provide a 5-year supply of oral vaccine to developing countries.⁷⁵

Sabin's plan quickly elicited reservations from WHO leaders. Ralph Henderson, MD, director of the global EPI at WHO, warned Sabin and Rotary that the polio task force might lead countries to pursue national immunization days without adequate preparation. He also encouraged Rotary to support other options

should avoid any polio vaccination approaches that interfered with building a permanent primary health care system, and Mahler asked Rotary to adopt this policy as its own.⁷⁷

Sabin hoped that Rotary's efforts would influence WHO to adopt national immunization days instead of alienating the organization, so after a March 1985 meeting with de Quadros, he modified his proposal to emphasize that the Rotary polio task force would coordinate with WHO and its regional offices at every stage of its activities and would incorporate PAHO staff in its Western Hemisphere work.⁷⁸ Simultaneously,

offices.⁸² Although Sabin had hoped Rotary would replicate his efforts in the Dominican Republic and Brazil, its leadership ultimately focused on activities more consistent with Rotary's identity as a federation of clubs of local notables.

Rotary's decision to play to its strengths proved essential to the wider efforts against polio because local Rotarians were able not only to bring their own resources to bear but also to persuade their governments to take polio elimination seriously. According to de Quadros, "Rotary's involvement in every country was critical in maintaining political commitment at the highest levels of government."⁸³ Rotarians also opened their wallets to polio vaccination, raising \$247 million by 1988 instead of the target \$120 million.⁸⁴ This fundraising success and the commitment it reflected have kept Rotary involved with polio immunization for 20 years. The depth and duration of the commitment of Rotary's membership indicate that Rotary's leadership understood the interests of their organization better than did Sabin.

THE ELIMINATION OF POLIO FROM THE AMERICAS

Although the first half of 1985 held great disappointments for Albert Sabin, it also featured a key moment in international efforts against polio. On May 14, PAHO director Macedo unveiled a campaign to eliminate polio from the Americas by 1990.⁸⁵ De Quadros's efforts within PAHO had come to fruition, unaffected by the discussions between Rotary and WHO.⁸⁶ Sabin was present for the announcement, along with polio researchers Frederick Robbins, MD, Thomas

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Weller, MD, and Jonas Salk, MD, and representatives from the effort's main international financial backers: UNICEF, Rotary, the Inter-American Development Bank, and the US Agency for International Development (USAID).⁸⁷

The motivations of UNICEF and USAID shed some light on why groups interested in child welfare and international development would support polio elimination. Like PAHO, UNICEF and USAID backed a mass campaign against polio primarily as a way to increase immunization rates in general, not as an end in itself and not at the price of undermining general health services. UNICEF viewed immunization as one of the best options for improving child survival at a time of economic difficulty and structural adjustment in many developing countries.⁸⁸ USAID not only shared this view but also had a mandate from Congress to increase immunization rates in the countries in which it funded programs.⁸⁹ Many Western Hemisphere national governments also supported polio elimination to improve immunization rates,⁹⁰ although the promise of foreign funds⁹¹ and the possibility of improving their image with their citizens may have provided incentive for some as well.⁹²

The regional elimination campaign PAHO announced incorporated many of the ideas Sabin had been advocating for years as well as lessons from the smallpox eradication program and the na-

tional immunization days conducted by Cuba, Brazil, and other countries in the Western Hemisphere. Countries that had endemic wild poliovirus would mount 2 national immunization days a year, making use of mass marketing and large groups of organized volunteers. Vaccines against measles, diphtheria, tetanus, and pertussis would ideally be administered along with polio vaccine. In keeping with WHO's primary health care goals, as the endemic countries eliminated polio within their borders, they would phase out the national immunization days and focus on building up permanent routine immunization services.⁹³

Drawing on a lesson from the smallpox program, PAHO also planned to implement a large surveillance system to detect new cases of polio. A probable or confirmed case would lead to an investigation and a mop-up vaccination drive in the surrounding area. Countries would be certified as free of endemic polio after passing a careful inspection and going 3 years without indigenous polio cases. Unfortunately, polio vaccination would have to continue even after all participating countries had been certified as polio free, because of the risk of importation of infectious cases from outside of the Americas.⁹⁴ Despite the challenges involved—such as vaccinating millions of children in the midst of guerrilla wars—the polio elimination campaign in the Americas closely fol-

lowed this plan until the last chain of wild poliovirus transmission in the Americas was broken in 1991.⁹⁵

The Western Hemisphere campaign against polio was spearheaded by senior leaders in international organizations, nonprofits, and hemispheric governments, but it succeeded, just as in Brazil, thanks to widespread grassroots support. Polio vaccination efforts were so popular that guerrillas in El Salvador and Peru not only observed cease fires during immunization Days of Tranquility, but also often served as vaccinators themselves.⁹⁶ This popular enthusiasm contributed to the polio elimination campaign's overall positive effect on health systems in the Americas. A commission set up under primary health care proponent Carl Taylor, MD, determined that although the polio program had somewhat disrupted other health activities by diverting resources, it had also substantially enhanced the health services' reputations and ties to local communities, broadened support for vaccination at every socioeconomic level, and provided a model for social mobilization and interagency cooperation for future programs.⁹⁷

For his part, Sabin remained active and interested in the Western Hemisphere polio elimination campaign until his death in 1993. He continued to provide advice to several countries, including Paraguay and Nicaragua, as well as to PAHO and the US surgeon general. Somewhat predictably, he was often unsatisfied with the Western Hemisphere program, particularly the surveillance data and the use of vaccine delivery methods other than national immunization days.⁹⁸ Ironically, in 1986 Sabin went full circle from his 1960 efforts and

asked the US surgeon general, C. Everett Koop, MD, to introduce a resolution at the World Health Assembly calling for WHO to provide assistance to developing countries in fighting polio, this time by helping them organize volunteer vaccination armies for national immunization days.⁹⁹ Sabin had the satisfaction of living long enough to see the World Health Assembly endorse, in 1988, the goal of globally eradicating polio by 2000, an event that owed much to the success of the elimination program in the Americas.¹⁰⁰

Although the oral polio vaccine had largely fulfilled Sabin's hopes for it by the time of his death, clearly this was attributable as much to the work of Risi, de Quadros, Macedo, Sever, and others as to Sabin's own efforts to promote national immunization days for his vaccine. Sabin's record as an adviser was obviously mixed. Although he provided the Dominican Republic's health officials exactly the kind of detailed advice they needed, he was dismissed by the Brazilians and angrily broke ties with the Rotarians well before the completion of the projects he was involved in. These breaks usually occurred after he had moved from his original brief of advising on immunization techniques to offering guidance on how the groups he worked with should set their priorities and organize internally.

Furthermore, Sabin's commitment to the oral polio vaccine blinded him to its flaws. A polio program run solely by Sabin might never have addressed the possibility that vaccine poliovirus strains might regain their ability to paralyze. Nevertheless, Sabin's efforts prompted WHO's Henderson to write in 1986,

"Dr Sabin's great strength, in addition to his long experience and personal charisma, is his determination to see the world rid of polio as quickly as possible. His advocacy is an important element in making this happen."¹⁰¹ ■

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Endnotes

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