“...the world and all its peoples have won freedom from smallpox...a most devastating disease...since earliest time, leaving death, blindness and disfigurement in its wake and which only a decade ago was rampant in Africa, Asia and South America.” Resolution of the 33rd World Health Assembly, Geneva, May 8, 1980.

The juxtaposition of the writings above, 174 years apart, stand as a testament to human ingenuity. The year 2010 marks the 30th anniversary of the eradication of smallpox from the globe. It is a seminal scientific achievement for mankind and for vaccinology and public health in particular. Marking the event will be special ceremonies at the May WHO Assembly in Geneva and an international conference in Rio de Janeiro August 24–27, 2010. Information about the conference can be found at: http://www.globalhealth.emory.edu/programs/facultyPrograms/sec2010.php. VACCINE plans to publish a supplement with the major papers presented at this conference so that they will be widely available to the scientific community.

The process leading to eradication was not an easy one, and many lessons can be learned from its history. In their comprehensive book, Smallpox and It’s Eradication, Fenner, Henderson, Arita, Jezek, and Ladnyi recount that the World Health Assembly had considered programs aimed at smallpox eradication in 1950, 1952, 1954, and 1955 [1]. The first resolution introduced for smallpox eradication was put forward by Dr. Brock Chisholm, the first Director General, to the 6th World Health Assembly in 1953. This resolution was studied for 2 years and at the 8th World Health Assembly in May 1955, rejected as “unrealistic”. Three years later, Prof. Viktor Zhdanov, the Deputy Minister of Health for the USSR, introduced another resolution calling for smallpox eradication at the 11th World Health Assembly meeting in Minneapolis, Minnesota in 1958. At the 12th World Health Assembly in May 1959 the resolution was passed and agreement was procured from member nations to undertake the program. The eradication program officially began in 1967. At the time it was estimated that millions of cases were occurring in over 30 countries – leading to deaths and disfigurements – as well as the continuing threat of imported cases into countries where the disease was controlled. By 1980, certification was complete, and smallpox was declared “eradicated”.

Never before has a disease been eradicated from the globe by the deliberate efforts of mankind. The success of the effort stands as an exemplar of the potential of public health and medicine when countries of the world work constructively together in achieving common goals. It was a program whose professional staff included more than 70 nationalities and in which vaccination teams often worked across international borders to find cases and to stop outbreaks. Even during the Cold War years, collaboration replaced confrontation.

An enduring legacy of the program is that the success of the campaign resulted in the development of a range of new operational tools and methods and gave courage to governments and their health services to undertake other challenges in disease prevention. Indeed, the smallpox program catalyzed a new era during which vaccination for disease prevention grew rapidly. It is surprising to realize that when the eradication program began in 1967, vaccines were little known or used outside of the industrialized world. In developing countries, smallpox vaccine, frequently of poor quality, was used sporadically to counter epidemic smallpox. A few high-risk countries used vaccine to combat yellow fever outbreaks; BCG was provided to a few countries by UNICEF; but DPT, polio, and the comparatively new measles vaccines were relatively unknown and unused in these locations.

Among the important strategic components of the eradication program were systematic, and monitored smallpox vaccination programs designed and intended to reach 80% of the population. What surprised African program directors and advisers alike in the early years was the ready acceptance of vaccination by native populations. Where local political leaders, teachers, and health workers participated, health staff could vaccinate, on average, 500 or more persons per day.

It soon became obvious that the infrastructure developed to support smallpox vaccination could be leveraged to administer several vaccines at the same time. The Centers for Disease Control had recently completed several studies demonstrating that several vaccine antigens could be given simultaneously with safety and efficacy, including all of the then commonly used vaccines. An opportunity came in 1970 when a pharmaceutical company approached WHO offering to fund an international technical meeting which would include recent studies of its new measles vaccine. An international group was convened in December 1970 at the Pan American Health Organization headquarters. Participants encouraged and endorsed programs in the developing world that would undertake expanded programs on immunization which would include, in addition to smallpox vaccine, DPT, polio and measles vaccine – leading to the name, “Expanded Program on Immunization” (EPI).

It is owing to your discovery...that in the future the peoples of the world will learn about this disgusting smallpox disease only from ancient traditions.” Thomas Jefferson in a letter to Dr. Edward Jenner, 1806

Thirty years after smallpox: Celebration and sobering thoughts

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The World Health Assembly approved the EPI initiative in 1974 and later, UNICEF identified the program as a priority. Rotary International agreed to cover the costs of the polio vaccine. The goal was to reach 80% of the world’s children with these vaccines by 1990. Remarkably, given the logistics, intervening wars and disruption, and the economics of vaccine manufacture, this goal was effectively met. Other vaccines have now been accepted for administration on a population-wide basis in an increasing number of countries – including vaccines against hepatitis B, rubella, mumps, rotavirus, Haemophilus influenzae type b, and pneumococcus. All of these successes can effectively be traced back to the smallpox eradication program.

The eradication of smallpox was a remarkable accomplishment with the last case occurring little more than ten years after the program began. It served to enlarge our vision of the possible, and catapult us in to a new world of disease prevention through vaccines. Interested readers who wish to learn more about the history of this accomplishment, and understand the challenges, drama, and conflicts that characterized the eradication program may want to read the book, Smallpox: Death of a Disease, written by D.A. Henderson, Prometheus Books, 2009. The history of the introduction of smallpox vaccine into Boston, and the controversies surrounding it, is a captivating story effectively told in a recently released book, The Pox and the Covenant: Mather, Franklin, and the Epidemic that Changed America’s Destiny, written by Tony Williams, Sourcebooks, 2010.

Tempering the justly deserved celebration of smallpox eradication however, are some sobering thoughts. While the threat of naturally occurring smallpox has been eradicated, concern remains about both accidental release of stored smallpox and intentional release by bioterrorists. In addition, other Orthopox viruses, such as the brief outbreak of monkeypox in the midwestern US states earlier in the decade serve as a reminder for continued vigilance, and the need for safer smallpox vaccines. Other concerns have included the inability, as yet, to eradicate other human pestilences such as measles and polio. Among the lessons learned are that not only are the needed technology and specific scientific criteria required for eradication of an infectious disease, but sustained political will and cooperation are critical determinants of success. Equally important, public trust and uptake of vaccines is a critical necessity for success. As we enter into the second decade of the 21st century, these ingredients for good public health need further strengthening and renewed commitment by all the nations of the world, for the good of all peoples.

Reference


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