

From Smallpox to Polio: the Global Eradication of Disease

Part III- The Eradication of Smallpox and Other Diseases

Before it was eradicated in 1980, smallpox infections affected as many as 15 million people a year. The last known naturally occurring case of smallpox was in Somalia in 1977; however, laboratory acquired infections have occurred since the official year of its eradication. The elimination of smallpox is probably the greatest success story of the World Health Organization, which is continuing its efforts with its current program to eliminate polio.

The elimination of a contagious infectious disease requires that there be an effective vaccine against the disease and that the organism can infect only humans. The latter is more often true of viruses than bacteria. If the organism can infect other animals, these animals can provide a reservoir where the organism can survive to infect non-immunized humans in the future. Smallpox, a virus, met both of these important criteria, but that alone is not enough to ensure an effective eradication program. In addition, it is important that outbreaks of the disease can be easily identified by characteristic symptoms so that infected people may be isolated to prevent further spread of the disease. Finally, a vaccination program is only successful when people want to be vaccinated and when vaccination is readily available and affordable. This requires the involvement of the governments in those countries that harbor the disease.

In the case of smallpox all these important criteria for eradication were met. The vaccine was safe, effective and provided life-long immunity. Most people wanted to be vaccinated because they knew how terrible the disease was. Physicians could readily diagnose the disease because of its distinctive symptoms and could isolate infected individuals so the disease could not spread. Governments worked with the World Health organization to make the vaccine readily available and free to everyone. Under these conditions it took only about 14 years to eliminate the disease from the world.

The next disease targeted for eradication was polio. In 1988 the World Health Assembly comprising 166 member states began the global initiative to eradicate polio. The original target date of 2000 has not been met; however, it is estimated that polio will be eliminated by 2005. It is currently endemic in only the Indian sub-continent and in sub-Saharan Africa. Since 1988 the number of cases of polio in the world has decreased from about 350,000 cases a year to 1,947 cases in 2000.

The reason for optimism in the eradication of polio is that it has many of the same characteristics as smallpox: no animal reservoir; an effective and inexpensive vaccine that provides life-long immunity; no carriers of the disease; and government support of the efforts to stop the disease. The global eradication strategy includes: 1) routine immunization of all children with the oral polio vaccine, 2) supplementary immunization of the population on national immunization days, 3) surveillance of the population for symptoms of polio and for presence of the wild poliovirus, and 4) door-to-door immunizations. Given the current rate of decline of global cases of polio it appears likely that polio will be the next disease to be eradicated through the efforts of the World Health Organization and the member states.

Relatively few diseases can be eradicated, either because there is no effective vaccine that provides life-long immunity or because there are other hosts that provide a reservoir. Measles is one of the few diseases that could be eradicated with the present vaccine. The development of a safe and effective HIV vaccine to prevent AIDS is one of the most urgent scientific problems. Global efforts to control HIV, which has become a rapidly escalating epidemic in Africa, will depend on an effective vaccine. Unfortunately, it is still not clear whether there may be other hosts, such as monkeys, that may make eradication of this scourge simply a dream.

For more information on the eradication of polio, visit this web site:
<http://www.polioeradication.org/>