Ring Vaccination Revisited

A fresh look at 2-decades-old studies could have important consequences for U.S. smallpox policy, according to a paper in the January issue of *Epidemiology*. The study questions a key piece of evidence for the efficacy of “ring vaccination,” a cornerstone of the U.S. plan to contain smallpox outbreaks. But the authors of the original papers say that even if the study is right, there’s plenty of other evidence that ring vaccination works.

Last month, the Bush Administration announced it would vaccinate up to 11 million people preemptively against smallpox (*ScienceNOW*, 13 December 2002). But the postattack game plan is still evolving. The current version prominently features ring vaccination—isolating smallpox victims and rapidly immunizing all of their close contacts, as well as those people’s contacts.

In the new paper, Yale University mathematician Edward Kaplan and his colleagues take aim at a graph, published in scientific papers in 1971 and 1975, claiming that ring vaccination was extremely effective during the global smallpox eradication campaign. The figure, presented by an official of the Centers for Disease Control and Prevention at several key policy meetings last year, seems to show a sharp drop in new cases just after ring vaccination was introduced in 20 countries in West and Central Africa in September 1968.

But Kaplan says the figure uses several tricks to make its case. For instance, by inappropriately using a logarithmic scale on the Y axis, the authors exaggerate the plunge in incidence, while portraying gains in overall vaccination coverage (expressed as a decreasing percentage of unvaccinated people) between January 1968 and March 1969 as unremarkable. In fact, says Kaplan, the vaccination rate tripled.
during that time. When Kaplan reanalyzed the data and plotted the actual number of cases and the percentage of unvaccinated people over time on an arithmetic scale, the two appeared to decline in lockstep; nothing notable happened shortly after ring vaccination began.

William Foege, the first author on both of the earlier papers and now a consultant to the Bill and Melinda Gates Foundation, stands by the figure, arguing that logarithmic plots are perfectly acceptable in epidemiological graphs. But Donald A. Henderson, the former head of the eradication campaign and a co-author on the 1975 paper, concedes it was drawn with a political goal: persuading reluctant governments in developing countries to adopt ring vaccination. "I've always had some difficulty with that curve myself," Henderson says.

Both agree, however, that by focusing on the graph, Kaplan ignores a wealth of evidence that ring vaccination worked. By March 1969, no more than 60% of the population in West and Central Africa had been immunized—which, under normal conditions, would never suffice to wipe out smallpox, Foege says. Even in India, where coverage reached more than 90%, the scourge kept festering in some areas, he adds. Once ring vaccination was introduced, it was gone within a year. "Kaplan doesn't understand what he's talking about," Henderson concludes.

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CDC's Smallpox Preparation and Response Activities
Edward Kaplan's home page

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