

THE NEW ERA FOR IMMUNIZATION

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On May 18, 1976, twenty years ago, I was privileged to be one of the two first recipients of the Ernst Jung Prize for Medicine. It came at a time when the World Health Organization and national teams were hunting down the world's few remaining outbreaks of smallpox. I had been privileged to serve as director of that eradication effort over the preceding decade. It was believed in May 1976 that eradication was imminent and so it proved to be--the last case occurring on October 26, 1977. More than two years of arduous search followed in order to be certain that there were no more cases. Finally on May 8, 1980, the World Health Assembly officially declared that smallpox had been eradicated and recommended that all countries cease vaccination--and this, in fact is what occurred. That was 16 years ago and no further cases have been detected.

But, as Dr. Otto Westphal stated in his laudation at that time, the prize is given as much for promise for the future as for accomplishment in the past. It is appropriate today to take stock of what followed that remarkable decade when countries across the world, on both sides of the then existent Iron Curtain, joined their efforts in achieving the common goal of smallpox eradication.

During the course of the smallpox program, we all had been surprised to discover in most developing countries, entire hospital wards given over to cases of measles and poliomyelitis and tetanus and whooping cough--all diseases which are totally preventable by immunization. Such vaccines were then in widespread use in all the industrialized

countries, but fewer than one child in 20 was receiving those vaccines in the developing countries.

We proposed to the World Health Assembly in 1974 that the smallpox program be expanded to include several additional vaccines: DPT; polio; measles; and BCG. Over the following three years, the "Expanded Program on Immunization" began to take form. Progress was slow at first but in the early 1980s, it gained a new momentum--first, as UNICEF (the United Nations children's program) decided that this activity would be the cornerstone of its Child Survival initiative; and later, when Rotary International elected to raise \$100 million in support of an effort to eradicate poliomyelitis. In fact, Rotary was eventually to raise more than \$300 million and Rotary Clubs themselves in all parts of the world participated directly in helping to conduct immunization programs.

By 1990, 80% of all children throughout the world were regularly receiving these vaccines--an achievement in commitment, dedication and cooperation which in fact, dwarfs the smallpox effort. But there is more.

The numbers of cases and deaths due to these vaccine-preventable diseases fell dramatically. Most impressive of all, was the decrease in cases of poliomyelitis. Noting this, the Pan American Health Organization, WHO's Regional Office for the Western Hemisphere, proposed in 1985 to undertake a hemisphere-wide effort to eradicate polio. The principles employed were those which had been so successful in the smallpox eradication campaign. Specifically, large-scale vaccination programs which extended into the villages and which enlisted the help and support of the community; secondly, a comprehensive program of surveillance to detect and to diagnose accurately all suspected

cases; and finally, use of the data regarding polio cases to focus available resources where problems were greatest. The polio campaign in the Americas was successful. The last case occurred in August 1991, and now the program has been extended globally. Most of east Asia appears to be free of polio--this includes China, Japan, Korea, the Philippines, Australia and New Zealand--more than one-third of the world's population. Major campaigns are now in progress in both Asia and Africa. The target is to achieve eradication by the year 2000--an optimistic goal but potentially achievable. In all, the Expanded Program of Immunization now prevents more than three million deaths each year, in addition to the two million smallpox deaths which once occurred annually.

I hasten to add, for those concerned about issues of population growth, that decreases in fertility rates typically occur only after infant death rates begin to decline. And this is precisely what is happening. Fertility rates in the developing countries are now 40% lower than they were 25 years ago. In brief, there are fewer children being born and healthier children who are surviving.

But now we foresee another chapter in this evolving saga. The past decade has witnessed an exponential growth in our knowledge of exactly how man's immune system functions, in our knowledge of how organisms induce disease and in how vaccines can be produced which can prevent other infections. Within the past decade, new vaccines have been produced--against hepatitis B, the first vaccine which will protect against cancer. IT will not be the last. Early studies are in progress on a human papilloma virus vaccine which, if successful, could make carcinoma of the cervix a rare disorder. In addition, there are now vaccines against chicken pox, cholera, typhoid, meningitis and middle ear

infections. And more are promised. With increasing recognition of the number and diversity of auto-immune disorders, studies are in progress utilizing T cell vaccines in an effort to remove offending T cell subsets. Such vaccines could have broad implications for diseases such as rheumatoid arthritis, multiple sclerosis and perhaps even atherosclerosis. A recent survey indicates that there are today 150 new vaccines in various stages of testing of which 25 are in what we call phase III human trials.

The challenges now are to combine these products so that many vaccines can be given in a single injection or, better yet, given by mouth or by inhalation.

In a sense, all of this began just 200 years ago--in May 1796--when an English physician, Edward Jenner, performed the first vaccination. It required nearly 180 years before that vaccine was fully and effectively used to eradicate the dread smallpox. But that achievement has served to trigger a growing and massive global effort to control and to eradicate many other infectious diseases. The early recognition of the Jung Foundation in encouraging that effort is gratefully acknowledged.