

Nov. 30, 2005

### Formaldehyde's Key Role in the Defeat of Polio<sup>1</sup>

In America in the 1950s, summertime was a time of fear and anxiety for many parents; this was the season when children by the thousands became infected with the crippling disease poliomyelitis (polio for short), or infantile paralysis. This burden of fear was lifted forever when it was announced in April 1955 that Dr. Jonas Salk had developed a vaccine against the disease. Salk became world-famous overnight, but his discovery was the result of many years of painstaking research.

Eight years before the vaccine's success was announced, Salk accepted an appointment to the University of Pittsburgh Medical School. While working there, Salk saw an opportunity to develop a vaccine against polio, and devoted himself to this work. Eventually, Salk's work led to a vaccine composed of "killed" polio virus, which retained the ability to immunize without running the risk of infecting the patient as a live virus could. **Formaldehyde played a critical role in development of the "killed-virus" vaccine.** Here is what Salk had to say<sup>2</sup>:

"We shall soon learn the results of last year's extensive field test of the vaccine against poliomyelitis. Whatever the analysis of that test shows, the type of vaccine that is being tested will continue to be an issue among virologists, because an immunological principle is under test as well as a vaccine. **The vaccine in question is made of a 'killed' virus, that is, a virus rendered noninfectious by treatment with formaldehyde.** Many virologists believe such a vaccine can never be as effective as one containing live virus. I share the view that a killed-virus vaccine not only avoids the hazards of live virus but, if properly prepared and used, may be just as effective in producing immunity."

The worst polio epidemic in U.S. history occurred in the summer of 1952, when more than 57,000 cases were recorded. The sense of urgency to conquer the disease could not have been higher than May 1953, when Salk began his first community-based trial, inoculating volunteers drawn from the practices of two Sewickley, Pa., physicians. The mark of success would be evidence from blood samples that a child had produced antibodies to the polio virus after receiving the shots.

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<sup>1</sup> Much of this background is excerpted from two sources – A biography of Jonas Salk, M.D., on the Academy of Achievement website, [www.achievement.org](http://www.achievement.org), and *Pittsburgh Post-Gazette* articles published on April 3 and 4, 2005, to commemorate the 50<sup>th</sup> anniversary of the defeat of polio.

<sup>2</sup> "50, 100 & 150 Years Ago," *Scientific American*, April 2005

Encouraged by Salk's preliminary results and feeling pressure from a public still panicky from the 1952 outbreak, leaders of the National Foundation for Infantile Paralysis moved ahead in 1954 with plans for what would be the largest controlled trial in the history of medicine. Under auspices of the University of Michigan, about 440,000 children ages six to nine in 44 states would receive the vaccine.

As it turned out, Salk was right. In an electrifying moment in medical history, a terrifying, incurable disease that had existed for thousands of years had yielded to the targeted efforts of scientists, who used formaldehyde to make a vaccine that was safe and effective. Statistics reflect the dramatic impact of the vaccine's introduction. More than 38,000 new cases of polio were reported in 1954, the third highest annual total. In the late 1950s, an oral vaccine, using a weakened virus, was introduced by Dr. Albert Sabin of the University of Cincinnati. By 1960, together the Salk and Sabine vaccines had cut the number of U.S. polio cases to 2,525, and by 1965 that number had plummeted to 61.

The dreaded disease had been conquered, thanks in significant measure to **formaldehyde's ability to create a "killed" virus**. Dr. Jonas Salk went on to work on a cure for the AIDS virus and to be named one of Time Magazine's 100 most important people of the 20<sup>th</sup> Century.

Today, **formaldehyde** is used to inactivate bacteria or viruses in the production of numerous other vaccines<sup>3</sup>, including those to inoculate against anthrax, cholera, diphtheria, hepatitis A and B, influenza, Japanese encephalitis, pertussis and tetanus. Inactivated viruses are stable and safe; they cannot revert to the virulent form. They often do not require refrigeration, a quality that makes them accessible to the people of many developing countries, as well as practical for vaccinating people who are highly mobile, such as members of the armed forces. Most inactivated vaccines stimulate a relatively weak response and must be given more than once.

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<sup>3</sup> *The Economic Benefits of Formaldehyde to the United States and Canadian Economies*, prepared for the Formaldehyde Council Inc. by Global Insight, Lexington, Mass., August 2005.