

HISTORICAL NOTE

Salk and Sabin: poliomyelitis immunisation

The first decade of the 20th century was marked by a wave of poliomyelitis research. Treatment and prevention were, however, of little avail and epidemics continued, with a large toll of residual disabilities.

Vaccines

In 1935 Maurice Brodie had attempted to modify the virus by exposing it to formaldehyde. This formalin inactivated "vaccine" was first tried with 20 monkeys, then with 3000 children. The results were poor and Brodie's vaccine was never used again.¹ John Kollmer used live attenuated virus that also proved ineffective, and was blamed for causing many cases of polio, some fatal.

Attempts to develop a polio vaccine progressed. In 1955, Salk² developed the inactivated poliovirus vaccine; thus began widespread immunisation. This was followed in 1960 by a live, attenuated oral vaccine developed by Sabin.³ The effect was impressive. From 28 000 reported cases of polio in 1955, in 1956, one year after immunisation, there were only 15 000 cases.

Salk's laboratory in Pittsburgh was established in 1948 for poliovirus typing. Salk was new to polio research. His wartime work on influenza virus used "killed virus". For polio, he used this same approach, applying tissue culture methods, recently developed. By 1954 it proved effective against all three strains of poliovirus. Salk reported the results in January, 1953. Perhaps because of the worst polio epidemic in history in 1952, the National Foundation's Committee backed Salk's work. In the 1954 trials over a million children were randomly assigned to vaccinated or non-vaccinated groups. Vaccination reduced the incidence to less than 50%; when a vaccinated child did contract polio, it was usually non-paralytic.

Jonas Salk (1914–1995)

Born of Russian–Jewish parents, Salk attended medical school in New York University. He spent a year researching the recently discovered influenza virus. His technique succeeded and informed his later work on polio:

"The principal that I tried to establish was really that it was not necessary to run the risk of infection, which would have been the case if one were to try to develop an attenuated or weakened poliovirus vaccine. And so it seemed to me the safer and more certain way to proceed. That if we could inactivate the virus that we could move on to a vaccine very quickly."

In 1947, he was appointed to the University of Pittsburgh to work with the National Foundation for Infantile Paralysis. By 1955 trials of his polio vaccine showed its efficacy. When news of the discovery broke on 12 April 1955, Salk was hailed as a miracle worker. He further endeared himself to the public by refusing to patent the vaccine or to profit from his discovery. In 1963 he founded the Salk Institute for Biological Studies. He continued to conduct research and publish books, some in collaboration with his sons, who are also medical scientists. Salk's books include *Man unfolding* (1972), *The*

survival of the wisest (1973), *World population and human values: a new reality* (1981), and *Anatomy of reality* (1983). He was awarded the Nobel Prize in 1954 for the first effective polio vaccine. His last years he spent searching for a vaccine against AIDS. A great pioneer, Salk died aged 80 on 23 June 1995.

Albert Sabin (1906–1993)

Sabin showed that poliovirus first invaded the digestive tract and then the nervous system. He was also among those who identified the three types of poliovirus. He developed a live but attenuated oral vaccine that proved to be superior in administration, but also provided longer lasting immunity than the Salk vaccine. After a clash between the rival camps and their principals, by 1962 Salk's vaccine was replaced by the Sabin vaccine.⁴ The effectiveness was demonstrated in field trials (1958 and 1959).

Albert Bruce Sabin⁵ was born 26 August 1906 in Bialystok, Poland, then a part of Russia. He and his family emigrated to the USA in 1921, to escape racial persecution. He graduated from New York University in 1928. A year at the Lister Institute of Preventive Medicine in London furthered his training. In 1935, he joined the staff of Rockefeller University before moving in 1939 to Cincinnati Children's Hospital to conduct research on viruses. He was consultant to the army during world war two, isolated the virus of sandfly fever, and helped to develop a vaccine against dengue fever. His studies included toxoplasmosis and viral encephalitis. After the war, Sabin returned to Cincinnati to develop the polio vaccine in 1954.

In 1970 he became president of the Weizmann Institute of Science in Israel, but because of cardiac illness he later resigned. He received many honours: election to the National Academy of Sciences, 1951; the Bruce Memorial Award of the American College of Physicians, 1961; the Feltnelli Prize of the Academia dei Lincei of Rome, 1964; the Lasker Clinical Research Award in 1965; and the United States National Medal of Science in 1971.

The value of the work of Salk and Sabin is immeasurable. Sabin died on 3 March 1993.

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doi: 10.1136/jnnp.2003.028530

References

- 1 Paul JR. *A history of poliomyelitis*. New Haven: Yale University Press, 1971:256.
- 2 Salk JE. Studies in human subjects on active immunization against poliomyelitis. 1. A preliminary report. *J Amer Med Assoc* 1953;151:1081–98.
- 3 Sabin AB. Characteristics and genetic potentialities of experimentally produced and naturally occurring variants of poliomyelitis virus. *Ann NY Acad Sci* 1955;61:924–38.
- 4 Sabin AB. Characteristics and genetic potentialities of experimentally produced and naturally occurring variants of poliomyelitis virus. *Ann NY Acad Sci* 1955;61:924–38.
- 5 Obituary Dr Sabin. *New York Times* March 4 1993.