SALK POLIO VACCINE PROVES SUCCESS; MILLIONS WILL BE IMMUNIZED SOON; CITY SCHOOLS BEGIN SHOTS APRIL 25

Associated Press Wirephoto

WORDS OF HOPE: Dr. Thomas Francis Jr., left, and Dr. Jonas E. Salk on speakers' platform at Ann Arbor, Mich., where they addressed scientists on effects of polio vaccine.

TRIAL DATA GIVEN

Efficacy of 80 to 90% Shown—Salk Sees Further Advance

Abstract of report, summary of data on tests, Page 22.

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Special to The New York Times.

ANN ARBOR, Mich., April 12—The world learned today that its hopes for finding an effective weapon against paralytic polio had been realized.

The triple anti-polio vaccine originated by Dr. Jonas E. Salk works. This was revealed in the long-awaited report on the mass field trials of 1954, largest of their kind in medical history.

In these tests the vaccine, designed to protect against the crippling effects of all the three types of virus known to produce paralytic polio, was administered to 440,000 children in forty-four states.

The report, a medical classic, was presented at a special scientific meeting at the University of Michigan by Dr. Thomas Francis Jr. It was he who had directed the evaluation of the vast mass of data provided by the tests, involving the correlation of 144,000,000 separate items of information.

Half Got Dummy Shot

Dr. Francis reported the vaccinations had been 80 to 90 per cent effective on the basis of results in eleven states.

In these states, which included New York, half of the children vaccinated got the Salk vaccine. The other half received a placebo, or dummy shot.

These results, Dr. Francis reported, were looked upon with "greater confidence" than the figures in other areas. In these the results indicated an effectiveness of 60 to 80 per cent against paralysis by any polio virus.

Dr. Salk reported at the meeting that new and more potent vaccines and more effective methods of administering them, were ready for the 1955 vaccinations.

Dr. Salk, who is a member of the faculty at the University of Pittsburgh's School of Medicine, said:

"Theoretically, the new 1955 vaccines and vaccination procedures may lead to 100 per cent protection from paralysis of all those vaccinated."

The new procedures he out-

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SALK'S VACCINE PROVES SUCCESS

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ined require two inoculations spaced two to four weeks apart, with a third "booster" shot seven months later.

This means that the amount of vaccine immediately available this season is automatically increased by 50 per cent, because in last year's trials the first two inoculations were given a week apart, and the third only one month after the second.

Comparisons Made Possible

There are three distinct types of polio virus, known respectively as Type I, II and III, or Brunhilde, Lansing and Leon. Each is able to produce paralytic polio.

The Salk vaccine is made of the three types of virus, killed by formaldehyde, so that they no longer can produce the disease, but retain their ability to stimulate the production of antibodies (immunity factors) in the recipient's blood stream.

In thirty-three states the vaccine was administered only to children in the second grade. Children in the first and third grades received no injections. The latter served as controls. That is, they were watched for the incidence of paralytic polio among them as compared with the vaccinated second graders.

The areas in these thirty-three states were known as the observed areas, as contrasted with the areas in the eleven states, in which all children in the first three grades were vaccinated. In these latter areas half of those injected were given the placebo. Hence they were known as the placebo areas.

The placebos and the real vaccines looked exactly alike. No one knew which was which until they were decoded by Dr. Francis. The placebos were used to eliminate any possible subjective influence, to make sure of 100 per cent objectivity in the tests.

Results Found to Differ

Dr. Francis' report states, however, that the data show that the vaccine was not equally effective against all the three types of the polio virus, either in the observed or in the placebo areas.

The report adds, "from these data it is not possible to select a single value giving numerical expression in a complete sense to the effectiveness of the vaccine as a total experience."

The results from the observed areas in the thirty-three states, the report states, suggest a lower effectiveness than those in the placebo areas.

"If the results from the observed study are employed," the Francis report declares, "the vaccine could be considered to have been 60 to 80 per cent effective against paralytic poliomyelitis, 60 per cent against Type I poliomyelitis, and 70 to 80 per cent effective against disease caused by Types II and III.

"There is, however, greater confidence in the results obtained from the strictly controlled and almost identical test populations in the placebo study area.

Effectiveness Calculated

"On this basis it may be suggested that vaccination was 80 to 90 per cent effective against paralytic poliomyelitis; that it was 60 to 70 per cent effective against disease caused by Type I virus and 90 per cent or more effective against that of Type II and Type III virus.

"The estimate would be more secure had a larger number of cases been available."

Type I polio is the most prevalent type of the disease. It accounts for about 65 per cent of all cases of clinical polio. Type II accounts for about 5 per cent of the clinical cases. Type III causes about 30 per cent.

Dr. Salk, talking further about the prospects for the current 1955 tests, said it had been found that a certain chemical that had been used as a preservative for the vaccine had destroyed a great deal of the vaccine potency. This may account for the lack of consistency in the results, the lower figures possibly being due to batches of vaccine that had lost their potency because of the preservative.

The field trails were made possible by $7,500,000 in March of Dimes funds provided by the National Foundation for Infantile Paralysis. The evaluation was carried out at a special center at the University of Michigan by a large staff directed by Dr. Francis, one of the world's outstanding epidemiologists.

Comparable Efficacies Cited

While no official figures are available, authorities here said that the effectiveness of most vaccines was in the neighborhood of 90 to 95 per cent. However, it was pointed out, none of them was 90 per cent efficient the first year it was given.

The two most effective vaccines now known are those against smallpox and yellow fever. Both are made of live attenuated virus. Their effectiveness is in the range of 95 per cent. This means that ninety-five out of every 100 vaccinated are proected against the disease if exposed to it. Effective vaccines, in the form known as toxoids, also exist against diphtheria, about 90 per cent effective, and tetanus, about 95 per cent effective.

Potent vaccines also exist against whooping cough, typhoid fever, typhus fever, Rocky Mountain spotted fever, rabies and influenza. The vaccine against typhus reduces mortality from the disease to zero, but that does not mean it also completely eliminates the sickness. The vaccine against influenza is effective against only the same strain of virus.

The vaccine last year was given in three separate inoculations, of one cubic centimeter each. The first two were given one week apart, while the third, known as the "booster" shot was given one month after the second.

The first two inoculations are the conditioning shots, creating in the blood stream a "memory" that mobilizes the body's defensive forces quickly as it is invaded by the specific microbe against which the vaccine has been designed.

The third "booster" shot is thus the one, aided by the "memory," that produces in the bloodstream the largest amount of anti-bodies.

The effectiveness of the "booster" shot depends on the time interval between it and the conditioning shots, as it takes a definite amount of time for the "memory" to be fully developed.

Dr. Salk's latest studies have revealed, he reported today, that the "booster" shot should properly be given some seven months after the first conditioning shots, as it takes that long for the anti-polio "memory" to be fully developed.

These findings, therefore, indicate that the percentage of effectiveness on the mass trials last year would have been considerably greater had the "booster" shot been given seven months after the first two, instead of only one month later.

Would Cut Inoculations

Only two inoculations, spaced two to four weeks apart, should be given in 1955, instead of three over a five-week period, Dr. Salk reported today.

The third shot, should not be given before at least seven months have elapsed, but certainly before the onset of the 1956 polio season, he said.

At present it is known that the National Foundation for Infantile Paralysis has ordered a total of 27,000,000 cubic centimers of the vaccine on the basis of three shots of one cubic centimer each. This quantity is enough for the immunization of 9,000,000 children.

However, if only two shots of one cubic centimer each are to be given this year, with the third shot to be postponed for seven months, the 27,000,000 cubic centimers would be enough to provide immunization for 13,500,000 individuals.

Basil O'Connor, president of the National Foundation, said no decision had as yet been made as to what course of distribution to follow in the light of Dr. Salk's latest findings.

Reactions to the vaccine were nearly negligible, the Francis report showed. Only 0.4 per cent of the vaccinated children suffered minor reactions. An even smaller percentage suffered more severe reactions.

The persistence of protection appears reasonably good. When good anti-body responses were obtained from vaccination, the report said, "the effect was maintained with but moderate decline after five months."

Distribution of anti-body levels among vaccinated persons was much higher than that in the control population from the same areas.

Out of a total population of 1,829,916 children a total of 1,013 cases of polio developed during the study period and were reported to the center.

In places of control areas, where vaccine was interchanged with an inert substance, 428 out of 749,236 children contracted the disease.

In the observed control areas where only second graders were inoculated, 585 cases developed among 1,080,680 children.

Only One Death Reported

Specifically, thirty-three inoculated children in the placebo areas receiving the complete vaccination series became paralyzed. This is opposed to 115 uninoculated children who contracted the disease.

Similarly, in the observed areas there were thirty-eight such children who became paralyzed, as opposed to 330 uninoculated children.

There were four deaths among children who received placebo; none among the vaccinated. In observed areas there were eleven fatalities; none among children receiving the vaccine.

Only one child who had been inoculated with the vaccine died of polio, and this death followed a tonsillectomy two days after the second injection of the vaccine in an area where polio was already prevalent.

Other findings were:

¶The vaccine's effectiveness was more clearly seen when measured against the more severe cases of the disease.

¶Although data were limited, findings in Canada and Finland support the report in showing a significant effect of the vaccine among cases from whom virus was isolated.

¶Vaccination protected against family exposure. One out of 233 inoculated children developed the disease, while eight out of 244 children receiving placebo contracted the disease from family contact.

Dr. Salk further urged that all children who had received polio inoculations during the 1954 field trials should be given an additional dose in 1955. This is necessary, he said, because the three doses given in 1954 could not have been expected to produce more than a primary effect.

Dr. Salk explained that the first two inoculations in the three-inoculation series were sufficient to induce a primary stimulation of disease fighters in the blood. Over a period of months, a hyper-reactive state develops. This is simply a state of readiness, somewhat like a revolver that is cocked and ready to fire at a slight pressure on the trigger.

While the amount of measureable anti-body in the blood serum may not be large during this state of readiness, a "booster" shot administered after the required seven months serves as a trigger to explode the anti-body formation to remarkably high levels.

He added that exposure to a natural polio infection also served to induce the rapid production of anti-body once the hyper-reactive state has been developed in the anti-body cells.

In other words, even though anti-body may not be demonstrable in the blood serum at the time of invasion by polio virus, previous vaccination will have so primed the immunologic mechanism that anti-body in good concentration would appear in the serum shortly after the initiation of virus multiplication at the portal of entry.

If such anti-body development occurs prior to invasion of the blood stream and is present in sufficient concentration, access of virus to the central nervous system would be intercepted.

Dr. Salk said that use of vaccine for the first time during the polio season, or even in epidemic areas, might be expected to have a beneficial effect so long as certain time limitations are kept in mind.

He said that measurable anti-body was almost always induced by the fourteenth day after first vaccination. It is conceivable, then, that the probability of contracting paralytic polio would be less if exposure occurred after anti-body was present in the serum in concentration.