Salk Vaccine

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ALMOST everyone knows what is vaccination; for it is the usual practice in our country to vaccinate children in their early infancy and later in their school life. But, what all probably may not know is that, apart from this small-pox vaccine, there are a few other vaccines available, against the diseases such as typhoid, cholera, plague, whooping cough, yellow fever, tuberculosis etc. This vaccination procedure to fight the contegeous and communicable diseases came to be known to us ever since Jenner first made the discovery of small-pox vaccine. The principle of vaccine therapy, in short, as it is known today, is like this: the 'killed' or 'attenuated' germs are introduced in the body, which by its natural mechanism starts producing "antibodies" which attack and kill the disease-producing organisms. This antibody formation is a specific one, which means that one particular vaccine will give rise to that particular type of antibodies and will cure that disease only. In other words, there will have to be as many vaccines as there are diseases. So far, we have not been able to achieve vaccines for all diseases; for the preparation of vaccine is by no means an easy process.

One such disease, for which there was no vaccine, is poliomyelitis, commonly known as infantile paralysis. This disease is a curse to the children in Western Countries, particularly in America. It attacks the children in early life and paralysis their limbs. However, the cases of polio in adult life are not uncommon. Considering the fact that millions of children are crippled by polio and there is no remedy for it, it is no wonder that the medical world, why, even the general public, are today excited over the polio vaccine produced, developed and evaluated by Salk and his colleagues. No medical discovery in recent years has received such welcome and publicity, such help and support from Government and private institutions, such glory and gratitude from the public as this Salk polio vaccine. And yet it is as simple a vaccine as any other.

The biggest hurdle in the development of this vaccine was overcome by Drs. John Endors, Thomas Weller and Frederick Robbins of America, six years ago. They discovered a method of cultivating viruses, the tiniest of disease-producing organisms, in artificial media like the minced monkey kidneys. Thus, they were able to cultivate the polio virus, which usually attacks the nervous tissue, in non-nervous tissue culture. This work, for which they received the Nobel prize in 1949, broke the bottle-neck in polio research.

What followed in the next six years is the struggle of Dr. Salk and his colleagues and several other teams of investigators to isolate and cultivate the various strains of polio virus and prepare them into a safe vaccine that could afford protection against all those virus strains. This was a long drawn-out struggle. All the available polio viruses were classified into three family types: Types I, II and III. These were isolated and cultivated in separate tissue culture flasks and after killing them, were preserved in an antiseptic called *Merthiolate*, preparatory to vaccination. On experimental vaccination to monkeys and mice and then to groups of children, it was found that the protection offered to the infection with virulent strains of polio virus was not complete. Closer studies revealed that

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this vaccine was only 60-70% effective against the virus type I—the type which caused most of the paralytic and fatal cases of polio. On the other hand, the protection against Types II and III was nearly 100 per cent. There could only be one mistake, i.e. the vaccine had lost part of its potency on keeping. Intensive investigation revealed that the preservative *merthiolate* was weakening the potency of the vaccine. Hence, a chemical called versene had to be added to counter-act the ill-ffects of *merthiolate.*

The next part of the strugle was to find out the number and spacings of vaccination and the time taken by the animals and human beings to develop the full complement of anti-bodies, before the vaccine could be certified as fully protected. And then the field trials showed that what is optimum time for animals was insufficient for human beings. While monkeys and mice developed full anti-body concentration in a week's time, men took several months. Moreover, there was variation in response from man to man. It is the usual practice in vaccination procedures to give vaccines in properly spaced and divided doses than in one large dose, for the response to the first dose is known to be boosted up by the shots of subsequent vaccination. This, in medical parlance, is called " booster effect ".

The last but not the least important part in the investigations was to find out how long this vaccine can give protection against polio. A few years ? A life time ? This is a question that remains to be satisfactorily answered, for, the vaccine was discovered only recently. Dr. Salk believes that his vaccine can afford protection at least for two and a half years and probably a good deal longer.

And the investigators are on the war-path again. Attempts are being made to improve upon the present vaccine. In some laboratories, studies on " attenuated " polio vaccine are under progress. And the eternal search for a " cure " for polio is pursued with greater and greater vigour. Statistical records have warned that during the last fifteen years there has been a sharp " step-ladder " increase in the incidence of this disease.

And if this vaccine works, the story of its development and field testing often in the face of serious obstacles will, doubtless, become and remain one of the greatest classical dramas in the history of medicine.