

# Complication of Making Salk Vaccine Reason for Lack of Sufficient Supply

Editor's note: In these days of mass production many people have wondered why it hasn't been possible to turn out enough polio vaccines to take care of everybody's right away. To get the answer, the United Press sent its polio reporter on a tour of the big Eli Lilly plant.

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Indianapolis—(UP)—Why isn't there enough polio vaccine for everyone? Very simple. It is incredibly difficult to make.

Only six American drug firms attempted it. Only one, the big Eli Lilly Co. here, has got into mass production.

From the collecting of monkeys in far away India to the filling of the small glass vials that are shipped to your doctor or clinic, the manufacture of Salk vaccine is a bewilderingly complicated process.

The experts say it is the most difficult biological product man has ever tried to make. And if you have any doubts, come along on a guided tour of the Lilly plant.

### Monkeys From India

In the crisp early morning air, a plane settles down on the airport just outside of Indianapolis with 1,600 Rhesus monkeys gathered only four days earlier in India. Heated trucks speed them to steam cleaned cages in Lilly's building 50. One by one, they are taken into a small glass-walled room and anesthetized. A white-robed technician removes the kidneys; another removes the other vital organs to check for possible disease.

### Monkey Cells Vital

The healthy kidneys, one of the raw materials of all Salk vaccine, then are taken into another germ-free room where girls mince them with ordinary barbers' shears. After this they are placed in Poblitsky flasks, large squarish bottles, along with a nourishing fluid known as medium 199. For six days, mechanized racks rock the flasks to and fro in a large incubating room and the tiny kidney cells mysteriously multiply.

These monkey cells are vital. They are the only material in which polio viruses have been grown successfully in mass production.

When the kidney cells have grown for six days, the flasks are "seeded" with live polio virus, types I, II and III in different flasks. For four more days, the flasks are rocked gently and the viruses multiply to a thousand times their original quantity.

Now the fluid is filtered three times to remove kidney cell fragments, bacteria, and indeed everything but the polio virus itself. And the first of a seemingly interminable series of tests is performed, to determine the strength of the virus fluid and to make sure it isn't contaminated with monkey viruses, bacteria, molds, or tuberculosis germs. Inactivation Process

Then begins the crucial "inactivation" process in which the live polio viruses are "killed" by heat and formaldehyde so that the final product cannot infect a child.

The virus fluid, now assembled in 100-gallon stainless steel tanks, is pumped through a heater and the formaldehyde injected simultaneously under pressure. The virus and the formaldehyde are kept together for 13 days in a heated room. Each day the tanks are shaken by hand three times and the fluid is completely filtered once to make sure the formaldehyde reaches every virus particle.

Every 15 hours for the first 45 hours, samples of the virus fluid are taken and added to live monkey kidney cells. By measuring the damage done to the cells, the Lilly technicians can determine the rate at which the virus is being killed. Then, three days before the end of the inactivation period, and again at the end, more tests are done to confirm that the virus has been fully inactivated.

As soon as the fluid is inactivated, it is moved to Lilly's plant more than a mile away. This is to guard against live viruses in the first plant accidentally getting into the inactivated product.

In this huge building, the pools of type I, II, and III vaccine are mixed together in huge tanks to form the three-strain vaccine called for in the Salk formula. More long tests.

Final Safety Tests  
Samples are tested for the absence of bacteria. Monkeys are vaccinated and their blood tested to make sure the vaccine is potent enough, that it will prevent polio paralysis. The vaccine's safety is tested again both in monkeys and in monkey kidney tissue cultures.

When it has passed these considerable hurdles, it moves into the filling rooms. Here, the air is triple-filtered and kept under pressure to keep out germs. Girls in sterile white gowns reach into stainless steel filling hoods to fill the small vials by hand. They watch what they are doing through small windows in the hood.

The vials move monotonously out of the room on a conveyor belt and are stored while more tests are run. This time samples of the finished products are injected into monkeys, which have

been made extra sensitive with cortisone, to provide one final guarantee that the vaccine is safe.

All in all, it has taken 20 days to make the vaccine and at least 100 days to test it. Lilly's production line is booming. This one firm alone has produced nearly 70 per cent of all the vaccine released so far. It plans to turn out a record 60,000,000 shots in the first six months of 1956.

One reason for this is that Lilly has put its vaccine production on a seven-day, nine-hour-a-day basis and has transferred key technicians and scientists from other departments. Frank E. Kamplain, the man in immediate charge of production, put it this way: "Our workers have been making a lot of sacrifices. When we were asked to boost production we put it squarely up to them and they responded 100 per cent."

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