

MEDICAL INNOVATION: MEASLES VACCINE (PHARMACEUTICAL: BIOLOGICALS)

Physician: John Enders, Samuel Katz, Tom Peebles, Maurice Hilleman
Industry: Merck, Enders Laboratory

Situation

One of the most contagious diseases known to man

Measles is one of the most contagious diseases known to man, striking mostly young children. Caused by an airborne virus, measles is so easy to spread that just being in the same room as someone with the disease is almost guaranteed to make one come down with it – even if the person carrying the virus has left the room. Patients stricken with measles develop a cough, a serious rash and a high fever of 104 degrees or above. The disease lasts two to three weeks, and can be fatal.

Measles has no known cure. By the early 1960s, measles would strike over 100 million people worldwide, and of these, some six million would die annually. In the U.S., complications from measles were less serious, due to good nutrition and healthcare, but three to four million Americans would catch the disease annually, 400-500 of whom would die from it. Still, it was the world's most deadly acute infectious illness worldwide among children.

Physician-Industry Collaboration

A long search for a vaccine is finally perfected through collaboration

In the mid-1950s, a celebrated virologist named John Enders, who was instrumental in the development of a polio vaccine, began working together with several trusted colleagues on developing a similar compound that would prevent infection with measles. Enders first needed a reliable strain of the disease, so he sent his colleague Tom Peebles to draw blood from infected children nearby in Massachusetts.

The next challenge was to find a suitable host animal that could be reliable for experimentation on the virus. Asian monkeys – the only animals known to be susceptible to the disease – were largely unreliable carriers, as some would get infected with measles and some would not. Working with another colleague, Sam Katz, Enders found the problem: some monkeys had previously been exposed to the disease, so they were immune; hence the irregular patterns of infection in the laboratory.

With a reliable virus and a good animal host, the Enders team set about the task of growing the virus in non-primate tissue, essential to developing a vaccine. They eventually found success with chick cells, and the race was on to multiply the virus to the point that it weakened so it was in a form that could no longer infect humans, but still produce an immune reaction. They isolated a possible vaccine strain in 1958 and went about testing it on small groups of children, with very good results – it made them immune from measles.

However, the vaccine was far from perfect, as it caused a fever in a third of the children to whom it was given. Enders then enlisted the vaccine developer Maurice Hilleman from Merck, and they perfected the vaccine licensed for safe and regular use in children worldwide in 1963.

Innovation Benefits

110 million lives saved in the last 50 years

With the rapid adoption of an effective vaccine worldwide, outbreaks of measles dropped dramatically, though it remains a deadly disease in some impoverished countries. In 2000, more than 80% of the world's children were vaccinated against it. In 2004, only 37 people were infected with measles in the U.S., down from 3-4 million in the early 1960s.

Worldwide infections dropped to 20 million from over 100 million before the vaccine was developed, and deaths from the disease shrank to 345,000 from over 6 million. It is estimated that the vaccine has saved over 110 million lives in the last 50 years.

Patient Benefits

“For a while, he seemed to be wasting away...”

Megan Campbell described a harrowing [story](#) involving her 10-month-old son catching measles to the Centers for Disease Control, serving as a reminder of how dangerous measles can be in children even today:

"After picking our son up at child care because he had a fever," says Megan, "we went straight to our pediatrician who said our baby had a virus. Two days later, his fever hit 104 degrees and a rash appeared on his head."

The rash quickly crept down to his arms and chest. Megan and husband Chris turned to the Internet. Finding pictures of measles that looked like their son's rash, they rushed him to the local children's hospital.

"No one there had seen or tested for measles for about 17 years," says Megan. "And no one expected it in the year 2008 in the United States. The next day, an infectious disease specialist confirmed [it was] measles.

"We spent three days in the hospital fearing we might lose our baby boy. He couldn't drink or eat, so he was on an IV, and for a while he seemed to be wasting away. When he began to be able to drink again we got to take him home..." His fever continued, spiking as high as 106 degrees.

Thankfully, the baby recovered fully.

Megan now knows that her son was exposed to measles during his 10-month check-up, when another mother brought her ill son into the pediatrician's waiting room. An investigation found that the boy and his siblings had gotten measles overseas and brought it back to the United States. They had not been vaccinated.

"People who choose not to vaccinate their children actually make a choice for other children and put them at risk," Megan explains. "At 10 months, my son was too young to get measles, mumps, rubella (MMR) vaccine. But when he was 12 months old, we got him the vaccine—even though he wasn't susceptible to measles anymore. This way, he won't suffer from mumps or rubella, or spread them to anyone else."

