World Health Day

Vaccination : The best Medical Insurance

By Nancy Resenberg

THE BABY gurgles happily on the examining table, oblivious of the doctor and his hypodermic needle. In a corner, the baby's mother covers her eyes. Minutes later it is over, the baby calm but no longer gurgling, his mother relieved and reassured. The inoculation may give her baby a slight fever, or make him feel a little out of sorts, but this is a small price to pay for the protection it will give him against a potentially crippling or fatal disease.

Inoculations like this one are the very best medical insurance and certainly the least expensive. Properly administered, they can prevent diphtheria, whooping cough, tetanus, polio, measles, smallpox, mumps, tuberculosis and a number of other serious diseases.

This miracle of preventive medicine was discovered about two hundred years ago. The first person to receive it was an English boy, James Phipps, who lived in the farmlands of Gloucestershire. There, in 1796, Edward Jenner inoculated him with cowpox you could never get smallpox. Cowpox is a mild disease, smallpox a severe and often fatal one. When Jenner inoculated James Phipps with smallpox germs a few weeks later, the belief was borne out. It proved impossible to infect the boy with smallpox.

Jenner's discovery was called vaccination from vacca, the Latin word for cow. A huge success in its own time, it is still in use today. But, though children be protected against smallpox, they continued to die from other diseases. It was only years later, when scientists discovered just why vaccination worked so well, that they were able to apply the same principle on a broader scale.

One of the body's natural responses to invasion by disease germs is the production of antibodies, special proteins that are designed to neutralize the germs and render them harmless. Each germ has its own special antibody that fits it as a lock fits a key. Measles antibodies, for example, are effective against mealses germs but powerless against the germs that cause smallpox or polio. Once the body has produced antibodies for a particular germs, it never forgets how to do it. If ever the germ comes back again, it is neutralized before it can do any harm. That is why people almost never catch diseases like measles and smallpox more than once.

Vaccination is a way of taking advantage of this natural defence mechanism. When James Phipps was inoculated with cowpox germs, his body reacted by producing cowpox antibodies to neutralize them. Luckily, smallpox germs are so similar to the germs that cause cowpox that cowpox antibodies are able to neutralize them too. By allowing himself to be infected with a harmless disease, James Phipps was able to acquire protection against a far more dangerous one.

Generally speaking, vaccines work on a similar principle. Each is made from a germ that has been changed or weakened just enough to prevent it from causing a serious illness but not enough to destroy its ability to stimulate the production of antibodies. Some vaccines are prepared with killed germs. Once the vaccine has been administered, the antibodies are on the scene before the harmful germ arrives, and the serious illness does not have a chance to develop. Jenner was fortunate in discovering a ready-made smallpox vaccine that nature had provided. Developing vaccines for other diseases has often taken years of arduous work. Scientists have isolated the disease germs, and, in some cases, grown them in the laboratory animals that have been found to be susceptible to the disease. So, ferrets have been given flu, monkeys polio, and rabbits rabies. Only when animal experiments have shown the safety and effectiveness of the vaccine are the first tests carried out on people.

All vaccines are made in accordance with this same general procedure, yet each microorganism presents problems of its own. One of the great triumphs of modern virology was the development of a vaccine for polio, a severe disease that can damage the spinal cord, causing paralysis and death. Polio is caused by a virus, a tiny mocroorganism that grows only inside living cells. To raise viruses in the laboratory, scientists must find just the right living cells in which to grow them and learn to keep these cells alive under laboratory conditions.

For many years, no way could be found to grow polio virus in the laboratory. Without a large supply of the virus, there was no hope of developing a vaccine. The break came in 1948 when Dr. John Enders and his colleagues at Harvard University finally managed to solve the problem, winning a Nobel Prize for their efforts. They succeeded in growing polio virus in cells which were themselves growing on the glass walls of a laboratory flask.

When large quantities of the virus were available, Dr. Jonas E. Salk undertook the development of a "killed" virus vaccine, one in which the virus was inactivated with formaldehyde. It took several years to complete this work and to test the vaccine for safety and effectiveness. The Salk vaccine, still used to-day, is administered by injection. In addition, Dr. Albert B. Sabin has developed a "live" polio vaccine, one in which the virus is weakened rather than killed. The Sabin vaccine is given by mouth.

The influenza virus has been leading scientists a merry chase for decades now. A microscopic quick-