Vaccines

Did you know that "More than 6.47 billion doses have been administered across 184 countries" according to Bloomberg. Humans have benefited from the vaccines for more than two centuries yet the road to effective vaccines has been bumpy and difficult to cross. In today's video we will be talking about vaccines.

So what is the history of vaccines? What are the developments Vaccines have gone through throughout history? And how much do we invest in producing Vaccines? We will answer these questions and more.

Origins

The world's first ever vaccine was developed in the 1790s at the hands of Edward Jenner. Jenner inoculated an eight-year-old boy by taking a pus from a cowpox lesion on a milkmaid's hand. But how did Jenner, a country doctor, formulate the vaccine concept, you ask? Well, his discovery relied extensively on knowledge of the local customs of farming communities and the awareness that milkmaids infected with cowpox were immune to subsequent outbreaks of smallpox that periodically swept through the area. If you are thinking:" There is now way he accomplished all that with only knowledge of the local customs" then you are absolutely right! Jenner applied the scientific methods of observation and experimentation to this wisdom, ultimately conducting one of the world’s first clinical trials.

Jenner also profited from his training as a wide-ranging generalist with a broad knowledge of science and medicine. For example, before devoting himself to private practice, Jenner focused on natural history. The seed for the vaccine idea was planted in his head after hearing a Bristol milkmaid boast, “I shall never have smallpox for I have had cowpox. I shall never have an ugly pockmarked face.” Two decades later he translated that farming lore into the guiding principle of his cowpox inoculation hypothesis. His cognizance that animals were implicated and necessary for vaccine production was truly farsighted; it foreshadowed later use of cows, guinea pigs, rabbits, and even chicken eggs in vaccine production. However this made many people hostile to the idea of injecting their bodies with foreign animal products. It seems that they would rather die than believe in science.

Vaccines train your immune system to create antibodies, just as it does when it’s exposed to a disease. However, because vaccines contain only killed or weakened forms of germs like viruses or bacteria, they do not cause the disease or put you at risk of its complications.

How do vaccines work!?

Now that we know the history of vaccines, one can only wonder how they work!? Vaccines contain weakened or inactive parts of a particular organism (antigen) that triggers an immune response within the body. Newer vaccines contain the blueprint for producing antigens rather than the antigen itself. Regardless of whether the vaccine is made up of the antigen itself or the blueprint so that the body will produce the antigen, this weakened version will not cause the disease in the person receiving the vaccine, but it will prompt their immune system to respond much as it would have on its first reaction to the actual pathogen.

Some vaccines require multiple doses, given weeks or months apart. This is sometimes needed to allow for the production of long-lived antibodies and development of memory cells. In this way, the body is trained to fight the specific disease-causing organism, building up memory of the pathogen so as to rapidly fight it if and when exposed in the future.

So in other words, it is the same when Batman delivers the already beaten up bad guy to the police for them to only identify them and lock them up. The vaccine shot contains a beat up and weak disease and the little police in our body will just identify it and come up with ways to beat the disease.

Early Tissue And Cell Culture In Vaccine Development.

Researchers had to first grow the viruses or bacteria with which to develop vaccinations – in big quantities and with excellent consistency – before they could develop vaccines that could be mass-produced. Viruses cannot replicate on their own and must infect living cells, unlike bacteria, which may be produced in a laboratory environment when placed in an appropriate growth medium. When a virus infects a cell, it makes new copies of itself using the cell's own components.

While material for early bacterial vaccines could be produced in a lab without the use of laboratory animals, researchers working on viral vaccine material encountered an additional obstacle. They were constrained to collecting materials from infected animal hosts because procedures for generating viruses outside of live hosts were not yet available.

During the early stages of developing a polio vaccine, scientists realized that the virus could cause disease not only in humans but also in monkeys. This resulted in early field trials of vaccine candidates created using material collected from polio-infected monkeys, such as monkey spinal cords, in the 1930s. These candidates proved harmful, inducing paralysis in the limb where the vaccine was injected; vaccines produced from nervous system tissue have a greater adverse effect profile than those developed through other approaches. The studies

were terminated, and researchers moved on to discover another means to culture the virus for vaccine development.

The Promise of Cell Culture in Vaccine Development

Many researchers in the 1930s and 1940s were motivated by the prospect of generating polio-virus in the lab without the use of live animals. Cell cultures are the process of growing cells in a culture dish with the help of a growth media such as collagen. They provide a level of control not possible with live animals, as well as the resources to enable large-scale virus generation.

Early attempts to develop polio-virus in culture, on the other hand, failed miserably.

The Rockefeller Institute's Albert Sabin and Peter Olitsky successfully cultivated polio-virus in a culture of brain tissue from a human embryo in 1936. The virus developed rapidly, which was encouraging, but Sabin and Olitsky were worried about adopting it as a vaccine starting material, thinking that vaccine recipients may suffer nervous system damage. They attempted, but failed, to develop polio-virus in cultures using tissue obtained from different sources.

International investment

Since Jenner's discovery governments have been investing huge amounts of both money and time. Initially vaccines were considered a matter of national pride and prestige.

Vaccine programs became worldwide once the World Health Organization (WHO) and allied organizations such as the United Nations Children's Fund (UNICEF) were established. The Expanded Programme on Immunization (EPI), for example, was started by the WHO in 1974 with the objective of substantially boosting immunization rates among children in poor countries.

Did you know ?

- According to the Health Policy Watch News " Governments have spent at least €93 billion on COVID-19 vaccines and therapeutics globally since the beginning of the pandemic".

- Not all vaccines are given as shots. Some vaccines are given orally.

- The CDC has reported a 99% reduction in the incidence of bacterial meningitis caused by Haemophilus influenzae since the introduction of the vaccination against the disease in 1988.

- Vaccines cause “herd immunity,” which means if the majority of people in a community have been vaccinated against a disease, an unvaccinated person is less likely to get sick because others are less likely to get sick and spread the disease.

Anecdotes

Here are some anecdotes about vaccines:

1. Edward Jenner was the first person to develop Vaccines.
2. Vaccines have saved countless lives throughout history.
3. Vaccines train your immune system to create antibodies, just as it does when it’s exposed to a disease. However, because vaccines contain only killed or weakened forms of germs like viruses or bacteria, they do not cause the disease or put you at risk of its complications, such as: (Cervical cancer, Pneumonia, Polio, Cholera) and many more.
4. Some other vaccines are currently under development or being piloted, including those that protect against Ebola or malaria, but are not yet widely available globally.

Sources

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