The Discovery of Vaccines

A

Few medical innovations have had as profound an impact on public health as the discovery of vaccines. By stimulating the body's immune system to recognize and combat pathogens, vaccines have dramatically reduced the prevalence of once-deadly diseases. From the first experiments in the 18th century to today’s advanced mRNA technologies, the history of vaccination is a story of scientific curiosity, public health policy, and global cooperation.

B

The roots of vaccination can be traced back to a practice known as variolation, used in ancient China, India, and the Ottoman Empire. Variolation involved the deliberate exposure of healthy individuals to material taken from the sores of smallpox victims. While the method was risky, it generally led to a milder infection and provided immunity. This method was introduced to Europe in the early 18th century, where it gained attention, especially following advocacy by Lady Mary Wortley Montagu, who observed it in Constantinople and arranged for her children to undergo the procedure.

C

The major breakthrough came in 1796, when British physician Edward Jenner conducted an experiment that laid the foundation for modern vaccination. Jenner noticed that milkmaids who had contracted cowpox, a relatively mild disease, did not catch smallpox. He hypothesized that exposure to cowpox provided immunity to smallpox. To test this, he inoculated an eight-year-old boy, James Phipps, with pus taken from a cowpox sore. The boy developed a mild illness but recovered quickly.

Later, when exposed to smallpox, he did not fall ill. Jenner's findings, published in 1798, were met with both enthusiasm and skepticism, but his method quickly spread across Europe and beyond.

D

The term "vaccine" itself originates from the Latin word "vacca," meaning cow, a nod to Jenner's use of cowpox. Over the next century, Jenner's work inspired further developments. In the late 19th century, French scientist Louis Pasteur expanded the field by creating vaccines for rabies and anthrax. Pasteur's approach relied on attenuated, or weakened, pathogens rather than cross-species protection. His rabies vaccine, first tested on a young boy bitten by a rabid dog in 1885, proved successful and cemented his reputation. Meanwhile, German physician Emil von Behring developed a diphtheria antitoxin, further demonstrating the potential of immunization strategies.

E

The 20th century saw a surge in vaccine development, driven by advances in microbiology and global efforts to eradicate infectious diseases. Vaccines for polio, measles, mumps, rubella, and many others were introduced, saving millions of lives. The global eradication of smallpox, officially certified by the World Health Organization in 1980, stands as one of the greatest achievements in medical history. It was the first—and so far only—human disease to be eliminated through vaccination.

F

Despite its success, vaccination has also faced challenges. Throughout history, public resistance has emerged, often fueled by mistrust, misinformation, or religious concerns. In the 19th century, some British citizens opposed compulsory smallpox vaccination, leading to the

formation of anti-vaccination leagues. More recently, fears surrounding vaccine safety have resulted in lower immunization rates in some areas, contributing to the resurgence of diseases like measles. Nevertheless, the overwhelming scientific consensus supports vaccines as safe and effective tools in disease prevention.

G

The 21st century has brought new technologies to vaccine development. The COVID-19 pandemic led to the rapid deployment of mRNA-based vaccines, a technology that had been under development for years but had never been widely used. These vaccines work by delivering genetic instructions to cells, prompting them to produce a harmless viral protein that triggers an immune response. Their success has opened the door for future vaccines targeting a range of diseases, including certain cancers and autoimmune disorders.

H

In retrospect, the discovery of vaccines was not a single event but a cumulative process, marked by centuries of observation, experimentation, and refinement. From the crude methods of variolation to today's genetic platforms, vaccination remains a pillar of global health. As science continues to evolve, so too will the strategies used to protect future generations from infectious diseases.

Questions

Questions 1–4

Match each statement with the correct paragraph (A–H).
Write the correct letter in boxes 1–4 on your answer sheet.

1. A child was successfully treated using a vaccine derived from a weakened virus.
2. A widespread disease was declared eliminated through vaccination.
3. Observations made by a British woman introduced a foreign medical practice to Europe.
4. Recent technologies allow cells to produce viral proteins themselves.

Questions 5–10

Complete the summary below.
Choose NO MORE THAN TWO WORDS from the passage for each answer.
Write your answers in boxes 5–10 on your answer sheet.

The Early History of Vaccines
Early immunization practices included a method called 5 _____, which originated in Asia and involved the intentional exposure to smallpox material. This technique was brought to Europe partly due to the efforts of 6 _____, who had observed its use abroad.

A major turning point came with Edward Jenner's 1796 experiment, in which he exposed a young boy to 7 _____, leading to immunity

against smallpox. Jenner's success gave rise to the term "vaccine," derived from the Latin word for 8 _____.

Later, Louis Pasteur developed vaccines based on 9 _____ pathogens, while Emil von Behring worked on a treatment for 10 _____ using antitoxins.

Questions 11–13

Do the following statements agree with the information in the reading passage?
In boxes 11–13 on your answer sheet, write:

- YES if the statement agrees with the claims of the writer
- NO if the statement contradicts the claims of the writer
- NOT GIVEN if it is impossible to say what the writer thinks about this

11. Jenner's experiment was immediately accepted and praised by all of his peers.

12. The anti-vaccination movement existed even before the 20th century.

13. mRNA vaccines can potentially be used to treat non-infectious diseases.

Answer Key

1. D
2. E
3. B
4. G
5. variolation
6. Lady Mary Wortley Montagu
7. cowpox
8. cow
9. attenuated
10. diphtheria
11. NO
12. YES
13. YES