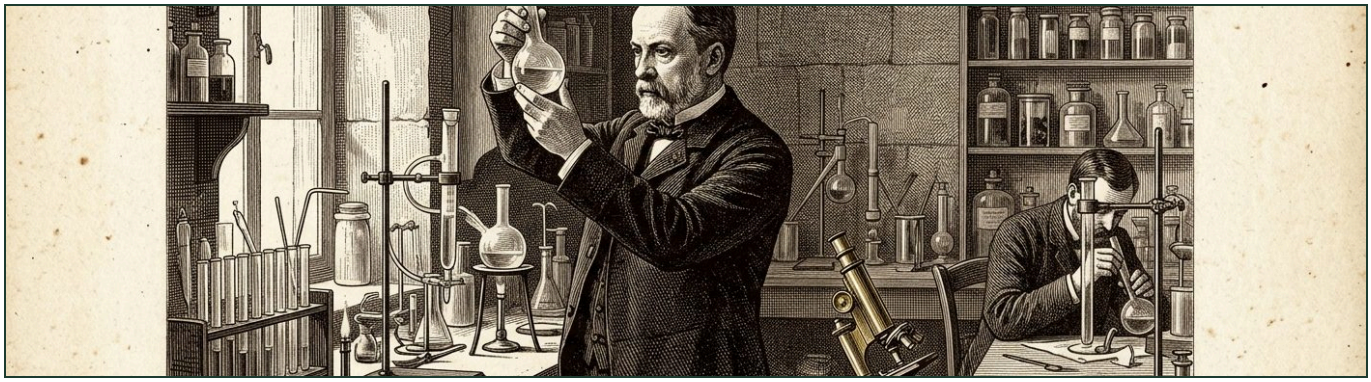


1796 – 1955

Germ Theory & Vaccines Timeline

Germ theory — the discovery that invisible microorganisms cause infectious disease — is one of medicine's most life-saving ideas, transforming surgery, public health, and disease prevention in less than a century.

1796 — Jenner Invents Vaccination

English physician Edward Jenner discovers that people inoculated with cowpox — a mild cattle disease — become immune to smallpox, one of history's most lethal killers; he calls the procedure vaccination (from vacca, Latin for cow).

> **Why it mattered:** *Jenner's vaccine was the first proof that a disease could be prevented before it struck — the founding concept of immunology; smallpox vaccination eventually eradicated the disease entirely in 1980, making it one of the greatest medical achievements in history.*

1847 — Semmelweis and Hand-Washing

Hungarian doctor Ignaz Semmelweis discovers that doctors who wash their hands with a chlorinated solution before delivering babies cut maternal death rates from childbed fever by more than 90% — but is ridiculed and ignored by the medical establishment.

> **Why it mattered:** *Semmelweis's discovery was tragically ahead of its time — without germ theory to explain WHY hand-washing worked, most doctors refused to believe invisible particles on their hands could kill patients; he died in an asylum before his ideas were vindicated by Pasteur and Lister.*

1854

Snow Maps the Cholera Outbreak

London physician John Snow traces a cholera epidemic in Soho to a single contaminated water pump on Broad Street — by mapping where victims lived, he proves cholera spreads through contaminated water, not bad air, and convinces authorities to disable the pump.

> **Why it mattered:** *Snow's cholera map is the founding document of epidemiology — the science of tracking and controlling disease outbreaks; his method of tracing disease to its source is still how public health officials investigate outbreaks today.*

1859–61

Pasteur Proves Germ Theory

French chemist Louis Pasteur publishes a series of experiments proving that microorganisms — not spontaneous generation or bad air — cause fermentation and disease; his 'swan-neck flask' experiment demonstrates that sterilized broth stays sterile unless exposed to airborne microbes.

> **Why it mattered:** *Germ theory was the single most important idea in the history of medicine — once doctors understood that invisible living organisms caused disease, every aspect of medicine could be rebuilt on that foundation: surgery, food safety, water treatment, and vaccine development.*

1867

Lister Introduces Antiseptic Surgery

Scottish surgeon Joseph Lister, inspired by Pasteur's germ theory, begins using carbolic acid to sterilize surgical instruments, clean wounds, and spray the operating room — cutting post-surgical infection deaths from roughly 50% to under 15%.

> **Why it mattered:** *Lister's antiseptic surgery transformed an operation from a likely death sentence into a survivable procedure — before Lister, most patients who survived the knife died of infection afterward; his methods (later refined into sterile technique) are used in every operating room today.*

1876–84

Koch Identifies Disease-Causing Bacteria

German physician Robert Koch proves that a specific bacterium (Bacillus anthracis) causes anthrax (1876); he later identifies the bacteria causing tuberculosis (1882) and cholera (1883), establishing 'Koch's postulates' — the rules for proving a microbe causes a disease.

> **Why it mattered:** *Koch's work transformed medicine from theory to precision — by proving that each infectious disease has a specific microbial cause, he made it possible to develop targeted treatments and vaccines; his postulates are still the standard framework for proving what causes an infectious disease.*

1892–98

Discovery of Viruses

Russian biologist Dmitri Ivanovsky (1892) and Dutch scientist Martinus Beijerinck (1898) discover that tobacco mosaic disease is caused by something smaller than any known bacterium — too small to be filtered out — establishing the existence of a new category of infectious agent: viruses.

> **Why it mattered:** *The discovery of viruses explained diseases — including smallpox, influenza, and polio — that no known bacterium could account for; it opened a new branch of medicine and, eventually, led to antiviral drugs and vaccines against diseases previously beyond medicine's reach.*

1928

Fleming Discovers Penicillin

Scottish bacteriologist Alexander Fleming notices that a mold (Penicillium notatum) contaminating a petri dish has killed the surrounding bacteria; he identifies the mold's antibacterial substance as penicillin — though it takes over a decade for others to turn it into a usable drug.

> **Why it mattered:** *Penicillin was the first antibiotic — a drug that kills bacteria inside the body — and it transformed medicine overnight; diseases that had killed millions (pneumonia, sepsis, syphilis, wound infections) became treatable; penicillin saved an estimated 200 million lives in the 20th century.*

1955

Salk Polio Vaccine

American physician Jonas Salk announces a successful vaccine against polio — a disease that paralyzed tens of thousands of children every year, including Franklin D. Roosevelt; mass vaccination campaigns eliminate polio from the United States within a decade.

> **Why it mattered:** *The Salk vaccine ended one of the 20th century's most feared diseases — parents had kept children home from swimming pools and movie theaters every summer in terror of polio; within years of the vaccine's introduction, polio was gone from the developed world, a direct vindication of Jenner's original insight 160 years earlier.*