

History of successful virus vaccines

- 1100s.** **Variolation** technique developed in several countries, i.e. China
Inoculation dried scab material recovered from smallpox patients.
- 1798.** Jenner published his work on **smallpox vaccine**.
Inoculation with a related virus, vaccinia or cowpox.
- 1885.** Louis Pasteur and Emile Roux develop first **rabies vaccine**.
Weakened virus from dessicated brain tissue from infected rabbits.
- 1937.** Max Theiler and Hugh Smith develop live attenuated **yellow fever vaccine**.
Attenuated strain 17D, licensed in 1953 in US.
- 1938.** Jonas Salk and Thomas Francis develop **influenza vaccines**.
Inactivated influenza virus grown in eggs, licensed in 1945 in US.
- 1955.** Jonas Salk **inactivated polio virus vaccine** is licensed.
- 1961.** Albert Sabin **oral polio virus vaccine** is licensed.
- 1963.** First live **measles virus vaccine** developed by John Enders is licensed.
Improved by Maurice Hilleman in 1968 (more attenuated).
- 1967.** **Mumps live attenuated vaccine** is licensed.
Derived from a virus isolated by Maurice Hilleman from her daughter.
- 1969.** Maurice Hilleman **live attenuated rubella virus vaccine** licensed.
- 1971.** First use of the **MMR vaccine** .
- 1971.** First tissue culture derived **TBE vaccine** is developed and commercialised.
Developed by the Institute of Virology, Vienna, and Baxter.
- 1977.** Last case of naturally-acquired smallpox.

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- 1981.** First **hepatitis B viral vaccines** were licensed.
Developed by Merck by the Pasteur Institute.
- 1986.** **Recombinant hepatitis B vaccine** was licensed.
Using recombinant DNA technology, Merck scientists developed a hepatitis B surface antigen subunit vaccine.
- 1991.** Last case of indigenous polio in the Western Hemisphere .
- 1992.** **Japanese encephalitis virus vaccine inactivated** is licensed.
Developed by BIKEN (Foundation for Microbial Diseases of Osaka University).
- 1995.** **Live varicella virus vaccine** developed by Merck is licensed.
- 1995.** **Inactivated hepatitis A vaccine** developed by SmithKline Beecham is licensed.
- 2003.** **First nasally administered influenza vaccine** (by MedImmune) was licensed).
- 2006.** **Rotavirus vaccine**, live, oral, pentavalent is licensed
Developed by Merck for use in infants ages 6 to 32 weeks.
- 2006.** **Shingles vaccine** (herpes zoster) is licensed).
Developed by Merck for use in people aged 60 years of age and older.
- 2006.** FDA licensed the first vaccine developed by Merck to prevent cervical cancer , precancerous genital lesions, and genital warts due to **human papillomavirus (HPV) types 6, 11, 16, and 18.**
- 2019.** First FDA-approved **Ebola virus vaccine** developed by Merck based on VSV vector.
- 2020.** **COVID-19 mRNA vaccines** (Pfizer/BioNTech, Moderna) approved by FDA for emergency use.

As of December 2020, we have effective and safe COVID-19 vaccines

Now what?

Distribution of the vaccines needs to be accompanied by monitoring for infections, disease, and vaccine safety

Does SARS-CoV-2 changes under vaccine immune pressure? Do we need to update vaccines?

How long protection lasts? Do we need revaccinations?

Are there any groups where vaccines are not effective?
Immunosuppressed?

A successful virus vaccine needs:

TO BE USED