

Role of horsepox in smallpox vaccine



Mulford 1902 smallpox vaccine (Shrick et al., N Engl J Med 2017; 377:1491-1492)

Due to the widespread use of the smallpox vaccine, the disease was eradicated in 1980. The assumption was that the smallpox vaccine was derived from cowpox virus but since the 1930s it was known that the virus used in the vaccine was vaccinia virus. However, the origins of the vaccinia virus are not well understood. Researchers found vials of smallpox vaccines from the 19th century that contain horsepox virus. Their data suggest that horsepox may be an ancestor of vaccinia virus.

Smallpox was a contagious disease spread through direct contact. The symptoms included fever, body aches and pustular rash. The smallpox vaccine was developed by Edward Jenner in 1798. Jenner observed that milkmaids who contracted cowpox were somehow immune from getting smallpox. He then later showed that inoculated cowpox was able to protect against inoculated smallpox.

Many types of smallpox vaccines were used before 1967 when the World Health Organization declared that 4 vaccinia strains should mostly be used to vaccinate against smallpox. Since the standardization and widespread use of the vaccine, the disease has been successfully eradicated.

Since the 1930s, it has been shown that the virus used in the smallpox vaccine is vaccinia virus and not the cowpox virus. The origins of vaccinia are largely unknown and many described it as a “laboratory virus”. Researchers investigated the origins of the virus by analyzing a smallpox vaccine from 1902. Whole-genome amplification and sequencing of the DNA in the 1902 vial revealed that the virus in this vial was most likely horsepox virus. Deletions at the end of the sequence of this horsepox virus were similar to ones found in the current vaccinia virus but not in both horsepox or cowpox viruses.

These data suggest that horsepox virus may have a role in the origin of the widely successful smallpox vaccine. Interestingly, Jenner had also suspected a role for horsepox in protection from smallpox. The study also suggests that the horsepox virus may be an ancestor of the vaccinia virus.

Journal article: [Schrick et al., 2017. An Early American Smallpox Vaccine Based on Horsepox. *The New England Journal of Medicine*](#)

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