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Short communication

Smallpox: the Infection and the Arms

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Introduction

Essentially, when smallpox first affected humans, it is difficult to tell, although research suggests that it may have first appeared during the Neolithic Period. The first credible evidence of smallpox contamination is provided by the mummified remains of Egyptians, specifically Pharaoh Ramses V (d. 1157BC). Smallpox was deeply established in Asia in the 6th century AD. The Crusades and Asia's increasing trade spread the disease to Europe. The Europeans took the disease to the New World from there, and by the middle of the 18th century, with the exception of Australia, the disease was widespread almost anywhere in the world.

In the late 18th century, Jenner produced the first smallpox vaccine. He used the pus from cowpox lesions to produce the vaccine, noticing that milkmaids who contracted cowpox (a similar relative to smallpox) developed immunity to the disease. About a century and a half since, a global vaccine campaign was launched by the World Health Organization (WHO). The initiative was successful and the last naturally occurring case of smallpox recorded was in 1977. In 1980, WHO formally declared the disease eradicated. There are currently only two official virus libraries, one at the Centers for Disease Control and Prevention in Atlanta, Georgia, and the other at the Russian State Virology and Biotechnology Research Center in Koltsovo.

The Variola virus belongs to the Poxviridae family, the Chordopoxvirinae subfamily, and the Orthopoxvirus class, including vaccinia, monkeypox virus, and many other serologically cross-reactive animal poxviruses.[1]

Smallpox affects people of all ages, but in young people and older people, it has the highest death rates. Transmission happens mostly via the respiratory tract (from secretions of the nose and mouth) and infection can occur from as little as ten viral particles.[2,3] The death rate of untreated persons with naturally occurring cases is between 20 % and 50 % Viremia, toxaemia, disseminated intravascular coagulation, hypotension, or coronary collapse are typically the result of death.

Keywords: Smallpox, WHO, Vaccine

Smallpox as a Bioweapon

During the French and Indian Wars (1754–1767), the governor of Fort Pitt also used smallpox as a biological agent. In order to initiate outbreaks among American Indians, soldiers circulated blankets that had been used for smallpox patients. There was an outbreak, killing over 50 % of infected tribes.[5,6]

The Soviet Union first attempted to grow the smallpox virus during the late 1930s by cultivating it on the chorioallantoic membrane of chicken embryos. Through more than three decades (from the 1940s to the 1960s), the Soviet Union used the chicken embryo method almost entirely, during which time it was changed slightly to accommodate mechanisation and automation, becoming more effective and profitable. However, extensive manpower and considerable material requirements reduced the chicken embryo technique's production potential. Soviet scientists started experimenting with reactor cultivation using 10, 25, 100, 250, and 630 litre reactors during the late 1960s and early 1970s, in order to maximize output capacity. However, until the late 1980s, various problems hindered this approach from entirely replacing older methods.

While testing has shown that both dry and liquid formulations of a smallpox weapon can be obtained, because of the stability and viability of the liquid smallpox weapon, the Soviet Union never developed a dry formulation of smallpox. Liquid smallpox is stable for years and viable at 0–4 °C for months in a deep frozen state. In comparison, the composition of liquid smallpox in an aerosol is stable.

New Smallpox Arms Can Result In the Growth of Genetically Engineered Orthopoxviruses

Virus genetic modification has been a widespread practise. The use of modified viral vectors for the transmission of genetic material with medicinal intent or the alteration of viruses in order to modify the immune response of the host is a major target of genetic manipulation. It is typically difficult to predict improvements in virulence and host range of modified viruses. Nevertheless the research and development work will most likely concentrate on the following "targets" as one studies the prospect of making variola virus more pathogenic.

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Shortening of the disease's incubation time by improving the virus' attachment to a host cell and speeding the dissemination of the virus in host cells

The suppression/subversion of inherent and particular immune responses to the virus decreases the infectious dosage and raises mortality.

Reinforcing seriousness, "adding" new infection syndromes and increasing mortality by increasing the number of possible infection sites (e.g., brain and parenchymal organs, etc.).

It is understood that Orthopoxvirus has a broad capacity to handle foreign DNA. In double-stranded DNA with a size of about 180 kbp that codes about 150–200 polypeptides, the genetic material of variola major is found. An paper on the growth of a recombinant vaccine virus with an inserted DNA clone of the 26S RNA of the Venezuelan equine encephalomyelitis (VEE) virus was published in 1993 by a group of Russian writers.[7]

CONCLUSIONS

It is plain, summarizing the above-mentioned facts, that the re-emergence of smallpox as a result of a man-made outbreak poses a significant danger to civilization, even if it does not annihilate the entire human population from the Planet. A smallpox terrorist threat is deemed an unlikely occurrence by most biodefense specialists. Although our expectation is that this is valid, there is proof to the contrary. If there is a chance, no matter how small, of a smallpox attack, it must be dealt with. The best way to actually reduce the possibility of a bioterrorist attack from smallpox is to be prepared for one. It is important to improve anti-epidemic and therapeutic steps, such as successful detection methods, quarantine and isolation techniques, prophylaxis of vaccines and adequate medications for early and late stage infections. And then will we be confident of our right to be adequately prepared to face this challenge. The choice is to be as powerless as the millions of people who died in previous centuries from smallpox.

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