

Smallpox Eradication

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Ten years ago the worldwide incidence of smallpox was established in about 10 million cases annually but since October 1977, when a case of smallpox was recorded in Somalia, no naturally occurring smallpox case has been reported from any part of the world. Hopes that the case in Somalia would be the last instance of smallpox in the world were destroyed by the outbreak of smallpox in Birmingham, U.K. in August 1978. This caused considerable concern among the scientific community as well as the public because laboratory virus stocks appeared to have been the source of infection. Although the focus of attention has been to minimize the potential danger of variola virus stock in laboratories, it is equally important for the world scientific community to examine whether variola virus has readily become extinct in the human population and if so, what future surveillance and research on orthopox viruses are required to ensure the permanent status of this phenomena.

At the end of the eighteenth century, Edward Jenner showed that material extracted from the lesions of cowpox would immunize against smallpox. During the following 150 years Jenners vaccine was gradually accepted by health services all over the world. However over the years the virus strains used for vaccine production did not remain identical to those used by Jenner. By the 1950's the existence of an effective vaccine and coordinated use in vaccination programmes had resulted in the interruption of indigenous smallpox transmission in many countries in the temperate zone. Smallpox was, however, still prevalent in many of the tropical countries of Africa, South America and Asia. One reason for this was that the smallpox vaccine rapidly lost potency when exposed to tropical climates. In early 1950's a method of freeze drying smallpox vaccine was adapted to a large scale production so that it retained its potency for at least 4 weeks at 37's (Collier, 1955). This freeze dried smallpox vaccine greatly enhanced the prospects of smallpox eradication.

Among the milestones in the progress of smallpox eradication programmes, have been the recording of the last cases in South Americas and West and Central Africa in 1971, in Indonesia in 1972, in Southern Africa in 1973, and in the Asian subcontinent in 1975. Since 1976, the endemic foci were confined to the Horn of Africa. The last known cases of smallpox of natural origin was detected in Merka town, Southern Somalia in October, 1977.

Over 650 strains of variola viruses have been isolated, all of which confirmed the previous understanding of the characteristics of this virus. Also, vaccinia virus (Smallpox vaccine virus) has been isolated on several occasions, indicating that either the suspect patient had generalized vaccinia or the specimens were contaminated with vaccine virus. In the literature from 1947 to 1949 there are seven references to a smallpox-like disease in non-human primates (Arita and Henderson, 1968). Except for the one in Indonesia, which occurred in Jakarta Zoo in 1949, there was no valid evidence that any of those was real smallpox.

Current evidence from field and laboratory investigations indicates convincingly that when the interruption of smallpox transmission in the human population has been confirmed throughout the world, the risk of re-introduction of disease will be negligible. This assessment may logically lead to the universal termination of routine smallpox vaccination programmes. This, however, should be accompanied by continuing studies and vigilance. The surveillance of the orthopox virus infections in animals and man as well as laboratory studies of orthopox virus should continue and all necessary steps should be taken to minimize the potential danger of live variola virus stocks. Thus smallpox that has prevailed throughout the populated world during the last four centuries, its end seems near because WHO eradication campaign has now apparently interrupted transmission of the disease in the human population. The risk of natural reintroduction of the disease seems negligible.

References

1. Arita, I. and Henderson, D.A. (1968) Small and Monkeypox in non-human primates. Bull. WHO., 39:277.
2. Coffler, L.H. (1955) Development of stable smallpox vaccine. J. HYG., 53: 76.