

SMALLPOX: A potential biological weapon

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Endemic smallpox, caused by variola, was declared eradicated in 1980 by the WHO. Weaponization of variola, an easily manufactured virus that possesses high aerosol infectivity especially in a variola-naïve population, poses a clear and present military threat.

Clinical manifestations of smallpox occur 7-17 days after respiratory exposure. A febrile prodrome begins with associated rigors, headache, vomiting and backache, and 15% of patients develop delirium. This is followed in 48-72 hours by a rash on the face, upper extremities and oral mucosa. The palms and the soles are commonly involved. The rash spreads centrally to the legs and trunk in the second week. The lesions are usually synchronous and start as macules progressing to papules and pustules. Scabs develop 7-14 days from the onset of the rash leaving behind hypopigmented depressed scars. The mortality rate in unvaccinated individuals is 30%.

The diagnosis of smallpox requires a high index of suspicion since the disease may be confused with chickenpox, disseminated herpes zoster, erythema multiforme with bullae formation or allergic contact dermatitis. The diagnosis of a single case of smallpox is an international emergency requiring the cooperation of local, state, federal, and international agencies. In suspected cases, scrapings of vesicular lesions can be examined by electron microscopy for characteristic virions or by light microscopy for aggregates of variola virus particles. However, these methods do not distinguish variola from other "pox" viruses. Viral isolation is required for confirmation and is only available at the CDC. PCR and restriction length polymorphism tests are under development. The diagnosis requires transportation of clinical specimens to the CDC for identification using biosafety Level 4 facilities.

Treatment:

Supportive care is the mainstay of therapy. There are no antiviral drugs with proven clinical efficacy. Adefovir, cidofovir, and ribavirin have in vitro anti-viral activity against pox viruses. An exposed individual is one who has been in close personal contact with an individual with suspected or confirmed smallpox. This includes individuals residing in the same household or persons with face to face contact with the

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individual after that individual has developed fever. These individuals should be vaccinated immediately. All health care workers who might care for smallpox patients including emergency personnel who may transport patients and mortuary staff should be vaccinated. The vaccination is most effective if given within 4 days of exposure. Individuals who have been previously vaccinated during childhood should not be expected to be currently protected against smallpox. The smallpox vaccine is stockpiled and available only through the CDC. In the event of bioterrorism attack, local and state health agencies will provide information on how to obtain the vaccine. All exposed individuals should be placed in strict quarantine.

The vaccine is administered by scarification. Contraindications to vaccination include eczema, leukemia, lymphoma, generalized malignancy, chemotherapy with alkylating agents, antimetabolites, radiation, high-dose corticosteroids, HIV disease, hereditary immune deficiency syndrome, pregnancy, life-threatening allergy to polymyxin B, streptomycin, tetracycline or neomycin. The risk of vaccination must be weighed against the likelihood of acquiring infection. Those individuals in close personal contact with a smallpox case and with clear contraindication to vaccine may receive the vaccine along with vaccinia immune globulin (VIG) in a dose of 0.3 ml/kg IM simultaneously within the 1st seven days after exposure.

Conclusion:

Smallpox would be difficult to treat with available antiviral agents but vaccination could be protective, even if given after exposure.

ALERTS

- Smallpox is highly contagious.
- The rash progresses from macules to papules to pustular vesicles at the same time in any one region.
- Mortality rate if untreated is 30%.
- Individuals exposed by close personal contact should be vaccinated.
- Vaccine is most effective within 4 days of exposure.

To report a suspected case, contact the Maryland State Department of Health and Mental Hygiene at 410-767-6860 (24/7).