Anthrax

Anthrax is much in the news these days. Iraq is thought to be producing *Bacillus anthracis*, the causative agent, for use as a weapon of mass destruction, and an outbreak of anthrax is in progress in Western Province in Zambia.

Anthrax was extensively studied by, among others, Koch and Pasteur. The bacterium produces hardy, airborne spores, described by Osler as "very resistant" both within and outside the body.[1] This resistance encompasses extreme temperatures and most disinfectants.

The disease affects primarily herbivores. In humans, it occurs through contact with animals or animal products (e.g., hides or wool), especially during the early stages of processing these materials.[2] Vaccination of animals in North America has markedly limited the spread of this disease, and cases in humans are rare. But they do occur. In Zambia's Western Province in recent weeks, 70 cases have been reported in humans and much larger numbers in animals.

The disease most commonly occurs in the skin of an exposed surface, such as the arm or the face, where inoculation of the spores into a superficial wound or abrasion leads to the development of a pustule. The pustule ruptures, exposing a black eschar at the base. The lesions are not painful, and with appropriate treatment almost all heal, leaving only a residual scar.[2]

Inhalation of *B. anthracis* spores is much more serious. About 5 days after inhalation, a viral syndrome develops, followed by severe respiratory distress. The disease appears to involve primarily the mediastinal lymph nodes, which become hemorrhagic and drain into the lungs and pleura. Septic shock often occurs, and death is almost inevitable, even when penicillin is administered intravenously in large doses.[2]

In 1979, 96 cases of inhalation anthrax and 64 deaths were reported in Sverdlovsk (now Yekaterinburg), Russia.[3,4] A report in the journal *Science* concluded that these cases were likely the result of an accident at a biological weapon facility.[3]

The only licensed vaccine is produced by the Michigan Department of Public Health. A single human trial of the vaccine in the late 1950s failed to demonstrate its efficacy in preventing inhalation anthrax, mainly because there were so few cases of the disease in the New England population that was studied.[5] It is possible that the US has produced other vaccines and that these were used to vaccinate troops during the Gulf War of 1991.[6] The US is planning to inoculate about 2 million personnel in its armed forces with the Michigan vaccine,[7] and Canadian troops being dispatched to support possible US action against Iraq were to be inoculated against anthrax in February.[8] However, little information about the efficacy and safety of this or other vaccines has been published. Creating vaccines is particularly difficult in the context of biological warfare. If anthrax-causing agents are being developed as weapons in Iraq (or elsewhere), then it is likely that biologically engineered varieties of the bacillus are being used. These might be specifically developed for antibiotic resistance, for example.

Anthrax, an old disease, might pose a new threat in years to come. — JH

References

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