

Biological Agents From Nature And Elsewhere

Commentary by Peter Palese, Mount Sinai School of Medicine

It is estimated that the total amount of anthrax spores sent in four letters during the fall of 2001 was equal to less than one-tenth of a teaspoon. This amount corresponds to about one gram of material, and yet it caused loss of life as well as enormous fear and disruption. The Clark Building, where Senator Tom Daschle had his office, has just been reopened almost a year-and-a-half after its anthrax incident. If one gram of "letterized" anthrax can cause this much of an uproar, consider the dangerous potential of the following: At the peak of its biological weapons program in the 1980s, the Soviet Union was producing 4,500 tons of weaponized anthrax annually!

A less well-known release of a bacterial agent, *Salmonella typhimurium*, occurred in 1984 when members of the Rajneeshes, a cult in Oregon, sought to sway a local election by causing food poisoning in the population. Almost one thousand people fell seriously ill, including a pregnant woman who gave birth prematurely to a poisoned baby. These and other incidents make it quite reasonable to be concerned about future attacks, particularly in light of information that more than 100 tons of smallpox and 250 tons of the Marburg virus were produced in the former Soviet Union and possibly in several countries of the mid-East. It may be more wise to ask *when*, rather than if, we might experience a biological weapons attack.

While we must try to prepare ourselves against a deliberate release of biological agents, we must not lose sight of the fact that Nature herself remains the most imaginative bioterrorist of all. In the last twenty-five years, more than a dozen agents novel to humans have emerged, including multidrug-resistant bacteria, HIV, West Nile fever virus and, most recently, the *severe acute respiratory syndrome* (SARS) virus. In most instances, these agents already had a niche in the animal kingdom and, as a result of sexual, social and economic changes, they found a foothold in the human population with devastating consequences. Thus, there is no need to conjure up images of Frankenstein concocting an HIV virus containing new genes which allow it to be transmitted through the air like an influenza virus and to kill as rapidly as an Ebola virus. Mother Nature does well enough on her own.

Despite the trauma caused by our fears about bioterrorism, there is at least one positive aspect of the situation. Funds made available to counter bioterrorism may be a boon for public health sectors in the U.S. and worldwide. Even more beneficial in the long run may be the accelerated efforts to develop improved antibiotics, novel antivirals and drugs against other infectious diseases, including malaria. Bioterrorism-related efforts by many scientists should also lead to the development of vaccines for infectious diseases against which we are presently helpless, as well as against other human diseases (the "spin-off" effect). By trying to fight terrorism and emerging pathogens, we may make great strides in developing stockpiles of novel treatments against a variety of diseases, including vaccines against Alzheimer's disease, multiple sclerosis and cancers.

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