In an attempt to determine whether more smallpox vaccines could be made available to the general population given supply questions, a recent study was conducted by the National Institute of Allergy and Infectious Disease (NIAID) (17). The study consisted of 680 adults <32 years of age who were never vaccinated for smallpox and who were assigned to three treatment groups. They received vaccine that was undiluted, diluted 1:5, or diluted 1:10 (18). The initial vaccination was successful in 97.8% of all three groups. There were no significant differences in the rate of vesicle formation (the end point demonstrating success of the vaccine) over the range of titers tested. When followed up with a second vaccination, the researchers demonstrated that the two dilutions were both effective against smallpox. The implication was that the 1:10 dilution could protect 10 times as many persons as would be protected by the administration of the undiluted vaccine.

Botulism is a muscle-paralyzing disease caused by the toxin produced by *C. botulinum*. Food-borne botulism is a public health emergency because the contaminated food may still be available to other people. This form of botulism occurs when the preformed toxin is ingested in contaminated food and causes illness within 6 hours to 2 weeks. Symptoms include double vision, blurred vision, drooping eyelids, slurred speech, difficulty swallowing, dry mouth, and muscle weakness that leads to paralysis of the breathing muscles. Botulism is not communicable from one person to the next.

Pneumonic plague occurs when *Yersinia pestis* infects the lung. The initial symptoms of this illness include fever, headache, weakness, and cough with a bloody or watery sputum. This disease progresses over 2 to 4 days and may cause septic shock. If treatment is not initiated, the result is death. This disease is communicable with face-to-face contact with the infected person. Early treatment with antibiotics (e.g., tetracycline, streptomycin, chloramphenicol) is imperative. There is no vaccine against this disease.

Anthrax has three forms: cutaneous (skin surface is exposed to anthrax particles and skin lesions develop), gastrointestinal (particles are ingested), and inhalation (often fatal). Cutaneous anthrax demonstrates typically on the arms or hands as a swelling of the skin that develops into a central area of ulceration or a depression, and then a dark, blackish-brown scab forms over the area. This manifestation of anthrax can be painless, and a fever may be present. Gastrointestinal anthrax is characterized by an acute inflammation of the intestines, loss of appetite, vomiting, and pain. This is followed by a bout of abdominal pain, vomiting of blood, and severe diarrhea. Initial symptoms of inhalation anthrax resemble the common cold and within a few days, progress to severe respiratory problems and shock.

Anthrax cannot be transmitted from one person to another. Treatment is with antibiotics (e.g., penicillin, doxycycline, fluoroquinolones), but only those exposed to this disease should be treated. Initially, with the anthrax scare after 9/11, prescriptions for Cipro, a fluoroquinolone, increased as concerned individuals were stockpiling to protect themselves and their families from the threat of anthrax. This was not a good practice because the drug should be used only by patients exposed to the disease and because storage conditions and validation of expiration dates cannot be ensured.

DIAGNOSTIC SKIN ANTIGENS

It may be necessary to use antigens in vivo as diagnostic tools. Typically, these are injected intradermally and the site inspected for development of a hypersensitivity reaction. A positive reaction is determined by the extent of induration (in millimeters) and degree of reaction, from slight induration to vesiculation and necrosis. These signs demonstrate sensitivity to the antigen and the presence of antibodies due to present or past infection with the particular organism.

The number of diagnostic skin biologics is relatively small. In the late 1970s, many were removed from the market as a result of the recommendations of the FDA panel on