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Advice to Building Owners - Bio Security Considerations.

According to the CDC, anthrax is a likely candidate for use as a weapon of biological terrorism, or bio-terror.

Anthrax is a disease caused by a type of bacterium called *Bacillus anthracis*. The germ produces infectious spores that, when in the ground, can live for years. Anthrax is mostly seen in wild and in domesticated cattle, but it also can sicken humans who touch or inhale spores from a live or dead infected animal, or eat undercooked meat from an infected animal.

The antibiotic *Cipro* is the only drug currently FDA-approved for preventing the development of anthrax after exposure, or the worsening of symptoms after the disease has taken hold. Anthrax is curable if it is recognized and treated early enough in the development of the infection.

The disease is in three distinct forms depending on how the germ enters the body: cutaneous (through a cut or scrape on the skin), inhalation (breathed in), and gastrointestinal (eaten). All forms of anthrax are quite rare in the U.S. But when one does occur, symptoms usually show up a day to a week after exposure. Here is a list of what these symptoms look like:

Cutaneous: Starts out with a bump like a mosquito bite, usually on the hand, but within a few days, it turns into a painless, open sore with a tell-tale black center of dead tissue. This form of anthrax is highly treatable and about 20% of untreated victims die.

Inhalation: At first, it feels like the common cold, but it can rapidly progress to severe pneumonia with difficulty breathing and shock. This form is fatal in about 90% of untreated people, but it is not contagious.

Gastrointestinal: Begins with loss of appetite, nausea, vomiting, and fever, and it progresses to vomiting of blood and severe diarrhea. This form is deadly in 25% to 60% of cases but is extremely rare in humans and almost unknown in the U.S.

Farm animals are regularly vaccinated against anthrax, but the formulas prepared for livestock are not approved for humans. A human anthrax vaccine does exist. The vaccine for people is about 93% effective, but for now, it's available only to military personnel deployed to areas with a high threat of biological warfare and to people who work closely with the bacterium, potentially-infected animals, or animal by-products. The only other way to develop immunity is a natural one and that is to have survived a previous anthrax infection. The body then recognizes this dangerous type of bacterium again and knows how to fight it.

Immunization isn't a quick fix, anyway. It requires three shots given two weeks apart, three more shots given six, 12, and 18 months later, then annual booster shots after that. There are no live or dead anthrax bacteria in the vaccine, and the serious adverse reactions are rare (about 0.2%).

SMALLPOX

The variola virus, commonly known as smallpox, was eradicated from the world in 1977, except for stocks of it kept in two World Health Organization reference labs. It is unknown whether it is being held in other labs in violation of WHO policy. Smallpox comes in two forms: variola minor or the more deadly variola major.

How does it spread?

The smallpox virus is relatively stable and the dose required for infection is small, making it a candidate for aerosol release. It could then be further spread by the saliva droplets of infected people.

Symptoms:

The incubation period is about 12 days following exposure. Symptoms include fever, fatigue and aches, followed by a rash with lesions and can lead to death within the first two weeks of the illness

Treatment:

No proven treatment at this time.

Prevention:

Vaccine -- *CDC, Atlanta*

ADVICE TO BUILDING OWNERS

For those of us who are in a position to advise building operators or engineers, here are some actions we recommend:

If one is in a high-risk area with a high-profile building, it might be wise to shut down accessible outdoor intakes and those on the first two floors. It might also be a good idea to put locks on all access doors and/or change the locks on the mechanical rooms and keep them locked at all times. Entry into the mechanical rooms should be by escort only.

If the building is equipped with an automated control system, building operators may want to alarm many of the functions they would consider unusual to have suddenly changed. If large return air registers are accessible in any way, they should be guarded.

As to air filtration, *Bacillus anthracis* is a Gram-positive bacterium that is approximately one by five-microns in size and has a rod-like shape that tumbles as it moves through the air. Upgrading to a higher efficiency air filter can be part of a well thought-out engineering control, if and only if it can be demonstrated that the

upgrade will not reduce the number of air changes in the building envelope. Remember that in a mass balance it is the increase in airflow and/or single-pass efficiency that will reduce the concentration per unit volume of any particle, infectious or not. Lowering either of the two or both would be counterproductive.

Drawing on our experience in hospitals with other bacteria such as TB, Staph and Strep, we know that high efficiency filters will drop the circulating numbers, but totally depending on filters and a typical air conveyance system to prevent infection has had its pitfalls. People still contract these diseases, even in these special settings. Of course, the average 25-35% filter found in most commercial buildings then proves to be woefully inadequate for significantly dropping the numbers of bacteria from an orchestrated terrorist attack. For these and other microbes, our method of applying its HVAC-style UVC Emitters has been shown to be a responsible, and so far, reliable way of adding to the overall destruction and/or elimination of infectious particles, a true engineering control. This is consistent with practices recommended by the CDC for the control of tubercle bacillus (TB): one would simply then include *Bacillus anthracis* in its place.

Using and applying our UVC products as recommended, one can provide an engineering control for the spread of infectious disease while enjoying a payback for the installation through restoration of system capacity and the residual reduction of energy consumption, while reducing system maintenance and odours. Properly designed and installed, our specialist UVGI for HVAC products will kill anthrax as well as many other microbes of concern.