

# BIOTERRORISM: Our Future/The Enemy Within

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Just when the 50's/60's Generation had relaxed over the past 20 years, with the thawing of the Cold War and the demise of the doctrine of Mutually Assured Destruction by intercontinentally targeted missiles, comes this. In the 60's, as we children were led from our classrooms to sit quietly in our schools' hallways against the walls (away from windows), and some built bomb shelters and stockpiled supplies, we were naively confident that we had a plan for the inevitable nuclear attack. Of course, because the threat was tangible, somehow we were able to comfort ourselves that what we were doing would be effective. But what are we to do about an unseen, inapparent mortal weapon in the air, the water, the food? And possibly spread across an ill-defined, wide geographic area? Indeed, the context of our lives has changed irrevocably.

A U.S. Army Medical Research Institute of Infectious Diseases paper in July, 1999 defined bioterrorism as "the use of violence on behalf of a political, religious, ecologic, or other ideologic cause without reference to the moral or political justice of the cause". There is a substantial list of agents that are considered potential bioterrorist weapons to achieve this end, such as Bacillus anthracis (anthrax), botulinum toxin, Francisella tularensis (tularemia), hemorrhagic fever viruses, staphylococcal enterotoxin B, Brucella suis (brucellosis), Coxiella burnetii (Q-fever), plague, and smallpox. All of these fulfill bioterror weapon criteria for infectivity, toxicity, disease severity, environmental stability, and ease of large-scale production. However, these agents must also be able to produce "a maximum credible event"; one that could cause panic, societal disruption, large loss of life, and overwhelmed civilian healthcare resources. This implies an airborne (aerosol) route of delivery with particles about 1-5 microns in size (slightly smaller than a human red blood cell). Additionally, optimal attributes to maximize the goals of bioterrorism are communicability person to person and no available treatment or vaccine.

Anthrax and smallpox have the greatest potential for casualties and disruption on a massive scale,

1. High lethality: 80% for untreated anthrax, 30% for unvaccinated smallpox victims
2. Aerosol stability/large-scale producibility: anthrax spores remain stable for decades
3. Panic potential: either agent has caused widespread disease outbreaks in the past
4. Delayed recognition: only 11 cases of inhalation anthrax reported in the U.S. over 50 years; a potentially fatal delay to diagnosis due to medical unfamiliarity. Likewise, few U.S. physicians are familiar with smallpox; have never seen it.
5. Vaccine availability: anthrax severely limited (10,000 individuals); smallpox none
6. Human contagion: one smallpox case can generate 10-20 others; only 20% U.S. population has any remaining immunity. There is no treatment.

Other bacterial agents with potential for a maximum credible event are those for plague and tularemia.

Focusing on anthrax as central to current U.S. events, a number of points are to be appreciated. Cutaneous (skin) anthrax is by far the usual form of natural human disease. Bioterrorism would change this to the rare, inhalation (pulmonary) form. Very few U.S. physicians have ever seen a case of anthrax, virtually none the lung form. And the rule of medical training is "to think of horses, not zebras, when you hear hoof-beats." This rule is confounded in the bioterror construct. Such "in the box" thinking will result in deaths, even in some of the first-responder medical professionals with early index case contact of some diseases (not anthrax). It is obvious that virtually no physicians (other than infectious diseases specialists) will have read on anthrax since their basic training medical school days. The implications are obvious. Anthrax incubates an average of 1-6 days (but up to 6 weeks). Early symptoms are indistinguishable from influenza: fatigue, fever, muscle aches, dry cough, and chest pain. Sudden progression to a 2-3 day severe illness, followed by systemic collapse and death, is typical. And, though the inhalation form is active in the chest cavity, chest x-ray findings are atypical, not the routine pneumonia radiographic image abnormalities U.S. physicians would be looking for with this type illness presentation. While the physician is confused, the patient rapidly deteriorates and dies.

On the other hand, are we currently at great risk for a maximum credible event attack with anthrax? Consider some of the obstacles,

1. Terrorist must obtain and prepare the germs
2. Design a release mechanism (hardware, etc.)
3. Operational release and dissemination plan
4. Urban heat/wind patterns: metropolitan areas create heat updrafts counter to the aim of aerosol delivery
5. Aerosol droplet size: crop dusters and other large aerosol generators create large droplets, likely to fall quickly to ground (unavailable for inhalation)
6. Develop a deadly (virulent) anthrax bacterial strain; the minority of all anthrax strains
7. Fragile bacterium; must coax it to convert to its spore-form (tricky)
8. Produce dry anthrax (hard to make); flies farther than "wet form"
9. Particle size 1-3 microns; to penetrate lungs deeply (need 8,000 – 10,000 germs to start lung infection)

Note that there are about 5,000 anthrax cases/year worldwide (4,000 cutaneous). The people who die are those who are not treated.

What does all this mean? There are reasons to be concerned and there is also reason for calm, deliberate consideration and methodical planning for workable solutions, at least for catastrophic attacks. We are currently experiencing a heightened public reaction that has more to do with the media's incessant "information" and the public's real-time access to Internet sources, all in the ominous shadow of the World Trade Center calamity. The public is marginally equipped or prepared to deal with this crisis-oriented packaging of information. The true risk for any individual of bioterror agent exposure is far less than the real risks of alcohol-related injury/death, heart attacks, etc. Yet, our open society's exhaustive presentation of news achieves much of the psychological and operational disruption that terrorists seek. Terrorism wants and needs publicity. What may be concluded?

1. Information: Sources must be carefully factored. Reliable information may be obtained from the Centers for Disease Control website ([cdc.gov](http://cdc.gov)) and from physician experts. Beware of the validity of information from reporters, news commentators, and politicians as these sources are prone to misinformation and propaganda (to control or incite public reaction).
2. Public-Health Reforms: This must happen if we are to solve bioterror (at least large-scale). Our current healthcare system has downsized inpatient services and capacity as an economic imperative of the managed care (HMO) model. We have a peacetime healthcare system. If the public wishes solutions, there will be a price to pay to expand medical expertise and infrastructure for a credible bioterror crisis response.
3. Public-Health Alert System: The first-line solution to minimizing a major bioterror event will be a real-time, highly connected local, state, and federal epidemiological (disease pattern) surveillance/detection system. This network would "see" index cases as quickly as possible and activate a public health response to minimize fatalities and spread by bringing greatest expertise and resources to bear immediately.
4. Vigilance/Mind-Set Change: This is already taking place, both in the citizenry and in the medical community. Individual awareness is vital until the societal response structure is configured and implemented.
5. Bioterror Reality: We are not ready for a major attack, but terrorists likely are not yet capable of producing/delivering it.
6. Our world has changed,
  - a. The enemy is within.
  - b. The threat is not geographically defined.
  - c. We are personally forced to look at death as a prospect in our daily lives.
  - d. There is an enemy that wants to destroy us and our way of life; they want us dead and have plausible ways to kill us in large numbers.

7. Our world has not changed,
  - a. We always had lethal enemies, just not as apparent within our national borders.
  - b. Death was always an issue. We have been in societal denial since the Vietnam War and the Cold War ended.
  - c. Prevention, deterrence, intelligence, and solution production are still the core values of our medical care system and the answer to the bioterror threat.

It is the function and essence of medical leadership to bring balance and perspective to the issue. It is a fact that the more Americans are alerted to the problem, the more difficult it will be to carry out bioterrorism. Every U.S. citizen must be intellectually conscripted into this war against homeland terrorism. Complacent confidence and wishful thinking should be discouraged. Instead, medical and political resolve, motivated by an informed and supportive public, will provide the solutions. And along the way, we will sleep at night.

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#### **About the Author**

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