

## BIOTERRORISM: A Big Attack by Smalls

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### Abstract:

*Chemical and biological warfare has been employed for hundreds, and probably thousands, of years in ways that might now be considered "primitive." Modern advances in science and technology make warfare by such means a greater threat today. Bioterrorism for short is one of the main threats of the 21<sup>st</sup> century because terrorist groups may obtain and deploy biological and chemical weapons.*

**Key Words:** *Bioterrorism, Biological warfare, Micro-organism.*

### Introduction:

Bioterrorism is one of the main threats of the 21<sup>st</sup> century because terrorist groups may obtain and deploy biological and chemical weapons. Biological weapons and toxins are appealing to terrorists because such weapons can affect a large number of people and some of them can be produced with relative ease. A person with limited scientific training may be able to cultivate bacteria or viral agents in a small space without expensive equipment. Biological and chemical weapons may or may not threaten in the future; it is impossible to know. Still, it is useful to know how to recognize such weapons and how best to protect ourselves in case of an attack. Good understanding of the nature of the threat can help us protect ourselves, our family members, and our friends, and help public health authorities reduce the damage to our community and our nation.

"Bioterrorism involves intentional use of an infectious agent, micro-organism, virus, infectious substance, or biological product, to cause death or disease in humans or other organisms in order to influence negatively the conduct of government or intimidate a population"<sup>[1]</sup>

Biological Weapons or bioweapons (BWs) may be defined as micro-organism that infect and grows in the target host producing a clinical disease that kills or incapacitates the target host eg. **Bacterias** : *Bacillus anthracis* (anthrax), *Francisella tularensis* (tularemia),

and *Yersinia pestis* (plague), **Viruses**: Variola virus (small Pox), Dengue Virus, Ebola Virus (Viral Hemorrhagic Fever), Flavivirus (Yellow Fever), **Fungi**: *Coccidioides immitis*, **Toxins**: Botulinum toxin (*Clostridium botulinum*; bacteria), *Staphylococcus enterotoxin* (*Staphylococcus aureus*; bacteria), Ricin (*Ricinus communis*).

Biological, chemical and nuclear weapons are weapon systems that have frequently been called "Weapons of Mass Destruction."<sup>[2]</sup> However, BWs are very different while nuclear and chemical attacks cause their damage maximally immediately, biological attacks become manifest after sometime. Thus target may not be aware of the attack when it occurs. Biological, chemical and nuclear weapons possess the common property of causing mass destruction.

### Historical Events of Bioterrorism:

The act of bioterrorism can range from a simple hoax to the actual use of these biological weapons, also referred to as agents. During the battle of Tortona in the 12th century AD, Barbarossa used the bodies of dead and decomposing soldiers to poison wells. During the French and Indian War in the 18th century AD, British forces gave small pox infested blankets to the Indian loyals in a plan to spread the disease<sup>[3]</sup>. During World War I, the German Army developed anthrax, glanders, cholera for use as biological weapons. In 1985, Iraq began an offensive biological weapons program producing anthrax, botulinum toxin, and aflatoxin. In September and October of 1984,

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751 people were intentionally infected with Salmonella, an agent that causes food poisoning, when followers of the Bhagwan Shree Rajneesh contaminated restaurant salad bars in Oregon. In 2001, anthrax was delivered by mail to US media and government offices.

### Potential Agents of Bioterrorism and their Classification.

Micro-organisms and toxins used in bioterrorism and biological warfare have been placed in three different categories by the United States Centers for Disease Control and Prevention (CDC), categories A, B, and C [4]. Microorganisms in category A are the most dangerous posing a threat to a nation's security and are called "High Priority agents" eg. B. Anthracis, Cl. Botulinum, Y. Pestis, Variola virus. Micro-organisms in category B are less dangerous (Second Highest Priority agents) eg. Brucellosis, P. Perfringes, Salmonella, E. coli, Ricin toxin and micro-organisms in category C (Third Highest Priority agents) are potentially dangerous microorganisms eg. Yellow Fever virus, Hanta virus etc.

### Clinical Aspects of Bioterrorism

**A. Anthrax:** The bacterium that causes anthrax can infect the skin, mouth, throat, intestines, bloodstream, meninges and/or lungs. Anthrax is caused by *Bacillus anthracis*. It is fatal in 85% cases. The spores of B. Anthracis are called "Perfect Germs for Bioterrorism".

**B. Botulism:** Caused by a bacterial toxin produced by *Clostridium botulinum*. Most cases of botulism are associated with food consumption. A person with severe botulism will have flaccid paralysis and may have paralysis of breathing muscles which can cause a person to stop breathing and die. This toxin is the most poisonous substance known to man.

**C. Plague:** Caused by *Yersinia pestis*. There are two different forms of this disease; bubonic plague and pneumonic plague. Humans being an accidental host when bitten by an infected rat flea. Symptoms of plague include extreme exhaustion, high fever, and low blood pressure resulting in shock, convulsions, and death.

**D. Small Pox:** Smallpox is a serious and contagious

disease caused by the variola virus. On May 8, 1980, the World Health Assembly declared the world free of smallpox.

**E. Tularemia:** Caused by *Francisella tularensis*. Infected person may have severe respiratory illness, including life-threatening pneumonia and systemic infection.

**F. Viral Hemorrhagic Fever:** Viral hemorrhagic fevers refer to a group of illnesses that are caused by several different viruses. Symptoms vary since over 12 different viruses are included in this group. However, the blood vessels are usually damaged causing leakage of the blood into the organs and into the membranes surrounding the eyes, nose, intestines, stomach, bladder and lungs. Patient may develop extremely low blood pressure and go into shock. Patients with infection of the brain more commonly result in death.

### Advantages of the use of bioweapons in war and terrorist attacks.

1. Low production cost. Bioweapons are known as "Poor Man's Atomic Bomb".
2. Large quantities can be produced in short period.
3. Not detectable by routine security system.
4. Easy transportation from one location to another.
5. Multiply and spread rapidly over a large area.
6. Destroy an enemy while leaving his infrastructure intact, unlike atomic bombs.

### Characteristics of the Perfect Biological Weapon

1. Highly infectious; requiring few organisms to cause the desired effect.
2. Efficient dispersal, usually by air.
3. Stable in storage.
4. Readily grown and produced in large quantities.
5. Resistant to tough environmental conditions.
6. Resistant to treatment.

### Preventive Measures

1. Develop international strategy to deal with this problem.
2. Educate likely target population about precautions and protective actions.
3. Military's gas masks for protection against 1-5  $\mu\text{m}$  particulates.
4. Sandia decontamination foam-neutralizes both chemical and biological agents.
5. Stockpile biological warfare fighting supplies.

Preparedness is always beneficial. The defender has to be lucky all the time, but the destroyers have to be lucky just once.

### Medical Countermeasures

It includes vaccines and therapeutics used to protect or treat people from Biological Warfare diseases. Once an appropriate agent is found it must be tested in animals to see if it is toxic. Immune modulators as the name implies modify the action of the immune system. Antisera have also been used to treat botulinum toxin. Some researchers are also looking at monoclonal antibodies for their potential as immune modulators.

### International Response

The attack of September 11<sup>th</sup> 2001 on the world trade centre in New York city and the anthrax bacilli by mail releases letter, that same month, made the nation acutely aware of its vulnerability to attack. Before these events most of the attention in the biodefence industry was devoted to protecting military personnel. Since these events, an enormous amount and resources have been devoted to civilian biodefence

purposes.

In a white house statement by George W. Bush on December 11<sup>th</sup> 2002, the President discussed a three fold strategy to improve national security concerning weapons of mass destruction like Biological Weapons. He said "To succeed we must use new technologies, strengthen our intelligence capabilities, work even more closely with allies, and establish new partnerships with other key states, including former adversaries"<sup>[5]</sup>.

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