

# BIOWARFARE AND BIOTERRORISM

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The malicious use of pathogen microorganisms is, nowadays, a real threat but terribly underestimate. However, it is not a novelty, since the humanity has used the biowarfare for centuries. Currently, the rapid development of biotechnology makes possible the creation or modification of pathogens and their transformation into mass destruction weapons

## HISTORY OF BIOWARFARE

- approx. 1500 BC: First episode known of biowarfare, by Hittites
- Assyrians, Greeks and Romans used fungi and human feces during sieges.
- 1340: The Tartars triggered the Black Death in Europe, after using infected carcasses as a weapon.
- XVI-XVIIIth centuries: Spanish, French and British used smallpox against American indigenes.
- XXth century: The great powers create programs for developing biological weapons. Japanese and the Soviets used them during World War II.
- 1975: Prohibition of biological weapons. USSR ignored the convention and continued with a clandestine development program.
- 1979: A escape of *Bacillus anthracis* spores in a Soviet factory caused at least 60 deaths.
- Last 40 years: Many States, especially Arab dictatorships, initiate development programs: North Korea, Syria, Iran, Iraq, Sudan, Libya...



The Plague in Florence (Sabatelli). Represents the Black Death epidemics in Europe.



Contaminated envelopes with *Bacillus anthracis* spores in the attempt in USA in 2001.

## HISTORY OF BIOTERRORISM

- 1984: An Hindu sect contaminated with *Salmonella typhimurium* several restaurants in Oregon, USA. 751 persons became ill. No deaths.
- 1995: A Buddhist sect released *Bacillus anthracis* spores in Tokyo. They committed the mistake of using a non-virulent strain, therefore had no effect.
- 2001: Various letters with spores of *Bacillus anthracis* were addressed to journalists and senators in USA. 22 persons became ill, of whom 5 died.

## HOW IS A BIOLOGICAL WEAPON?

- High death rate/morbidity
- Effective transmission
- Low infective dose
- Without vaccine or treatment
- Difficult diagnosis
- Easy to manipulate
- Easy to obtain
- Easy to scatter
- Stable in environment
- Capacity of create panic

Category	Agents	Features
A	<ul style="list-style-type: none"><li>- <i>Bacillus anthracis</i></li><li>- <i>Clostridium botulinum</i> toxin</li><li>- <i>Yersinia pestis</i></li><li>- <i>Francisella tularensis</i></li><li>- Smallpox virus</li><li>- Hemorrhagic fever viruses (Ebola, Marburg, Lassa, yellow fever...)</li></ul>	<ul style="list-style-type: none"><li>- Easily disseminated or spread person-to-person</li><li>- Highly lethal</li><li>- Serious public health effects</li><li>- May cause great panic and social disruption</li></ul>
B	<ul style="list-style-type: none"><li>- <i>Brucella</i> spp.</li><li>- Epsilon toxin of <i>Clostridium perfringens</i></li><li>- <i>Burkholderia mallei</i> and <i>B. pseudomallei</i></li><li>- <i>Chlamydia psittaci</i></li><li>- <i>Coxiella burnetii</i></li><li>- Staphylococcal enterotoxin B</li><li>- <i>Rickettsia prowazekii</i></li><li>- Water safety (e.g. <i>Vibrio cholerae</i>) or food safety threats (e.g. <i>Salmonella</i>, <i>Shigella</i> or <i>E. coli</i> O157:H7)</li><li>- Viral encephalitis viruses (e.g. VEE)</li></ul>	<ul style="list-style-type: none"><li>- Moderately easy to disseminate</li><li>- Moderate morbidity</li><li>- Difficult diagnosis</li></ul>
C	<ul style="list-style-type: none"><li>- Nipah virus</li><li>- SARS virus</li><li>- Hantavirus</li></ul>	<ul style="list-style-type: none"><li>- Emerging pathogens</li><li>- Possible future threats because of genetic manipulation, lack of information...</li></ul>

Adapted from <http://www.bt.cdc.gov/agent/agentist-category.asp>

## IS POSSIBLE A BIOLOGICAL ATTEMPT?

- In fact it is practically inevitable. Most pathogens can be found in the environment and it is not difficult or expensive to disperse them.
- In 2001 a group of microbiologists developed a simulated biological weapon with only 1.5 million dollars. The attempt of the same year was carried out by a laboratory technician of an Army Research center.

## SMALLPOX AS A WEAPON

- It is the deadliest disease in history, and has a great capacity of cause panic.
- Currently eradicated, which carries some risks: lack of immunity and vaccination, little information, inexperienced doctors in diagnoses and treatment.
- High mortality (about 30%) and efficient person-to-person transmission.
- There are two legal stocks, but it is suspected that there may be more.
- USA and the EU have developed response strategies, but there are few vaccines and there is no effective treatment.

## CONCLUSIONS AND EXPECTATIONS

- Microorganisms have shown their capacity to kill millions of people in a short time. The panic that could create a biological attack can be much greater than that of a conventional attack.
- A bioterrorist act is almost inevitable, it can occur at any time.
- It is necessary to make awareness in both political and health authorities.
- Preparation is essential at all levels: scientific, medical, pharmaceutical, economic and military or security forces.

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