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The Implications of the Biotechnology for Bioterrorism

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Abstract. The scourge of modern society – the terrorism, can take different forms, depending on the economic capacity, scientific or logistical capabilities available to the terrorist, either way this event aims to determine strong reactions on material assets or, to the lives of the population. One of the means that terrorists can access, into triggering attacks, are known pathogenic agents, that by altering their stems in order to make them more effective in this respect. To date, there were no cases in which terrorists have used pathogens, triggering attacks on a higher level of efficiency; this fact is also due to the use of inappropriate biological material. Amid scientific advances in biotechnology, but also due to relatively easy access to means and methods developed by science it is increasingly evident that the possibility of accessing such methods or means by terrorists, for the purpose weaponizing pathogens with high levels of efficiency in use - resulting in the perverted effect / unwanted effect of the scientific development, namely its use for achieving / obtaining negative, unwanted, destructive effects - and thus being highlighted the negative side of biotechnology: " the black biotechnology".

Keywords: bioterrorism, terrorism, biotechnology, biological agents, anhtrax, Bacillus anthracis, Sverdlovsk, antrax letters

INTRODUCTION

A definition of terrorism by outlining the purpose and method, presents this scourge as unconventional tactics used to achieve political objectives. It is based on violence acts taken upon populations not involved directly in the conflict but with the potential to create pressure on the management (state organizations, social groups, groups of civilians) in the sense intended by the terrorists - producing a generalized panic effect and intimidation, augmented by the use of manipulative media, in order to achieve an objective difficult to achieve by democratic or conventional means.

Bioterrorism is the type of terrorism that involves the use of biological weapons / pathogens, by terrorists, in carrying out specific acts of terror.

Biological weapons are "the means or devices which produce a biological agent release, including the delivery of vectors of the biological agents, generating harmful or lethal effects to humans, animals and crops."

Biological agents / pathogens are "living organisms of any kind, or infected material derived from them, which are used for hostile purpose, deliberately to generate morbidity and mortality, effects that depend on their ability to multiply."

The use of the biological weapons is not a new, this method of action was recorded repeatedly throughout history, from ancient times.

Initial records show an empirical way of action, but over time, the use of pathogens for causing incapacity or losses among opponents took more advanced forms, until reaching a highly technical/scientific level, culminating by the necessity, identified worldwide, to prohibit the use of such means/ways in order to avoid humanitarian disasters, due to

undiscriminatory action of these agents on the combatant personal, but also on the and civilians, enemy, own or ally.

MATERIALS AND METHODS

Along with highlighting of the effects that these agents, as potential weapons, can cause, they have become subject, primarily for military structures, for employment against enemy by using these "weapons".

Funds available for the military industry has allowed the development of advanced research programs, on study purposes, modification of these agents, and creating stocks of such agents, for military purposes.

a**.** The first such certified military program, was developed by Japan, between 1936 and 1937, when "Unit 731" was founded, a research and development facility dedicated exclusively to waponized pathogens, under the cover of a water purification unit.

This program was initiated as a result of medical research of Shiro Ishii, who since 1932, amid the Japanese invasion of Manchuria, began to experiment on using biological agents as weapons, both on civilians and on soldiers - prisoners of war.

Due to the experiments conducted by Shiro Ishii, there were tens of thousands of deaths.

In the law processes that occurred in the USSR, after the Second World War, Japanese scientists have recognized that they conducted twelve large-scale studies, using biological agents as Yersinia pestis, Bacillus anthracis, Vibrio cholerae, Shigella spp, Salmonella spp., stating that there were serious losses also among their own troops - more than 1,700 deaths. Operational use of biological agents was suspended in 1942, and the research continued until the end of the war.

But the field studies were not limited to these episodes, also Unit 731 has experienced in the field of water and food contamination with pure cultures of *Bacillus anthracis, Salmonella spp, Shigella spp, Vibrio cholerae* and *Yersinia pestis,* and also spread of *Neisseria meningitidis* and *Yersinia pestis*, in the air, above the Chinese localities.

The United States of America military program of development and use of biological agents for offensive purposes was initiated in 1943, and in response, in 1956, the marshal Zhukov, of the Soviet Union announced that the Soviet armed forces will soon have capabilities for use of biological and chemical weapons.

b. Another example of dissemination of weaponized pathogens was documented during the year 1979 in Sverdlovsk, Russia, it was a biological accident, with very serious consequences.

In 1979 in Russia, in the southern district of the city Sverdlovsk - now Yekaterinburg, there was a very serious accident, in which died an estimated of 66 or 68 people, following exposure to an unknown quantity spores of anthrax. The incident is also known as "the biological Chernobyl".

In the south of the city it run a military unit - military complex 19, which had a biological laboratory, where they were developing weaponized pathogens, including anthrax. According to data released by the Russian authorities, it has been established that, on 2 April, 1979, during maintenance stopover of the ventilation facilities, through which there were produced the aerosols of anthrax, a filter was taken out of this plant, and the replacement was to be made by someone else. By omission, the new filter has not been installed, and the plant was started without it, which allowed the dispersion of anthrax spores in the air. There is no reliable data on the period elapsed between the restarting time and the moment when it was

noticed the missing of the filter and it`s installation, as there is no reliable data on the amount of spores that has been vented.

It was established that during the night when the laboratory operated without a filter, and during the next day, the wind blew gently, steadily south, thus protecting the city from exposure.

Even so, there were exposed to spores an estimated 5,000 people.

c. In October 1992, Soko Asahra, Aum Shinrikyo Japanese cult leader, along with 40 followers, went to Zaire, for the official purpose of providing medical support for people infected with Ebola virus. The real goal of the movement was to get this virus subsequently intending to use it in carrying out biological attacks.

Aum Shinrikyo sect representatives have tried at least in 10 situations, to generate biological attacks, by dispersing spores of anthrax, botulinum toxin, Q fever and Ebola, on the Japanese people or the representatives of state authorities. There were no documented cases of infection as a result of these attacks.

In 1990, representatives of the sect made a appliance for the dispersing of anthrax spores from a car that they drove around the parliament building.

Similarly, in 1993, representatives of the sect tried to stop the wedding of Prince Naruhito by botuluinic toxin dispersal in the center of Tokyo, using a car.

In 1993 they made a spray device, installed on the roof of a building in Tokyo, which dispersed anthrax spores for 4 days.

In 1995, representatives of the sect have tried to release botulinum toxin from three bags in the Tokyo subway, the attack failed because a member of the sect replaced the biological agent with a non-toxic substance.

The event that triggered an extensive investigation that revealed these attacks was the release of sarin gas by members of the sect, in the Tokyo subway, in March 20, 1995, attack that affected over 6,000 people, and killed 12 people.

d. One week after the events of September 11, 2001, that took place in the U.S. they were followed by a concerted attack with *Bacillus anthracis* spores, carried out during several weeks, by letters sent to various media groups and two Democratic senators, containing biological material.

Following the attacks there were 22 cases of illness, 11cutaneus forms and 11 inhalational forms, five people died as a result of contact with anthrax spores - all five individuals have been documented as inhalational forms. Most of the people who became infected and who died were postal workers.

On October 17, 2001, Congress has been directly affected by the anthrax contamination, thus the building of the Senate, Washington, USA was closed.

The most important element in this case is generated by the confirmation of the fact that the anthrax spores used in the carrying out of these attacks came from a military research laboratory, and it was a very virulent strain, cultivated by USAMRIID. It was documented that the biological material has undergone specific interventions in order to increase it`s efficiency, the process used silicon to obtain aerosols of the biological material.

RESULTS AND DISCUSSION

1. The determined elements showed a relative inability of the use of these weapons by military structures during a classical military conflict because of international legislation, the non-discriminative action of the biological agents, and also due to the impossibility to assure the protection of the civilians and own troops from the effects of this kind of attack.

On the other hand in case of terrorist attacks these issues are not obstacles but rather they are advantages in using such weapons.

2. Anthrax is a bacterium relatively immune to changes as a result of its life cycle that oscillates between long periods in state of "hibernation" and short periods of activity. Worldwide there are a few documentations of induced mutations to the bacteria, in order to make it more effective for the use as a weapon of war. This is of interest to the extent that changes to the bacteria involves extensive knowledge in the field and logistics, thus it wouldn`t be easy for a novice to achieve results in this type of activity.

The situations taken under observation, have helped shape the general state of danger due to the possible occurrence of a terrorist attack by using biological weapons of mass destruction, but also were able to highlight the inefficient use of pathogens as a weapon of destruction mass, unable to generate catastrophic effects.

Thus, even if the anthrax attacks in the United States of America and the accident at Sverdlovsk, Russia, there were highly virulent strains involved, both having its origins in military programs of these countries, the number of victims was relatively small. In case of similar events, if there would have been used more efficient weaponized pathogen it could have triggered a catastrophic effect.

The fact that the disease triggered by this bacterium is not contagious, and that vaccination and medication significantly increase the chances of surviving for an individual who came into contact with the bacteria, revealed that once established the nature of the agent, one can fight against it with good results.

3. Naturally occurring pathogens do not have the characteristics needed to be used effectively as agents for bioterrorism attacks.

The potential of danger for these pathogens is given by the possibility of their change so that they become immune to the medication, fact that would raise the death rate generating the futility of the treatment for people who have already contacted the infection, leaving only the possibility of prophylactic vaccination, for the entire population or the personnel that can potentially be exposed to infection. Another possibility is the intervention on biological agents so that they are transformed to be more virulent, respectively to generate a much higher percentage of infection than that achieved so far. Also, a significantly higher level of risk can be achieved if triggered disease is contagious. It can also be of interest, in terms of the use of a pathogen as a weapon, the induction of specific elements of it`s action, avoid or reduce senescence and early detection of these pathogens.

CONCLUSIONS

Naturally occurring biological agents pose a significant risk to the health of the population, especially the emerging ones and also those already known, but their efficiency, in terms of biological agents intended for use as bioterrorist attacks is reduced.

Although it is often speculated that it is easy to access the items (knowledge and logistics) needed for weaponizing pathogens, contemporary reality showed otherwise. Cases showing an increased level of concreteness in terms of onset of terrorist attacks using biological agents, on which it has been intervened in order to improve them, can be:

- One in which a researcher in the field becomes a terrorist himself, using agents that he has changed in advance;
- Penetration of the security systems of laboratories, in which these agents are handled / stored (opinions were highlighted in the international scientific community that the major risk in this

context is determined just by working with these pathogens / stocking them in military / civil laboratories);
- Identifying and obtaining biological material, inadequately managed, from the military programs of the former Soviet Union (there were identified views in the international community according to which such risk can be generated, by obtaining this way the smallpox virus - the disease considered eradicated by the World Health Organization).

REFERENCES

1. Măciucă, M. and G. Toma (2004). Dimensiunea militară a securității în condițiile accelerării procesului globalizării. Editura U.N.Ap. Bucureşti (http://www.sri.ro/upload/Brosura%20Bioterorism. pdf).
2. Spencer, R.C. and M.H. Wilcox. (1993). Agents of biological warfare. Rev Med Microbiol. nr.4:138-143 (http://www.sri.ro/upload/Brosura%20Bioterorism.pdf).
3. ***http://www.bio-terry.com/HistoryBioTerr.html.
4. ***http://www.usamriid.army.mil/education/bluebookpdf/USAMRIID%20BlueBook%20 6th%20Edition%20-%20Sep%202006.pdf (p. 2-5)
5. ***http://e-learning.med.unifi.it/didonline/annoii/microbiologia/MaterialeIllustrativo/Excursu sBTxCLM.pdf.
6. ***http://ro.wikipedia.org/wiki/Terorism.