

Bioterrorism — nature of the problem

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Received: 2012.07.12 • Accepted: 2012.11.22 • Published: 2012.12.08

Summary:

In the 20th century, terrorism became a threat to international safety. Over the past 100 years, terrorism became transformed and became a factor to a large extent determining the sphere of political, economical and social relations on local, regional and international levels. Advancing globalization and accompanying progress in the field of IT and telecommunication technologies facilitated emergence of new forms of this phenomenon and widening of its spatial scope.

Key words: terrorism, biological weapons, biological weapons development programs.

We should seek the genesis and beginnings of bioterrorism much earlier, although all forms of its employment fall, in a more intense shape, at the turn of the 20th and 21st century. Its issues, essence and nature should rather be combined with, rather than detached from, generally understood terrorism. Experts on the issue associate this phenomenon, which is now widespread and considered one of the main global problems, with a symptom of “degeneration of war.” A growing number of civilian casualties constitute its illustration. Degeneration of war is accompanied by a tendency described by Boleslaw Balcerowicz as “lowering of war threshold” [1]. It is an inclination toward conducting warfare against a population of people completely uninvolved, intentionally at least, in any military conflict. Such actions are called “quasi wars” and their toll is based on the lack or low level of awareness among civilian population in a given region, city or territory of a given country. Destructive actions are no longer reserved for states, as main players in international relations and subjects of international public law. Suitably prosperous, although poorly

armed ideologist or even an ideological maniac playing on fanaticism can evoke a conflict on an international scale. With that, he can perform a detonation not only in its mechanical sense, but also detonate the sense of common, individual and personal safety and introduce a broadly defined psychosis of fear.

Despite multiple publications on terrorism, it is difficult to establish a uniform definition of this phenomenon. It should be noted that there are about two hundred expressions in the whole literature. Phonetically, it is almost identical in all European languages and therefore, understood by everyone (fr. terrorisme, sp. terrorismo, rus. terrorizm).

Two definitions should be mentioned in relation to the problem of bioterrorism as an accepted façade of broadly defined terrorism. One of them is taken from an encyclopedia (published by PWN in Warsaw in 1993, page 864), defining terrorism as: “an activity of small extremist groups that, through murder, death threats, political murders, kidnapping of hostages or planes and

similar means despised by the international community, try to turn public attention to their statements or to force governments to succumb to their demands.”

The other definition was created in 1996 by the Federal Bureau of Investigation and defined terrorism as: “unlawful use of force and violence against people and possessions (ownership) in order to frighten or force the government, civilian population or any other sector of the state system to support political or social demands.”

All definitions contain two fundamental elements: “fear” and “forcing behavior.” Moreover, a definition of a terrorist used by the Oxford dictionary emphasizes that a terrorist act is: “planned, calculated and premeditated” [2].

Due to a growing demand among terrorists for attacks associated with an increasing number of casualties and easier access to materials and technologies used for production of weapons of mass destruction, we should conclude that the probability of using chemical, atomic or biological weapons by terrorists is growing and becomes more and more substantial.

In contrast to chemical substances, biological material (viruses and bacteria) is characterized by the ability to reproduce and mutate. As a result, they become increasingly more dangerous and resistant with time. A single bacteria is capable of dividing every 20 minutes. After 10 hours, we can obtain a billion of daughter cells. It directly follows that it is relatively easy to produce a weapon capable of killing millions of people.

Anthrax bacilli (*Bacillus anthracis*) attack mainly sheep, cows and goats, which become infected through the oral route. Bacteria is transmitted through water, insects, wild animals or birds and their excretions. Human infections are rare. About 95% of cases constitute lighter forms of the disease involving the skin. When (5% is sufficient) anthrax invades the lungs, patient usually dies. Bacteria are not transmitted from one human to another and patient isolation is not necessary. Vaccines partially protect from anthrax, but they must be administered repeatedly.

On the basis of American simulations regarding the toxicity of anthrax it was concluded, that an

airplane drop of 50 kg of bacteria from 2000 m onto a city with a population of 500 thousand people would result in 135 thousand of infected patients, 90 thousand of which would die [3].

Relatively simple equipment, such as ordinary fermenters, is needed for growing bacterial cultures and obtaining pathogens and toxins does not pose any problems.

All of these “qualities” were and are known to terrorists and attempts were made to obtain the resources for bioterrorist attacks. Armed Islamic Group (GIA) conducted experiments in this respect in a biological mini-laboratory in Paris. The AUM sect was preparing for a large-scale attack with, among other things, biological agents. They employed scientists and technicians from Japan and Russia. Professional laboratories were arranged. The sect was partially ready for production of biological weapons, including anthrax, a very contagious disease called Q fever and probably the deadly Ebola virus. Seriousness of the threat is evidenced by the fact that it owned a special, double-turbine helicopter Mi-117 equipped with instrumentation for chemical spraying. It also conducted first biological attacks.

In 1990, using a sprayer of their own construction, terrorists attacked Tokyo downtown with botulin toxin. It turned out to be ineffective, but there were two repeated attempts the same year. The scope of biological weapons used by terrorists includes, beside the previously mentioned anthrax, botulin (also known as “sausage poison”), plague and smallpox. The latter, eradicated around the world in 1980, is still stored in two places: Atlanta (USA) and Kolcovo (Russia).

There are currently several visions of the world threatened by lab-modified microbes. Professors: Claire Fraser from Institute for Genomics Research in Rockville (Maryland) and Malcolm Dando from the University of Bradford in Great Britain are warning on the pages of “Nature Genetics” that rapidly progressing works on decoding microbial DNA can serve development of new varieties of difficult to detect microorganisms, for which there are no vaccines or drugs. It is estimated that as soon as this year or in two years at the latest we should learn the sequence of nucleotides of over 70 viruses and bacteria. Last year, molecular biologists drew a DNA

map of cholera, listeria (causing gastrointestinal infections), leprosy (evoking fear in the antic and medieval times) as well as one of the most dangerous bacteria, *Streptococcus pneumoniae* – an etiological factor of pneumonia, meningitis, otitis media and peritonitis, which kills over 3 mln children each year and increasingly often becomes resistant to antibiotics [4].

These studies can be used for development of new drugs as well as for better understanding of evolutionary mechanisms. Similar to atomic energy, it can be used both for the benefit of people as well as against them – e.g. development of lethal biological weapons. Such experiments are already being conducted. As early as in 1999, Professor Malcolm Dando cautioned in his book “Biotechnology Weapons and Humanity” that development of a biotechnological bomb directed against specific populations (e.g. Arabs, Serbs, Black men, Kurds or Jews) would become possible during the next 5-10 years. Such microorganisms, like cruise missiles, can be designed for destruction of selected biological targets, e.g. people with particular cell receptors or DNA sequences. It suffices to appropriately remodel genomes of bacteria or viruses causing cholera, plague, flu or hemorrhagic fever to turn the grim visions of science-fiction authors into a real threat.

Unfortunately, progress in the field of genetics is increasingly more often used for development of biological weapons. In 1998, David Kelly, a leading United Nations specialist, warned about his suspicions that works on such type of biological weapon had been conducted in Iraq under code-name Camel Pox. They were directed at producing pathogens, to which only Arabs would be resistant. Effect of this research is unknown. Wouter Basson, a military biologist from South Africa accused of conducting studies on organisms directed specifically against the black population, gained a nickname “Dr. Death.” In this case, the commentators emphasized a clearly emerging threat. There are multiple such causes for concern. Even following the attacks on New York and Washington and in cases of sending anthrax by post, it seems unlikely for the terrorists to have access to more advanced biological technologies. However, it must be a cause for concern that genetic modification of pathogens is easier than anticipated. For years, multiple biological weapons experts argued that the more modifications are introduced, the

greater the risk of pathogens becoming less viable and no longer posing a presumed threat. However, it is sometimes sufficient to introduce even small genetic changes to transform a harmless microbe into a lethal pathogen.

Research conducted only several months ago by Australian scientists corroborated that. They accidentally created a particularly dangerous poxvirus following introduction of only one gene into its genome. Scientists from the Australian National University tested a pregnancy vaccine. They used a murine poxvirus transfected with interleukin IL-4 gene. It was supposed to induce formation of ovulation-inhibiting antibodies. Instead, they completely blocked rodents’ immunological response protecting them against infections. Until now, it seemed that such manipulations could only weaken microorganisms.

Worldwide arsenals contain 43 types of biological weapons. Viruses, bacteria, rickettsiae (intracellular microorganisms) are used for their production, including genetically modified lethal pathogens, more dangerous than those discovered by scientists in a natural environment. In 1997, anthrax bacilli containing an additional gene were developed in Russia, against which available vaccines do not provide any protection. The most dangerous virus called Ebolapox was also developed by crossing poxvirus with Ebola. This pathogen combines exceptional infectivity and huge mortality. Ken Alibek, the former head of secret Soviet laboratory, Biopreparat, located in 40 cities and employing 70 thousand people, confirmed those facts during his stay in the USA.

Americans conducted similar research during the Cold War. In 1986, as a part of over fifty biological weapon development programs lead by the Pentagon, American scientists induced harmless *E. coli* bacteria to produce anthrax toxin within the intestine. Journalists from “The New York Times” exposed this fact in a bestseller titled “Germs: Biological Weapons and America’s Secret War.” It is worth noting that this research is still continued. On that occasion, “Der Spiegel” disclosed that there are experiments conducted on behalf of the Bundeswehr regarding production of *Yersinia pestis* resistant to antibiotics [5].

A Russian biologist, Siergiej Popov, who emigrated from Russia to Great Britain in 1992 and

later traveled to the USA, revealed that he had conducted research on microorganisms designed to confuse victim's immunological system and lead to central nervous system auto-destruction. He took advantage of the mechanism of multiple sclerosis development, which is one of the most dangerous disorders of central nervous system. It is an autoimmunological disease. Instead of destroying only foreign pathogens, immunological system causes destruction of myelin, which is an important component of nervous sheaths facilitating proper functioning of nerves.

Is it likely that terrorists could blackmail the world with such pathogens? Experts from "British Medical Journal" persuade that biological weapons, similar to chemical weapons, are primarily instruments of inducing fear.

A new stage of bioterrorism expansion was initiated at the end of September 2001. Terrorists began to distribute anthrax bacilli in the USA (Florida, New Jersey) via mail. On the 12th of October, anthrax struck New York. Attacks were directed at people representing the media (employees of NCB, AMI, "The Sun," "New York Times") and the government (offices of United States senators). Thirty-six anthrax infections, including one fatal case, were noted until the 23rd of October 2001. Despite difficulties associated with use of biological weapons as weapons of mass destruction, it evoked panic among American community as well as in Europe. United States government even considered early weaving of patent rights of Bayer Co. – the only producer of ciprofloxacin, an antibiotic effective against anthrax.

Not even the most absurd threat should be ignored nowadays. Bioterrorism grows. The

reasons should be traced to the fact that biological weapons are easy to apply and transport. Their low cost can also be encouraging, as mentioned by professor Wiesław Magdzik from the National Institute of Hygiene in Warsaw, who warned against it as far back as May 2001.

Experiences from previous terrorist attacks noted by the Monterey Institute of International Studies show that incompetent authorities, disorganization of rescue services, panic and poor level of social education are greatest allies of the attackers. To some degree, it is the price we pay for contemporary civilization. In case of ecological disaster, we usually know what substances we are dealing with.

A terrorist attack involves a series of unknowns. Rapid identification of the resources used by the aggressor is crucial to achieving success. Currently, hospitals introduce an electronic disease registration system equipped with special software. Its job is to identify anomalies (e.g. excessive number of infections with particular bacteria or viruses in a given time). A single case of anthrax infection might not arise the vigilance of hospital staff. However, if it appears that similar information flows from several hospitals, the system will alert the crisis management center.

Words suggesting the use of various bacteria, often implying alleged possession, are most dangerous in the context of this atmosphere. Like toxins, they invade the sense of security in all dimensions. Terrorists' goals are often directed not so much at large numbers of casualties, but at gaining publicity and transmitting their message through the media, which may bring fatal consequences in an era of information society.

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