

Bioterrorism and Synthetic Biology

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Summary

Bioterrorism is defined as criminal actions using biological agents such as pathogenic microorganisms, toxins or lethal substances in order to spread diseases, cause panic situations and, in some cases, death. Using biological agents as weapons is nothing new. History recalls abundant examples such as a case around 600 B.C., when ergot derivatives were employed in order to invade and conquer western Asia. The most recent case occurred in 2001, when anthrax spores (*Bacillus anthracis*) were dispersed by mail causing the death of five people.

Considering possible attacks and a worldwide terrorist crusade, international organizations, address extraordinary financial resources and military logistics in order to create new defense protocols and to promote legislation against this menace in member countries. In order to be in where position where effective and timely wise response can be given to the threat of biological weapons, governments have the duty to safeguard their populations. In the event of a bioterrorist attack, information reported by news should be oriented to inform, not to alarm. A quick and adequate counter offensive has also to be given. The only way to give it is by having opportune and accurate information which allows everybody knowledge of situation.

Regarding safety on synthetic biology products, risk assessments are the best answer to procedures and products which are not expressly forbidden by law, but need to be monitored and controlled due to its potential hazards. This assumption implies any action leading to production and use of living organisms to be subject of previous permits from the very start, as well as control measures and periodical inspections inspired on precaution principles.

Bioterrorism

It is defined as actions taken with criminal objectives using biological agents such as pathogenic microorganisms, toxins or damaging substances produced by living organisms or its derivatives. The potential targets of the attacks are human beings, food crops and animals; a bioterrorist incident is able to spread diseases, raise panic and in some cases, cause death (Garrote *et al*, 2008; Ferrés, 2002).

The use of biological agents is nothing new. History gives us many examples even before microbiology science was developed. For instance, the first biological weapon reported was used around 600 B.C. By that time, natural toxins derived from ergot were used by the Asirian army in order to invade and conquer the rest of western Asia (Escobar & Vega, 2008; Ferrés, 2002). More recently in history, there were more innovative and perverted strategies meant to cause panic. In 2001 it became a regular practice for bioterrorist to disseminate anthrax spores (*Bacillus anthracis*) through the U.S. Post Service. This caused direct death to five people and increased fear of massive attacks of the kind (Escobar & Vega, 2008; Ferrés, 2002; Franco-Paredes *et al.*, 2005)

“Despite of agreements at world level, biological weapons production has been in constant increase. A big concern has existed about its use in war, especially after the event of 9/11 in 2001, when the Twin Towers of the World Trade Center in New York City and part of the Pentagon in Washington D.C. were destroyed” (Ferrés, 2002).

Having taking into account the adequate hazards in the making of biological weapons and the concern about this issue within organizations such as the UN, WHO, FAO among others, NGO offices have written international regulations in order to take care of transportation, management and adequate use of infectious substances. Also, national governments have adopted safety measures and written internal regulations in order to protect its populations (WHO, 2009; FAO, 2009). Up to this day, there is no report informing about accidents, terrorist actions or deaths caused by infectious agents since 2001.

Even so, it is still a possible event and because there has been a rising in terrorist activities at a global level, international organizations place extraordinary financial resources and military logistics in order to create new defense protocols and promote legislation in its member countries. Despite the current and solid success of public forces and its important strategic presence all over the country, the arguments mentioned above suggest the incorporation into national security policies the design and implementation of protocols on surveillance, prevention and biosafety, able to neutralize vulnerability to terrorism in towns and cities today; a hazard unfortunately articulated currently at international level (Escobar & Vega, 2008).

According to Escobar & Vega (2008), local authorities must be in the best of positions in order to face the possibility of terrorist events. Institutions in charge of national defense must do their best to improve their strategic and security systems by means of incorporating a protocol on biosafety. The ability to react on time and with effectiveness facing the threat of biological weapons depends on the knowledge and training interdisciplinary groups responsible of national security have. In addition, Martin said that these data should be used to “inform but not to alarm”; because in the case to an event of that kind to occur, a quick and adequate

response would have to be given (Martin 2011). All of the above can be accomplished through processing scientific information with people that will allow proper communication about what is going on. For that, governments must prepare laboratories, protocols and teams to react in order to control the threat as soon as possible.

Synthetic Biology

Activities related to synthetic biology must be implemented progressively, step by step, in such a manner that hazards are evaluated in terms of protection to human and environmental health. Once the hazards have been assessed, it is possible to go to the next level with reasonable security. In addition, any possible issues must be addressed in an individual fashion, case by case (CBE and CNECV, 2011).

According to CBE and CBECV (2011), synthetic biology offers a potential positive development for human beings and several productive sectors, especially concerning health issues. That is enough reason to support its advance taking into account the necessary precautions. In addition, there are new kinds of conflicts, and its evaluation should be done with the same criteria applied to ethical and legal analysis of other emerging biotechnologies, and not away from them. For that reason, scientific research agencies should also fund research on ethical, legal and socioeconomic issues around approved synthetic biology projects.

Regarding safety about synthetic biology, it is a mandatory task to perform a risk assessment, as it is the best solution to mitigate risk for activities and products not expressly prohibited by law but requiring control and monitoring due to its potential hazardous uses. This proposal implies to be subject to previous authorizations at the beginning of activities of making and using organisms, as well as their periodical inspections and controls. In every case, following flexible criteria inspired in precaution principles (CBE and CNRCV, 2011).

Evaluation concerning the safety measures related to synthetic biology is necessary risk management analysis is a very well suited solution for activities and products not prohibited by law, but requiring control and monitoring as well as potential hazardous uses. This assumption implies any action leading to production and use of living organisms to be subject of previous permits from the very start, as well as control measures and periodical inspections inspired on precaution principles.

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