

## ***Bioterrorism – A New Threat to Mankind***

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Nowadays the whole world is facing the problem of terrorism. It is clear from recent attack in Mumbai that the terrorists keep finding new ways to spread terror among people. This leads to misuse of developments in various fields. This is also applied to the use of advances in field of life sciences for spreading such terror attacks. This has given rise to the bioterrorism, which refers to use of living organisms which can destroy a large population within no time.

A *bioterrorism attack* is the deliberate release of viruses, bacteria, or other germs (agents) used to cause illness or death in people, animals, or plants. These agents are typically found in nature and it is possible that they could be changed to increase their ability to cause disease, make them resistant to current medicines, or to increase their ability to be spread into the environment. Biological agents can be spread through the air, through water, or in food. Terrorists may use biological agents because they can be extremely difficult to detect and do not cause illness for several hours to several days. Some bioterrorism agents, like the smallpox virus, can be spread from person to person and some, like anthrax, cannot.

Though this term is being used in recent times it dates as far back as ancient Roman civilization, where dead and rotting animals were thrown into wells to poison water supplies. This early version of biological terrorism was used to destroy enemy forces covertly. Primitive medical technology provided limited means of protection for the aggressor and a battle's surrounding geographical regions. After the battle was won, the inability to contain enemies who escaped death led to widespread epidemics affecting not only the enemy forces, but also surrounding regions' inhabitants. The victims of biological terrorism in fact became weapons themselves. This was noted in the middle ages, but medical advancements had not progressed far enough to prevent the consequences of a weapons use. So many countries modified the weapons to make them more effective and also their ability to cause destruction to the right party.

One significant enhancement in biological weapon development was the first use of anthrax. Anthrax effectiveness was initially limited to victims of large dosages. This became a weapon of choice because it is easily transferred, has a high mortality rate, and could be easily obtained. Also, variants of the anthrax bacterium can be found all around the world making it the biological weapon of choice in the early 19th century. Another property of anthrax that helped fuel its use as a biological weapon is its poor ability to spread far beyond the targeted population.

As World War I began, advances in use of biological agents gave rise to use of anthrax and a newly discovered poisonous gas, the mustard gas. Its horrifying effects gave lead to a treaty to prevent use of such gases in warfare. But secretly advances in this field continued and led to consequently terror attacks in Korea, Iraq and the US.

Biological agents used in such bioterrorism attacks are divided into three groups on basis of the priority. The U.S. public health system and primary healthcare providers must be prepared to address various biological agents, including pathogens that are rarely seen in the United States.

### ***Category A agents:***

These have high potential for adverse public health impact and that also have a serious potential for large-scale dissemination. They have mortality rates. These agents include anthrax, smallpox, plague, botulism, tularemia, and viral hemorrhagic fevers.

### ***Category B agents:***

Category B agents are moderately easy to disseminate and have low mortality rates. The agents include Brucellosis, Glanders (*Burkholderia mallei*), Melioidosis (*Burkholderia pseudomallei*), Psittacosis (*Chlamydia psittaci*), Q fever (*Coxiella burnetii*), Ricin toxin from *Ricinus communis* (castor beans), Staphylococcal enterotoxin B, Typhus (*Rickettsia*

*prowazekii*), Viral encephalitis (alphaviruses, e.g.: Venezuelan equine encephalitis, eastern equine encephalitis, western equine encephalitis), Water supply threats (e.g., *Vibrio cholerae*, *Cryptosporidium parvum*).

#### **Category C agents:**

Category C agents are pathogens that might be engineered for mass dissemination because they are easy to produce and have potential for high morbidity or mortality (examples: nipah virus, hantavirus and multi-drug resistant Tuberculosis)

The reason for increase in use of biological agents in the future is that they are relatively easy to obtain by terrorists and they may become more threatening. In accordance to the threats laboratories are working on advanced detection systems to provide early warning, identify contaminated areas and populations at risk, and to facilitate prompt treatment. Methods for predicting the use of biological agents in urban areas as well as assessing the area for the hazards associated with a biological attack are being established in major cities. In addition to detection systems various surveillance strategies are being planned to cope up with such problems. These include bioterrorism detection system designed to draw, collect data from many data sources and use them to perform signal detection, that is, to detect a possible bioterrorism event at the earliest possible moment. This data includes health-related data such as that from hospital computer systems, clinical laboratories, electronic health record systems, medical examiner record-keeping systems, 911 call center computers, and veterinary medical record systems could be of help. In addition to such surveillance and detection strategies a country should take measures to ensure protection of the people through some steps like vaccines to immunize the public against diseases caused by bioterrorism agents, diagnostic tests to help first responders and other medical personnel rapidly detect exposure and provide treatment, therapies to help patients exposed to bioterrorism agents regain their health.

In addition to these measures researchers are trying to develop electronic devices for detection of bioterrorist attacks, they include electric chips with nerve cells, fiber optics with antibodies on its surface for easy and effective detection. The major drawback of such systems is the

capital required. These may be feasible in countries like the USA but are difficult in India. Hence, making them cost effective is the next step after their development. Also making use of limitations of bioterrorism *i.e.* it cannot be used as a warfare tactic because of the uncontrollable nature of the agent involved. Though India has not yet faced a major bioterrorism attack it is possible in the near future looking at the different strategies used by the terrorists for creating terror. It is clear that they use new techniques and even carry out research before for the same so the chances of them using this method in the future cannot be ruled out. This is caused due to the ease and less expensive techniques to use living organisms.

Apart from the organisms described above, others which would indirectly affect us may be used. These include the foot and mouth virus which is capable of causing widespread economic damage and public concern, whilst having almost no capacity to infect humans. Also techniques like agro terrorism which use of biological agents to attack agricultural resources can be applied. Scientists have started warning of the potential power which genetic engineering might place in the hands of future bio-terrorists; a bacterial agent might be engineered for genetic or geographical selectivity. Hence, the threat posed by biological agents employed in a terrorist attack in the world is arguably the most important homeland security challenge of our era. The bioengineered organisms created by the terrorists would cause millions of casualties—far more than we would expect from nuclear terrorism, chemical attacks, or conventional attacks on the infrastructure of the United States such as the attacks of September 11, 2001 or in Mumbai in 1993, July 11 2007 or 26 November 2008. Also bioengineering is not restricted to major terrorist organizations but has reached to small terrorist groups and even deranged individuals.

Hence, it has become a necessity to find remedies for coping with such bioterrorism attacks and finding solutions as to how to avoid such attacks. The world has to accept the challenges and unite together to fight against this new branch of terrorism -BIOTERRORISM.

