Genetically Engineered Biological Warfare

in

- GE Biological Warfare [1]

It sounds like science fiction, but it is a deadly reality: lethal microbes, with no cure, invisible to detection systems, and able to overcome vaccines. In 'defensive' programs, researchers in the USA, UK, Russia and Germany have genetically engineered biological weapons agents, building new deadly strains. And this is probably only the tip of the iceberg.

Genetic engineering can be used to broaden the classical bioweapons arsenal. Through genetic engineering, bacteria can not only be made resistant to antibiotics or vaccines, they can also be made even more toxic, harder to detect, or more stable in the environment. By using genetic methods that are standard procedures in thousands of labs worldwide, bioweapons can be made more virulent, easier to handle, and harder to fight. In short, more effective.

Military experts are perfectly aware of the danger of genetically engineered bioweapons, as their traditional defense measures - e.g. detection methods or vaccines - are easily sidestepped by the artificial microbes. The speedy development of genetic engineering is one driving force to strengthen the Bioweapons Convention (1) and establish a verification system.

Example 1: Bacteria causing unusual symptoms

Researchers from Obolensk near Moscow inserted a gene into Francisella tularensis, the causative agent of tularemia and a well known biological weapon agent. The gene made the bacteria produce beta-endorphin, an endogenous human drug, which caused changes in the behaviour of mice when infected with the transgenic bacteria. (2) According to the published results, the endorphin gene was not introduced into a fully virulent strain, but only into a vaccine strain. If inserted into virulent F. tularensis, the victims would not show the usual symptoms of tularemia, but instead unusual symptoms that would obscure the diagnosis and delay therapy. Development of symptom-altered BW-agents has been identified as one possible application of genetic engineering for BW purposes by the US Department of Defense. (3)

Example 2: Transferring a lethal factor to harmless human gut bacteria

Genetic engineering could make previously harmless bacteria lethal biological weapons by introducing deadly genes from a highly pathogenic organism. This was done by US researchers as early as 1986. They isolated the gene for the lethal factor of Bacillus anthracis, the causative agent of anthrax, and introduced into Escherichia coli, a normally harmless gut bacteria. The US team reported that the lethal factor protein was active in E. coli and displayed the same deadly effects as it did when in its native B. anthracis. (4)

Example 3: Antibiotic resistant anthrax and tularemia

Antibiotic resistance is often used as a marker gene in genetic engineering experiments. However, the very same genes could render biological weapons more dangerous by making agents less treatable. Any experiment with biological weapons agents using antibiotic resistance genes has a strong offensive potential, even if in the context of "defensive" research. Despite this obvious problem, there is a long list of questionable experiments:

Stained image of pulmonary anthrax.

German military researchers at the Santitaetsakademie der Bundeswehr in Munich, the main BW
research facility of the German army, cultured genetically engineered Francisella tularensis subsp. holarctica bacteria (5), a close relative of the causative agent of tularemia. An antibiotic resistance marker gene (tetracyclin) was been inserted into these bacteria.

Recently, researchers from Porton Down in the UK used genes conferring resistance to antibiotics for genetic studies in fully virulent strains of anthrax. (6) In the late 1980s, a researcher at the University of Massachusetts in Amherst also introduced antibiotic resistance genes into anthrax, making it less treatable with antibiotics. (7)

There are even more cases: Researchers from the Institut Pasteur in Paris (8) and from a Russian laboratory in Obolensk (near Moscow) (9) introduced antibiotic resistance genes into anthrax bacteria. All these studies are allegedly "basic research", where antibiotic resistance is used as a marker gene. But it is obvious that the very same genetically engineered bacteria can be used to design more effective bioweapons compared to the natural anthrax strains.

Example 4: Invisible anthrax

In December 1997, the same Russian research group from Obolensk published a paper in a British scientific journal on another effort to genetically engineer anthrax. (10) By putting new genes into fully pathogenic strains of anthrax, the scientists altered anthraxÂ’s immunopathogenic properties, making existing anthrax vaccines ineffective against the new genetically-engineered types.

In most cases, detection of bioweapons relies on molecular recognition of the microbe using antibodies similar to the human immune system. Altering the immunogenicity not only overcomes vaccinations; but also the detection systems.

Western military experts were alarmed by this work. The chief of the bacteriology division at the US Army Medical Research Institute of Infectious Diseases (USAMRIID) in Fort Detrick, Md, Col. Arthur Friedlander, commented: "This is the first indication we're aware of in which genes are being put into a fully virulent strain. They genetically engineered a strain that's resistant to their own vaccine, and one has to question why that was done". (11)

The Russian researchers also constructed a new vaccine against the new strain. This is of particular importance, as it could enable an army to use such a bioweapon by vaccinating their soldiers against a specific strain, while the enemy remains vulnerable. The case is an example of the frightening potential of genetic engineering applied to biological weapons research.

Article taken from the Sunshine Project website:

Notes:

(1) Full text here.


(5) Personal communication from the lead scientist at the Sanitaetsakademie. For further information, contact Dr. Biederbick at the German Ministry of Defense, ++49-228-12-6247


(10) Vaccine 15(17-18):1846-1850, Dec 1997, Pomerantsev AP, Staritsin NA, Mockov YV, Marinin LL, Expression of cereolysine ab genes in Bacillus anthracis vaccine strain ensures protection against experimental hemolytic anthrax infection


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